



Sri Shridevi Charitable Trust (R.)  
**SHRIDEVI INSTITUTE OF ENGINEERING & TECHNOLOGY**  
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(Approved by AICTE, New Delhi. Recognised by Govt. of Karnataka and Affiliated to Visvesvaraya Technological University, Belagavi)



## Criteria 1.1

# Curriculum Planning and Implementation

## Syllabus Copy (CSE)

### - 2018 scheme

PRINCIPAL  
SHRIDEVI INSTITUTE OF  
ENGINEERING & TECHNOLOGY  
TUMKUR - 572106.

**DATA STRUCTURES AND APPLICATION**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – III**

<b>Subject Code</b>	18CS32	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS32) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain fundamentals of data structures and their applications essential for programming/problem solving</li> <li>• Illustrate linear representation of data structures: Stack, Queues, Lists, Trees and Graphs</li> <li>• Demonstrate sorting and searching algorithms</li> <li>• Find suitable data structure during application development/Problem Solving</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<p><b>Introduction:</b> Data Structures, Classifications (Primitive &amp; Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Dynamically allocated arrays.</p> <p><b>Array Operations:</b> Traversing, inserting, deleting, searching, and sorting. Multidimensional Arrays, Polynomials and Sparse Matrices.</p> <p><b>Strings:</b> Basic Terminology, Storing, Operations and Pattern Matching algorithms. Programming Examples.</p> <p><b>Textbook 1: Chapter 1: 1.2, Chapter 2: 2.2 - 2.7</b>  <b>Text Textbook 2: Chapter 1: 1.1 - 1.4,</b>  <b>Chapter 3: 3.1 - 3.3, 3.5, 3.7,</b>  <b>Chapter 4: 4.1 - 4.9, 4.14</b>  <b>Reference 3: Chapter 1: 1.4</b></p> <p><b>RBT: L1, L2, L3</b></p>			10
<b>Module 2</b>			
<p><b>Stacks:</b> Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression.</p> <p><b>Recursion -</b> Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, Ackerman's function.</p> <p><b>Queues:</b> Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Dequeues, Priority Queues, A Mazing Problem. Multiple Stacks and Queues. Programming Examples.</p> <p><b>Textbook 1: Chapter 3: 3.1 -3.7</b>  <b>Textbook 2: Chapter 6: 6.1 -6.3, 6.5, 6.7-6.10, 6.12, 6.13</b></p> <p><b>RBT: L1, L2, L3</b></p>			10
<b>Module 3</b>			
<p><b>Linked Lists:</b> Definition, Representation of linked lists in Memory, Memory allocation; Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues.</p>			10

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Applications of Linked lists – Polynomials, Sparse matrix representation, Programming Examples  <b>Textbook 1: Chapter 4: 4.1 – 4.6, 4.8</b> <b>Textbook 2: Chapter 5: 5.1 – 5.10</b>  <b>RBT: L1, L2, L3</b>	
<b>Module 4</b>	
<b>Trees:</b> Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations. Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression, Programming Examples  <b>Textbook 1: Chapter 5: 5.1 –5.5, 5.7</b> <b>Textbook 2: Chapter 7: 7.1 – 7.9</b>  <b>RBT: L1, L2, L3</b>	10
<b>Module 5</b>	
<b>Graphs:</b> Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. <b>Sorting and Searching:</b> Insertion Sort, Radix sort, Address Calculation Sort. <b>Hashing:</b> Hash Table organizations, Hashing Functions, Static and Dynamic Hashing. <b>Files and Their Organization:</b> Data Hierarchy, File Attributes, Text Files and Binary Files, Basic File Operations, File Organizations and Indexing  <b>Textbook 1: Chapter 6 : 6.1 –6.2, Chapter 7:7.2, Chapter 8 : 8.1-8.3</b> <b>Textbook 2: Chapter 8 : 8.1 – 8.7, Chapter 9 : 9.1-9.3, 9.7, 9.9</b> <b>Reference 2: Chapter 16 : 16.1 - 16.7</b>  <b>RBT: L1, L2, L3</b>	10
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Use different types of data structures, operations and algorithms</li> <li>• Apply searching and sorting operations on files</li> <li>• Use stack, Queue, Lists, Trees and Graphs in problem solving</li> <li>• Implement all data structures in a high-level language for problem solving.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2<sup>nd</sup> Ed, Universities Press, 2014.</li> <li>2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1<sup>st</sup> Ed, McGraw Hill, 2014.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Gilberg &amp; Forouzan, Data Structures: A Pseudo-code approach with C, 2<sup>nd</sup> Ed, Cengage Learning, 2014</li> </ol>	

*Nandkumar Srinivasan*

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2. Reema Thareja, Data Structures using C, 3<sup>rd</sup> Ed, Oxford press, 2012.
3. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2<sup>nd</sup> Ed, McGraw Hill, 2013
4. A M Tenenbaum, Data Structures using C, PHI, 1989
5. Robert Kruse, Data Structures and Program Design in C, 2<sup>nd</sup> Ed, PHI, 1996.

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**ANALOG AND DIGITAL ELECTRONICS**  
(Effective from the academic year 2018 -2019)

**SEMESTER – III**

<b>Subject Code</b>	18CS33	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS –3**

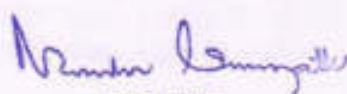
**Course Learning Objectives:** This course (18CS33) will enable students to:

- Explain the use of photoelectronics devices, 555 timer IC, Regulator ICs and uA741 opamp IC
- Make use of simplifying techniques in the design of combinational circuits.
- Illustrate combinational and sequential digital circuits
- Demonstrate the use of flipflops and apply for registers
- Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techniques.

<b>Module 1</b>	<b>Contact Hours</b>
<p><b>Optoelectronic Devices:</b> Photodiodes, Phototransistors, Light Emitting Diodes, Liquid Crystal Displays, and Optocouplers.</p> <p><b>Wave Shaping Circuits:</b> Integrated Circuit Multivibrators</p> <p><b>Linear Power Supplies:</b> Linear IC Voltage, Regulated Power Supply Parameters</p> <p><b>Operational Amplifier Application Circuits:</b> Inverting Amplifier, Non-inverting amplifier, Voltage Follower, Summing Amplifier, Difference Amplifier, Averagor, Integrator, Differentiator, Peak Detector, Absolute Value Circuit, Comparotor, Instrumentation Amplifier, Relaxation Oscillator, Current-to-Voltage and Voltage-to-Current Converter</p> <p><b>Textbook 1: Chapter7 – 7.4, 7.5, 7.10, 7.11, 7.14; Chapter13 – 13.10; Chapter14 – 14.6, 14.7; Chapter17 – 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.12, 17.13, 17.14, 17.17, 17.19, 17.20, 17.21</b></p> <p><b>RBT: L1, L2</b></p>	08
<p><b>Module 2</b></p> <p><b>Combinational Logic Circuits:</b> Sum-of-Products Method, Truth Table to Karnaugh Map, Pairs Quads, and Octets, Karnaugh Simplifications, Don't-care Conditions, Product-of-sums Method, Product-of-sums simplifications, Simplification by Quine-McClusky Method</p> <p>Introduction to HDL, HDL Implementation Models.</p> <p><b>Text book 2: Chapter2 – 2.5; Chapter3 – 3.2 to 3.9, 3.11.</b></p> <p><b>RBT: L1, L2</b></p>	08
<p><b>Module 3</b></p> <p><b>Data-Processing Circuits:</b> Multiplexers, Demultiplexers, 1-of-16 Decoder, BCD to Decimal Decoders, Seven Segment Decoders, Encoders, Exclusive-OR Gates, Parity Generators and Checkers, Magnitude Comparator, Programmable Array Logic, Programmable Logic Arrays, HDL Implementation of Data Processing Circuits.</p> <p><b>Text book 2: Chapter4 – 4.1 to 4.9, 4.11, 4.12, 4.14.</b></p>	08

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<b>RBT: L1, L2, L3</b>	
<b>Module 4</b>	
<p><b>Flip- Flops:</b> RS Flip-Flops, Gated Flip-Flops, Edge-triggered RS FLIP-FLOP, Edge-triggered D FLIP-FLOPs, Edge-triggered JK FLIP-FLOPs, FLIP-FLOP Timing, JK Master-slave FLIP-FLOP, HDL Implementation of FLIP-FLOP.</p> <p><b>Registers:</b> Types of Registers, Serial In - Serial Out, Serial In - Parallel out, Parallel In - Serial Out, Parallel In - Parallel Out, Universal Shift Register, Applications of Shift Registers.</p> <p><b>Text book 2: Chapter8 – 8.1 to 8.7, 8.12; Chapter9: 9.1 to 9.6</b></p>	08
<b>RBT: L1, L2, L3</b>	
<b>Module 5</b>	
<p><b>Counters:</b> Asynchronous Counters, Decoding Gates, Synchronous Counters, Changing the Counter Modulus, Decade Counters, Counter Design using HDL.</p> <p><b>D/A Conversion and A/D Conversion:</b> Variable, Resistor Networks, Binary Ladders, D/A Converters, D/A Accuracy and Resolution, A/D Converter-Simultaneous Conversion, A/D Converter-Counter Method, Continuous A/D Conversion</p> <p><b>Text book 2:- Chapter10 – 10.1 to 10.5, 10.9; Ch 12: 12.1 to 12.7</b></p>	08
<b>RBT: L1, L2, L3</b>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Design and analyze application analog circuits using photodevices, timer IC, power supply and regulator IC and opamp.</li> <li>• Simplify digital circuits using Karnaugh Map , POS and Quine-McClusky Methods</li> <li>• Explain Gates and flipflops and make us in designing different data processing circuits, registers and counters and compare the types.</li> <li>• Develop simple HDL programs</li> <li>• Explain the basic principles of A/D and D/A conversion circuits and develop the same.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Anil K Maini, Varsha Agarwal, Electronic Devices and Circuits, Wiley, 2012.</li> <li>2. Donald P Leach, Albert Paul Malvino &amp; Goutam Saha, Digital Principles and Applications, 8<sup>th</sup> Edition, Tata McGraw Hill, 2015.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. M. Morris Mani, Digital Design, 4<sup>th</sup> Edition, Pearson Prentice Hall, 2008.</li> <li>2. David A. Bell, Electronic Devices and Circuits, 5<sup>th</sup> Edition, Oxford University Press, 2008</li> </ol>	



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**COMPUTER ORGANIZATION**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – III**

<b>Subject Code</b>	18CS34	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS34) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain the basic sub systems of a computer, their organization, structure and operation.</li> <li>• Illustrate the concept of programs as sequences of machine instructions.</li> <li>• Demonstrate different ways of communicating with I/O devices and standard I/O interfaces.</li> <li>• Describe memory hierarchy and concept of virtual memory.</li> <li>• Describe arithmetic and logical operations with integer and floating-point operands.</li> <li>• Illustrate organization of a simple processor, pipelined processor and other computing systems.</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<p>Basic Structure of Computers: Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement. Machine Instructions and Programs: Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions</p> <p><b>Text book 1: Chapter1 – 1.3, 1.4, 1.6 (1.6.1-1.6.4, 1.6.7), Chapter2 – 2.2 to 2.10</b></p> <p><b>RBT: L1, L2, L3</b></p>			08
<b>Module 2</b>			
<p>Input/Output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB.</p> <p><b>Text book 1: Chapter4 – 4.1, 4.2 (4.2.1 to 4.2.5), 4.4, 4.5, 4.6, 4.7</b></p> <p><b>RBT: L1, L2, L3</b></p>			08
<b>Module 3</b>			
<p>Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage.</p> <p><b>Text book 1: Chapter5 – 5.1 to 5.7, 5.9</b></p> <p><b>RBT: L1, L2, L3</b></p>			08
<b>Module 4</b>			
<p>Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations.</p>			08

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Text book 1: Chapter6 – 6.1 to 6.7	
<b>RBT: L1, L2, L3</b>	
<b>Module 5</b>	
Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Micro programmed Control. Pipelining, Embedded Systems and Large Computer Systems: Basic Concepts of pipelining, Examples of Embedded Systems, Processor chips for embedded applications, Simple Microcontroller.	08
<b>Text book 1: Chapter7, Chapter8 – 8.1, Chapter9 – 9.1, 9.2, 9.3</b>	
<b>RBT: L1, L2, L3</b>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Explain the basic organization of a computer system.</li> <li>• Demonstrate functioning of different sub systems, such as processor, Input/output, and memory.</li> <li>• Illustrate hardwired control and micro programmed control, pipelining, embedded and other computing systems.</li> <li>• Design and analyse simple arithmetic and logical units.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002. (Listed topics only from Chapters 1, 2, 4, 5, 6, 7, 8, 9 and 12)	
<b>Reference Books:</b>	
1. William Stallings: Computer Organization & Architecture, 9 <sup>th</sup> Edition, Pearson, 2015.	



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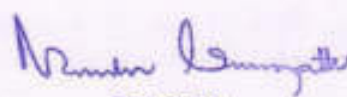


**SOFTWARE ENGINEERING**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – III**

<b>Subject Code</b>	18CS35	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS35) will enable students to:			
<ul style="list-style-type: none"> <li>• Outline software engineering principles and activities involved in building large software programs.</li> <li>• Identify ethical and professional issues and explain why they are of concern to software engineers.</li> <li>• Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation.</li> <li>• Differentiate system models, use UML diagrams and apply design patterns.</li> <li>• Discuss the distinctions between validation testing and defect testing.</li> <li>• Recognize the importance of software maintenance and describe the intricacies involved in software evolution.</li> <li>• Apply estimation techniques, schedule project activities and compute pricing.</li> <li>• Identify software quality parameters and quantify software using measurements and metrics.</li> <li>• List software quality standards and outline the practices involved.</li> <li>• Recognize the need for agile software development, describe agile methods, apply agile practices and plan for agility.</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<p><b>Introduction:</b> Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies.</p> <p><b>Software Processes:</b> Models: Waterfall Model (Sec 2.1.1), Incremental Model (Sec 2.1.2) and Spiral Model (Sec 2.1.3). Process activities.</p> <p><b>Requirements Engineering:</b> Requirements Engineering Processes (Chap 4). Requirements Elicitation and Analysis (Sec 4.5). Functional and non-functional requirements (Sec 4.1). The software Requirements Document (Sec 4.2). Requirements Specification (Sec 4.3). Requirements validation (Sec 4.6). Requirements Management (Sec 4.7).</p> <p><b>RBT: L1, L2, L3</b></p>			08
<b>Module 2</b>			
<p><b>System Models:</b> Context models (Sec 5.1). Interaction models (Sec 5.2). Structural models (Sec 5.3). Behavioral models (Sec 5.4). Model-driven engineering (Sec 5.5).</p> <p><b>Design and Implementation:</b> Introduction to RUP (Sec 2.4), Design Principles (Chap 17). Object-oriented design using the UML (Sec 7.1). Design patterns (Sec 7.2). Implementation issues (Sec 7.3). Open source development (Sec 7.4).</p> <p><b>RBT: L1, L2, L3</b></p>			08
<b>Module 3</b>			
<p><b>Software Testing:</b> Development testing (Sec 8.1), Test-driven development (Sec 8.2), Release testing (Sec 8.3), User testing (Sec 8.4). Test Automation (Page no 42, 70,212, 231,444,695).</p> <p><b>Software Evolution:</b> Evolution processes (Sec 9.1). Program evolution dynamics (Sec 9.2).</p>			08

  
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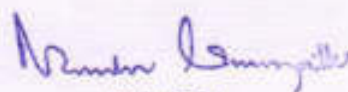
Software maintenance (Sec 9.3). Legacy system management (Sec 9.4).	
<b>RBT: L1, L2, L3</b>	
<b>Module 4</b>	
<b>Project Planning:</b> Software pricing (Sec 23.1). Plan-driven development (Sec 23.2). Project scheduling (Sec 23.3). Estimation techniques (Sec 23.5). <b>Quality management:</b> Software quality (Sec 24.1). Reviews and inspections (Sec 24.3). Software measurement and metrics (Sec 24.4). Software standards (Sec 24.2)	08
<b>RBT: L1, L2, L3</b>	
<b>Module 5</b>	
<b>Agile Software Development:</b> Coping with Change (Sec 2.3), The Agile Manifesto: Values and Principles. Agile methods: SCRUM (Ref "The SCRUM Primer, Ver 2.0") and Extreme Programming (Sec 3.3). Plan-driven and agile development (Sec 3.2). Agile project management (Sec 3.4), Scaling agile methods (Sec 3.5).	08
<b>RBT: L1, L2, L3</b>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Design a software system, component, or process to meet desired needs within realistic constraints.</li> <li>• Assess professional and ethical responsibility</li> <li>• Function on multi-disciplinary teams</li> <li>• Use the techniques, skills, and modern engineering tools necessary for engineering practice</li> <li>• Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5, 7, 8, 9, 23, and 24)</li> <li>2. The SCRUM Primer, Ver 2.0, <a href="http://www.goodagile.com/scrumpriener/scrumpriener20.pdf">http://www.goodagile.com/scrumpriener/scrumpriener20.pdf</a></li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.</li> <li>2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India</li> </ol>	
<b>Web Reference for eBooks on Agile:</b>	
<ol style="list-style-type: none"> <li>1. <a href="http://agilemanifesto.org/">http://agilemanifesto.org/</a></li> <li>2. <a href="http://www.jamesshore.com/Agile-Book/">http://www.jamesshore.com/Agile-Book/</a></li> </ol>	

  
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DISCRETE MATHEMATICAL STRUCTURES (Effective from the academic year 2018 -2019) SEMESTER – III			
Subject Code	18CS36	CIE Marks	40
Number of Contact Hours/Week	3:0:0	SEE Marks	60
Total Number of Contact Hours	40	Exam Hours	3 Hrs
CREDITS –3			
<b>Course Learning Objectives:</b> This course (18CS36) will enable students to:			
<ul style="list-style-type: none"> <li>• Provide theoretical foundations of computer science to perceive other courses in the programme.</li> <li>• Illustrate applications of discrete structures: logic, relations, functions, set theory and counting.</li> <li>• Describe different mathematical proof techniques,</li> <li>• Illustrate the use of graph theory in computer science</li> </ul>			
Module 1			Contact Hours
<b>Fundamentals of Logic:</b> Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication – Rules of Inference. Fundamentals of Logic contd.: The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems.  <b>Text book 1: Chapter2</b>  <b>RBT: L1, L2, L3</b>			08
Module 2			Contact Hours
<b>Properties of the Integers:</b> The Well Ordering Principle – Mathematical Induction, Recursive Definitions, The division algorithm, The Greatest common divisor. <b>Fundamental Principles of Counting:</b> The Rules of Sum and Product, Permutations, Combinations – The Binomial Theorem, Combinations with Repetition.  <b>Text book 1: Chapter4 – 4.1, 4.2, 4.3, 4.4, Chapter1</b>  <b>RBT: L1, L2, L3</b>			08
Module 3			Contact Hours
<b>Relations and Functions:</b> Cartesian Products and Relations, Functions – Plain and One-to-One, Onto Functions. The Pigeon-hole Principle, Function Composition and Inverse Functions. <b>Relations:</b> Properties of Relations, Computer Recognition – Zero-One Matrices and Directed Graphs, Partial Orders – Hasse Diagrams, Equivalence Relations and Partitions.  <b>Text book 1: Chapter5, Chapter7 – 7.1 to 7.4</b>  <b>RBT: L1, L2, L3</b>			08
Module 4			Contact Hours
<b>The Principle of Inclusion and Exclusion:</b> The Principle of Inclusion and Exclusion, Generalizations of the Principle, Derangements – Nothing is in its Right Place, Rook Polynomials. <b>Recurrence Relations:</b> First Order Linear Recurrence Relation, The Second Order Linear Homogeneous Recurrence Relation with Constant Coefficients.  <b>Text book 1: Chapter8 – 8.1 to 8.4, Chapter10 – 10.1, 10.2</b>			08

  
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<b>RBT: L1, L2, L3</b>	
<b>Module 5</b>	
<b>Introduction to Graph Theory:</b> Definitions and Examples, Sub graphs, Complements, and Graph Isomorphism, Vertex Degree, Euler Trails and Circuits. <b>Trees:</b> Definitions, Properties, and Examples, Routed Trees, Trees and Sorting, Weighted Trees and Prefix Codes	08
<b>Text book 1: Chapter11 – 11.1 to 11.3 Chapter12 – 12.1 to 12.4</b>	
<b>RBT: L1, L2, L3</b>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Use propositional and predicate logic in knowledge representation and truth verification.</li> <li>• Demonstrate the application of discrete structures in different fields of computer science.</li> <li>• Solve problems using recurrence relations and generating functions.</li> <li>• Application of different mathematical proofs techniques in proving theorems in the courses.</li> <li>• Compare graphs, trees and their applications.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education. 2004.	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Basavaraj S Anami and Venakanna S Madalli: Discrete Mathematics – A Concept based approach, Universities Press, 2016</li> <li>2. Kenneth H. Rosen: Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007.</li> <li>3. Jayant Ganguly: A Treatise on Discrete Mathematical Structures, Sanguine-Pearson, 2010.</li> <li>4. D.S. Malik and M.K. Sen: Discrete Mathematical Structures: Theory and Applications, Thomson, 2004.</li> <li>5. Thomas Koshy: Discrete Mathematics with Applications, Elsevier, 2005, Reprint 2008.</li> </ol>	

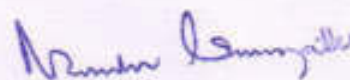
  
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**ANALOG AND DIGITAL ELECTRONICS LABORATORY**

(Effective from the academic year 2018 -2019)

**SEMESTER – III**

<b>Subject Code</b>	18CPL37	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs
<b>Credits – 2</b>			
<b>Course Learning Objectives:</b> This course (18CSL37) will enable students to:			
This laboratory course enable students to get practical experience in design, assembly and evaluation/testing of			
<ul style="list-style-type: none"><li>• Analog components and circuits including Operational Amplifier, Timer, etc.</li><li>• Combinational logic circuits.</li><li>• Flip - Flops and their operations</li><li>• Counters and registers using flip-flops.</li><li>• Synchronous and Asynchronous sequential circuits.</li><li>• A/D and D/A converters</li></ul>			
<b>Descriptions (if any):</b>			
<ul style="list-style-type: none"><li>• Simulation packages preferred: Multisim, Modelsim, PSpice or any other relevant.</li><li>• For Part A (Analog Electronic Circuits) students must trace the wave form on Tracing sheet / Graph sheet and label trace.</li><li>• Continuous evaluation by the faculty must be carried by including performance of a student in both hardware implementation and simulation (if any) for the given circuit.</li><li>• A batch not exceeding 4 must be formed for conducting the experiment. For simulation individual student must execute the program.</li></ul>			
<b>Laboratory Programs:</b>			
<b>PART A (Analog Electronic Circuits)</b>			
1.	Design an astable multivibrator circuit for three cases of duty cycle (50%, <50% and >50%) using NE 555 timer IC. Simulate the same for any one duty cycle.		
2.	Using appropriate linear IC regulators, design fixed +5V and -12V regulator circuits. For the rectification design a full wave bridge rectifier circuit. And simulate the same.		
3.	Using ua 741 Opamp, design a 1 kHz Relaxation Oscillator with 50% duty cycle. And simulate the same.		
4.	Using ua 741 opamp, design a window comparator for any given UTP and LTP. And simulate the same.		
5.	Demonstrate the use of LED and photodiode for an alarm system.		
<b>PART B (Digital Electronic Circuits)</b>			
6.	Design and implement Half adder, Full Adder, Half Subtractor, Full Subtractor using basic gates. And implement the same in HDL.		
7.	Given a 4-variable logic expression, simplify it using appropriate technique and realize the simplified logic expression using 8:1 multiplexer IC. And implement the same in HDL.		
8.	Realize a J-K Master / Slave Flip-Flop using NAND gates and verify its truth table. And implement the same in HDL.		
9.	Design and implement a mod-n ( $n < 8$ ) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working.		
10.	Design and implement an asynchronous counter using decade counter IC to count up from 0 to n ( $n \leq 9$ ) and demonstrate on 7-segment display (using IC-7447)		

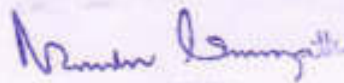
  
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**Laboratory Outcomes:** The student should be able to:

- Use appropriate design equations / methods to design the given circuit.
- Examine and verify the design of both analog and digital circuits using simulators.
- Make use of electronic components, ICs, instruments and tools for design and testing of circuits for the given the appropriate inputs.
- Compile a laboratory journal which includes; aim, tool/instruments/software/components used, design equations used and designs, schematics, program listing, procedure followed, relevant theory, results as graphs and tables, interpreting and concluding the findings.

**Conduct of Practical Examination:**

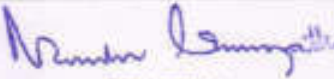
- All laboratory experiments, excluding the first, are to be included for practical examination.
- Experiment distribution
  - For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.
  - For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure part to be made zero.
- Marks Distribution (*Subjected to change in accordance with university regulations*)
  - a) For questions having only one part – Procedure + Execution + Viva-Voce:  $15+70+15 = 100$  Marks
  - b) For questions having part A and B
    - i. Part A – Procedure + Execution + Viva =  $4 + 21 + 5 = 30$  Marks
    - ii. Part B – Procedure + Execution + Viva =  $10 + 49 + 11 = 70$  Marks



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**DATA STRUCTURES LABORATORY**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – III**

<b>Subject Code</b>	18CPL38	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs
<b>Credits – 2</b>			
<b>Course Learning Objectives:</b> This course (18CSL38) will enable students to:			
This laboratory course enable students to get practical experience in design, develop, implement, analyze and evaluation/testing of			
<ul style="list-style-type: none"> <li>• Asymptotic performance of algorithms.</li> <li>• Linear data structures and their applications such as stacks, queues and lists</li> <li>• Non-Linear data structures and their applications such as trees and graphs</li> <li>• Sorting and searching algorithms</li> </ul>			
<b>Descriptions (if any):</b>			
<ul style="list-style-type: none"> <li>• Implement all the programs in 'C / C++' Programming Language and Linux / Windows as OS.</li> </ul>			
<b>Programs List:</b>			
1.	Design, Develop and Implement a menu driven Program in C for the following array operations. <ol style="list-style-type: none"> <li>a. Creating an array of N Integer Elements</li> <li>b. Display of array Elements with Suitable Headings</li> <li>c. Inserting an Element (ELEM) at a given valid Position (POS)</li> <li>d. Deleting an Element at a given valid Position (POS)</li> <li>e. Exit.</li> </ol> Support the program with functions for each of the above operations.		
2.	Design, Develop and Implement a Program in C for the following operations on Strings. <ol style="list-style-type: none"> <li>a. Read a main String (STR), a Pattern String (PAT) and a Replace String (REP)</li> <li>b. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in STR with REP if PAT exists in STR. Report suitable messages in case PAT does not exist in STR</li> </ol> Support the program with functions for each of the above operations. Don't use Built-in functions.		
3.	Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) <ol style="list-style-type: none"> <li>a. Push an Element on to Stack</li> <li>b. Pop an Element from Stack</li> <li>c. Demonstrate how Stack can be used to check Palindrome</li> <li>d. Demonstrate Overflow and Underflow situations on Stack</li> <li>e. Display the status of Stack</li> <li>f. Exit</li> </ol> Support the program with appropriate functions for each of the above operations		
4.	Design, Develop and Implement a Program in C for converting an Infix Expression to Postfix Expression. Program should support for both parenthesized and free parenthesized expressions with the operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.		

  
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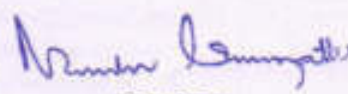
5.	Design, Develop and Implement a Program in C for the following Stack Applications a. Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^, &. b. Solving Tower of Hanoi problem with n disks
6.	Design, Develop and Implement a menu driven Program in C for the following operations on Circular QUEUE of Characters (Array Implementation of Queue with maximum size MAX) a. Insert an Element on to Circular QUEUE b. Delete an Element from Circular QUEUE c. Demonstrate Overflow and Underflow situations on Circular QUEUE d. Display the status of Circular QUEUE e. Exit Support the program with appropriate functions for each of the above operations
7.	Design, Develop and Implement a menu driven Program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: <i>USN, Name, Branch, Sem, PhNo</i> a. Create a SLL of N Students Data by using <i>front insertion</i> . b. Display the status of SLL and count the number of nodes in it c. Perform Insertion / Deletion at End of SLL d. Perform Insertion / Deletion at Front of SLL(Demonstration of stack) e. Exit
8.	Design, Develop and Implement a menu driven Program in C for the following operations on Doubly Linked List (DLL) of Employee Data with the fields: <i>SSN, Name, Dept, Designation, Sal, PhNo</i> a. Create a DLL of N Employees Data by using <i>end insertion</i> . b. Display the status of DLL and count the number of nodes in it c. Perform Insertion and Deletion at End of DLL d. Perform Insertion and Deletion at Front of DLL e. Demonstrate how this DLL can be used as Double Ended Queue. f. Exit
9.	Design, Develop and Implement a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes a. Represent and Evaluate a Polynomial $P(x,y,z) = 6x^2y^2z - 4yz^2 + 3x^3yz + 2xy^5z - 2xyz^3$ b. Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z) Support the program with appropriate functions for each of the above operations
10.	Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers . a. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2 b. Traverse the BST in Inorder, Preorder and Post Order c. Search the BST for a given element (KEY) and report the appropriate message d. Exit
11.	Design, Develop and Implement a Program in C for the following operations on Graph(G) of Cities a. Create a Graph of N cities using Adjacency Matrix. b. Print all the nodes reachable from a given starting node in a digraph using DFS/BFS method



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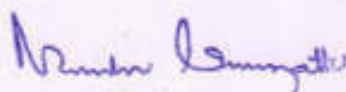


12.	Given a File of N employee records with a set K of Keys (4-digit) which uniquely determine the records in file F. Assume that file F is maintained in memory by a Hash Table (HT) of m memory locations with L as the set of memory addresses (2-digit) of locations in HT. Let the keys in K and addresses in L are Integers. Design and develop a Program in C that uses Hash function $H: K \rightarrow L$ as $H(K)=K \text{ mod } m$ (remainder method), and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.
<b>Laboratory Outcomes:</b> The student should be able to:	
<ul style="list-style-type: none"> <li>• Analyze and Compare various linear and non-linear data structures</li> <li>• Code, debug and demonstrate the working nature of different types of data structures and their applications</li> <li>• Implement, analyze and evaluate the searching and sorting algorithms</li> <li>• Choose the appropriate data structure for solving real world problems</li> </ul>	
<b>Conduct of Practical Examination:</b>	
<ul style="list-style-type: none"> <li>• All laboratory experiments, excluding the first, are to be included for practical examination.</li> <li>• Experiment distribution <ul style="list-style-type: none"> <li>○ For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.</li> <li>○ For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.</li> </ul> </li> <li>• Change of experiment is allowed only once and marks allotted for procedure part to be made zero.</li> <li>• Marks Distribution (<i>Subjected to change in accordance with university regulations</i>) <ul style="list-style-type: none"> <li>c) For questions having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks</li> <li>d) For questions having part A and B <ul style="list-style-type: none"> <li>i. Part A – Procedure + Execution + Viva = 4 + 21 + 5 = 30 Marks</li> <li>ii. Part B – Procedure + Execution + Viva = 10 + 49+ 11 = 70 Marks</li> </ul> </li> </ul> </li> </ul>	

  
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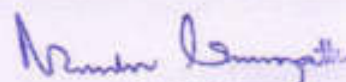
**DESIGN AND ANALYSIS OF ALGORITHMS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – IV**

<b>Subject Code</b>	18CS42	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS42) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain various computational problem solving techniques.</li> <li>• Apply appropriate method to solve a given problem.</li> <li>• Describe various methods of algorithm analysis.</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<p><b>Introduction:</b> What is an Algorithm? (T2:1.1), Algorithm Specification (T2:1.2), Analysis Framework (T1:2.1), <b>Performance Analysis:</b> Space complexity, Time complexity (T2:1.3). <b>Asymptotic Notations:</b> Big-Oh notation (<math>O</math>), Omega notation (<math>\Omega</math>), Theta notation (<math>\Theta</math>), and Little-oh notation (<math>o</math>), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples (T1:2.2, 2.3, 2.4). <b>Important Problem Types:</b> Sorting, Searching, String processing, Graph Problems, Combinatorial Problems. <b>Fundamental Data Structures:</b> Stacks, Queues, Graphs, Trees, Sets and Dictionaries. (T1:1.3,1.4).</p> <p><b>RBT: L1, L2, L3</b></p>			10
<b>Module 2</b>			
<p><b>Divide and Conquer:</b> General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum (T2:3.1, 3.3, 3.4), Merge sort, Quick sort (T1:4.1, 4.2), Strassen's matrix multiplication (T2:3.8), Advantages and Disadvantages of divide and conquer. <b>Decrease and Conquer Approach:</b> Topological Sort. (T1:5.3).</p> <p><b>RBT: L1, L2, L3</b></p>			10
<b>Module 3</b>			
<p><b>Greedy Method:</b> General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines (T2:4.1, 4.3, 4.5). <b>Minimum cost spanning trees:</b> Prim's Algorithm, Kruskal's Algorithm (T1:9.1, 9.2). <b>Single source shortest paths:</b> Dijkstra's Algorithm (T1:9.3). <b>Optimal Tree problem:</b> Huffman Trees and Codes (T1:9.4). <b>Transform and Conquer Approach:</b> Heaps and Heap Sort (T1:6.4).</p> <p><b>RBT: L1, L2, L3</b></p>			10
<b>Module 4</b>			
<p><b>Dynamic Programming:</b> General method with Examples, Multistage Graphs (T2:5.1, 5.2). <b>Transitive Closure:</b> Warshall's Algorithm, <b>All Pairs Shortest Paths:</b> Floyd's Algorithm, Optimal Binary Search Trees, Knapsack problem ((T1:8.2, 8.3, 8.4), Bellman-Ford Algorithm (T2:5.4), Travelling Sales Person problem (T2:5.9), Reliability design (T2:5.8).</p> <p><b>RBT: L1, L2, L3</b></p>			10
<b>Module 5</b>			
<p><b>Backtracking:</b> General method (T2:7.1), N-Queens problem (T1:12.1), Sum of subsets problem (T1:12.1), Graph coloring (T2:7.4), Hamiltonian cycles (T2:7.5). <b>Branch and Bound:</b> Assignment Problem, Travelling Sales Person problem (T1:12.2), 0/1 Knapsack problem (T2:8.2, T1:12.2): LC Branch and Bound solution (T2:8.2), FIFO Branch and</p>			10



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Bound solution (T2:8.2). <b>NP-Complete and NP-Hard problems:</b> Basic concepts, non-deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes (T2:11.1).	
<b>RBT: L1, L2, L3</b>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Describe computational solution to well known problems like searching, sorting etc.</li> <li>• Estimate the computational complexity of different algorithms.</li> <li>• Devise an algorithm using appropriate design strategies for problem solving.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Introduction to the Design and Analysis of Algorithms, Anany Levitin., 2nd Edition, 2009, Pearson.</li> <li>2. Computer Algorithms/C++, Ellis Horowitz, Satraj Sahni and Rajasekaran, 2nd Edition, 2014, Universities Press</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.</li> <li>2. Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education).</li> </ol>	



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**OPERATING SYSTEMS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – IV**

<b>Subject Code</b>	18CS43	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS43) will enable students to:			
<ul style="list-style-type: none"> <li>• Introduce concepts and terminology used in OS</li> <li>• Explain threading and multithreaded systems</li> <li>• Illustrate process synchronization and concept of Deadlock</li> <li>• Introduce Memory and Virtual memory management, File system and storage techniques</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Introduction to operating systems, System structures:</b> What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot. <b>Process Management</b> Process concept; Process scheduling; Operations on processes; Inter process communication			08
<b>Module 2</b>			
<b>Multi-threaded Programming:</b> Overview; Multithreading models; Thread Libraries; Threading issues. <b>Process Scheduling:</b> Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. <b>Process Synchronization:</b> Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.			08
<b>Module 3</b>			
<b>Deadlocks :</b> Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. <b>Memory Management:</b> Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.			08
<b>Module 4</b>			
<b>Virtual Memory Management:</b> Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. <b>File System, Implementation of File System:</b> File system: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.			08
<b>Module 5</b>			
<b>Secondary Storage Structures, Protection:</b> Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability- Based systems. <b>Case Study: The Linux Operating System:</b> Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.			08

  
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<p><b>Course Outcomes:</b> The student will be able to :</p> <ul style="list-style-type: none"> <li>• Demonstrate need for OS and different types of OS</li> <li>• Apply suitable techniques for management of different resources</li> <li>• Use processor, memory, storage and file system commands</li> <li>• Realize the different concepts of OS in platform of usage through case studies</li> </ul>
<p><b>Question Paper Pattern:</b></p> <ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>
<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7<sup>th</sup> edition, Wiley-India, 2006</li> </ol>
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition</li> <li>2. D.M Dhamdhare, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.</li> <li>3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.</li> <li>4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.</li> </ol>

  
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**MICROCONTROLLER AND EMBEDDED SYSTEMS**

(Effective from the academic year 2018 -2019)

**SEMESTER – IV**

<b>Subject Code</b>	18CS44	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS44) will enable students to:			
<ul style="list-style-type: none"><li>• Differentiate between microprocessors and microcontrollers.</li><li>• Explain the architecture of ARM processor with its instruction set.</li><li>• Identify the applicability of the embedded system</li><li>• Comprehend the real time operating system used for the embedded system</li></ul>			
<b>Module 1</b>			<b>Contact Hours</b>
Microprocessors versus Microcontrollers, <b>ARM Embedded Systems:</b> The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, <b>ARM Processor Fundamentals:</b> Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table , Core Extensions  <b>Text book 1:Chapter1 - 1.1 to 1.4, Chapter2 - 2.1 to 2.5</b>  <b>RBT: L1, L2</b>			08
<b>Module 2</b>			
Microprocessors versus Microcontrollers, <b>ARM Embedded Systems:</b> The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software, <b>ARM Processor Fundamentals:</b> Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table , Core Extensions  <b>Text book 1:Chapter1 - 1.1 to 1.4, Chapter2 - 2.1 to 2.5</b>			08
<b>Module 3</b>			
<b>Embedded System Components:</b> Embedded Vs General computing system, Classification of Embedded systems, Major applications and purpose of ES. Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components.  <b>Text book 2: All the Topics from Chapter1 and Chapter2</b>			08
<b>Module 4</b>			
<b>Embedded System Design Concepts:</b> Characteristics and Quality Attributes of Embedded Systems, Operational and non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design and Program Modeling, embedded firmware design and development  <b>Text book 2: Chapter-3, Chapter-4, Chapter-7 (Sections 7.1, 7.2 only), Chapter-9 (Sections 9.1, 9.2, 9.3.1, 9.3.2 only)</b>			08
<b>Module 5</b>			
<b>RTOS and IDE for Embedded System Design:</b> Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Preemptive Task scheduling techniques, Task			08

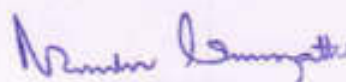
  
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<p>Communication, Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques</p> <p><b>Text book 2: Chapter-10 (Sections 10.1, 10.2, 10.3, 10.5.2 , 10.7, 10.8.1.1, 10.8.1.2, 10.8.2.2, 10.10 only), Chapter 12, Chapter-13 ( block diagram before 13.1, 13.3, 13.4, 13.5, 13.6 only)</b></p>
<p><b>Course Outcomes:</b> The student will be able to :</p> <ul style="list-style-type: none"> <li>• Describe the architectural features and instructions of ARM microcontroller</li> <li>• Apply the knowledge gained for Programming ARM for different applications.</li> <li>• Interface external devices and I/O with ARM microcontroller.</li> <li>• Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.</li> <li>• Develop the hardware /software co-design and firmware design approaches.</li> <li>• Demonstrate the need of real time operating system for embedded system applications</li> </ul>
<p><b>Question Paper Pattern:</b></p> <ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>
<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.</li> <li>2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2<sup>nd</sup> Edition.</li> </ol>
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd., 1st edition, 2005</li> <li>2. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015</li> <li>3. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008</li> <li>4. Raganandan, An Introduction to ARM System Design, Cengage Publication</li> </ol>

  
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**OBJECT ORIENTED CONCEPTS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – IV**

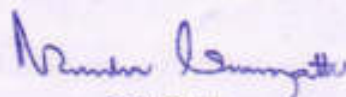
<b>Subject Code</b>	18CS45	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS -3</b>			
<b>Course Learning Objectives:</b> This course (18CS45) will enable students to:			
<ul style="list-style-type: none"> <li>• Learn fundamental features of object oriented language and JAVA</li> <li>• Set up Java JDK environment to create, debug and run simple Java programs.</li> <li>• Create multi-threaded programs and event handling mechanisms.</li> <li>• Introduce event driven Graphical User Interface (GUI) programming using applets and swings.</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Introduction to Object Oriented Concepts:</b> A Review of structures, Procedure-Oriented Programming system, Object Oriented Programming System, Comparison of Object Oriented Language with C, Console I/O, variables and reference variables, Function Prototyping, Function Overloading. <b>Class and Objects:</b> Introduction, member functions and data, objects and functions, objects and arrays, Namespaces, Nested classes, Constructors, Destructors. <b>Text book 1: Ch 1: 1.1 to 1.9 Ch 2: 2.1 to 2.6 Ch 4: 4.1 to 4.2</b>			08
<b>Module 2</b>			
<b>Introduction to Java:</b> Java's magic: the Byte code; Java Development Kit (JDK); the Java Buzzwords, Object-oriented programming; Simple Java programs. Data types, variables and arrays, Operators, Control Statements. <b>Text book 2: Ch:1 Ch: 2 Ch:3 Ch:4 Ch:5</b>			08
<b>Module 3</b>			
<b>Classes, Inheritance, Exceptions, Packages and Interfaces:</b> Classes: Classes fundamentals; Declaring objects; Constructors, this keyword, garbage collection. <b>Inheritance:</b> inheritance basics, using super, creating multi level hierarchy, method overriding. <b>Exception handling:</b> Exception handling in Java. Packages, Access Protection, Importing Packages, Interfaces. <b>Text book 2: Ch:6 Ch: 8 Ch:9 Ch:10</b>			08
<b>Module 4</b>			
<b>Multi Threaded Programming, Event Handling:</b> Multi Threaded Programming: What are threads? How to make the classes threadable ; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, read-write problem, producer consumer problems. <b>Event Handling:</b> Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes. <b>Text book 2: Ch 11: Ch: 22</b>			08
<b>Module 5</b>			
<b>The Applet Class:</b> Introduction, Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; The HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument(); The AudioClip Interface; The AppletStub Interface;Output to the Console. <b>Swings:</b> Swings: The origins of Swing; Two key			08



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Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet. JLabel and ImageIcon; JTextField;The Swing Buttons; JTabbedPane; JScrollPane; JList; JComboBox; JTable.
<b>Text book 2: Ch 21: Ch: 29 Ch: 30</b>
<b>Course Outcomes:</b> The student will be able to : <ul style="list-style-type: none"> <li>• Explain the object-oriented concepts and JAVA.</li> <li>• Develop computer programs to solve real world problems in Java.</li> <li>• Develop simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles using Applets and swings.</li> </ul>
<b>Question Paper Pattern:</b> <ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>
<b>Textbooks:</b> <ol style="list-style-type: none"> <li>1. Sourav Sahay, Object Oriented Programming with C++ , 2nd Ed, Oxford University Press,2006 (Chapters 1, 2, 4)</li> <li>2. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 1, 2, 3, 4, 5, 6, 8, 9,10, 11, 21, 22, 29, 30)</li> </ol>
<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. Mahesh Bhavne and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806</li> <li>2. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.</li> <li>3. Stanley B.Lippmann, Josee Lajore, C++ Primer, 4th Edition, Pearson Education, 2005.</li> <li>4. Rajkumar Buyya,S Thamarasi selvi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.</li> <li>5. Richard A Johnson, Introduction to Java Programming and OOAD, CENGAGE Learning.</li> <li>6. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.</li> </ol>
<b>Note: Every institute shall organize a bridge organize on C++ either in the vacation or in the beginning of even semester.</b>

  
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**DATA COMMUNICATION**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – IV**

<b>Subject Code</b>	18CS46	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS46) will enable students to:			
<ul style="list-style-type: none"> <li>• Comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.</li> <li>• Explain with the basics of data communication and various types of computer networks;</li> <li>• Illustrate TCP/IP protocol suite and switching criteria.</li> <li>• Demonstrate Medium Access Control protocols for reliable and noisy channels.</li> <li>• Expose wireless and wired LANs.</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Introduction:</b> Data Communications, Networks, Network Types, Internet History, Standards and Administration, <b>Networks Models:</b> Protocol Layering, TCP/IP Protocol suite, The OSI model, <b>Introduction to Physical Layer-1:</b> Data and Signals, Digital Signals, Transmission Impairment, Data Rate limits, Performance.			08
<b>Module 2</b>			
<b>Digital Transmission:</b> Digital to digital conversion (Only Line coding: Polar, Bipolar and Manchester coding), <b>Physical Layer-2:</b> Analog to digital conversion (only PCM), Transmission Modes, <b>Analog Transmission:</b> Digital to analog conversion,			08
<b>Module 3</b>			
<b>Bandwidth Utilization:</b> Multiplexing and Spread Spectrum, <b>Switching:</b> Introduction, Circuit Switched Networks and Packet switching. <b>Error Detection and Correction:</b> Introduction, Block coding, Cyclic codes, Checksum, Forward error correction,			08
<b>Module 4</b>			
<b>Data link control:</b> DLC services, Data link layer protocols, HDLC, and Point to Point protocol (Framing, Transition phases only). <b>Media Access control:</b> Random Access, Controlled Access and Channelization,			08
<b>Module 5</b>			
<b>Wired LANs Ethernet:</b> Ethernet Protocol, Standard Ethernet, Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet, <b>Wireless LANs:</b> Introduction, IEEE 802.11 Project and Bluetooth. <b>Other wireless Networks:</b> WIMAX, Cellular Telephony, Satellite networks			08
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"> <li>• Explain the various components of data communication.</li> <li>• Explain the fundamentals of digital communication and switching.</li> <li>• Compare and contrast data link layer protocols.</li> <li>• Summarize IEEE 802.xx standards</li> </ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> </ul>			

  
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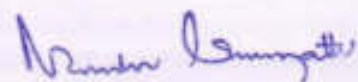
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. Behrouz A. Forouzan, Data Communications and Networking 5E, 5<sup>th</sup> Edition, Tata McGraw-Hill, 2013. (Chapters 1.1 to 1.5, 2.1 to 2.3, 3.1, 3.3 to 3.6, 4.1 to 4.3, 5.1, 6.1, 6.2, 8.1 to 8.3, 10.1 to 10.5, 11.1 to 11.4, 12.1 to 12.3, 13.1 to 13.5, 15.1 to 15.3, 16.1 to 16.3)

**Reference Books:**

1. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental Concepts and Key architectures, 2nd Edition Tata McGraw-Hill, 2004.
2. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
3. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.
4. Nader F. Mir: Computer and Communication Networks, Pearson Education, 2007.



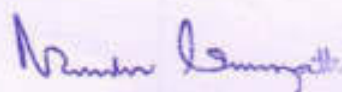
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## DESIGN AND ANALYSIS OF ALGORITHMS LABORATORY

(Effective from the academic year 2018 -2019)

### SEMESTER – IV

<b>Subject Code</b>	18CSL47	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs
<b>Credits – 2</b>			
<b>Course Learning Objectives:</b> This course (18CSL47) will enable students to:			
<ul style="list-style-type: none"> <li>• Design and implement various algorithms in JAVA</li> <li>• Employ various design strategies for problem solving.</li> <li>• Measure and compare the performance of different algorithms.</li> </ul>			
<b>Descriptions (if any):</b>			
<ul style="list-style-type: none"> <li>• Design, develop, and implement the specified algorithms for the following problems using Java language under LINUX /Windows environment. Netbeans / Eclipse IDE tool can be used for development and demonstration.</li> </ul>			
<b>Programs List:</b>			
1.			
a.	Create a Java class called <i>Student</i> with the following details as variables within it. (i) USN (ii) Name (iii) Branch (iv) Phone Write a Java program to create <i>nStudent</i> objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.		
b.	Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.		
2.			
a.	Design a superclass called <i>Staff</i> with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely <i>Teaching</i> (domain, publications), <i>Technical</i> (skills), and <i>Contract</i> (period). Write a Java program to read and display at least 3 <i>staff</i> objects of all three categories.		
b.	Write a Java class called <i>Customer</i> to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as "/".		
3.			
a.	Write a Java program to read two integers <i>a</i> and <i>b</i> . Compute $a/b$ and print, when <i>b</i> is not zero. Raise an exception when <i>b</i> is equal to zero.		
b.	Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.		
4.	Sort a given set of <i>n</i> integer elements using <b>Quick Sort</b> method and compute its time complexity. Run the program for varied values of $n > 5000$ and record the time taken to sort.		

  
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	Plot a graph of the time taken versus $n$ on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
5.	Sort a given set of $n$ integer elements using <b>Merge Sort</b> method and compute its time complexity. Run the program for varied values of $n > 5000$ , and record the time taken to sort. Plot a graph of the time taken versus $n$ on graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.
6.	Implement in Java, the <b>0/1 Knapsack</b> problem using (a) Dynamic Programming method (b) Greedy method.
7.	From a given vertex in a weighted connected graph, find shortest paths to other vertices using <b>Dijkstra's algorithm</b> . Write the program in Java.
8.	Find Minimum Cost Spanning Tree of a given connected undirected graph using <b>Kruskal's algorithm</b> . Use Union-Find algorithms in your program
9.	Find Minimum Cost Spanning Tree of a given connected undirected graph using <b>Prim's algorithm</b> .
10.	Write Java programs to (a) Implement All-Pairs Shortest Paths problem using <b>Floyd's algorithm</b> . (b) Implement <b>Travelling Sales Person problem</b> using Dynamic programming.
11.	Design and implement in Java to find a <b>subset</b> of a given set $S = \{S_1, S_2, \dots, S_n\}$ of $n$ positive integers whose SUM is equal to a given positive integer $d$ . For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$ , there are two solutions $\{1, 2, 6\}$ and $\{1, 8\}$ . Display a suitable message, if the given problem instance doesn't have a solution.
12.	Design and implement in Java to find all <b>Hamiltonian Cycles</b> in a connected undirected Graph $G$ of $n$ vertices using backtracking principle.

**Laboratory Outcomes:** The student should be able to:

- Design algorithms using appropriate design techniques (brute-force, greedy, dynamic programming, etc.)
- Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.
- Analyze and compare the performance of algorithms using language features.
- Apply and implement learned algorithm design techniques and data structures to solve real-world problems.

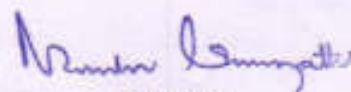
**Conduct of Practical Examination:**

- All laboratory experiments, excluding the first, are to be included for practical examination.
- Experiment distribution
  - For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.

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- For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure part to be made zero.
- Marks Distribution (*Subjected to change in accordance with university regulations*)
  - c) For questions having only one part – Procedure + Execution + Viva-Voce:  $15+70+15 = 100$  Marks
  - f) For questions having part A and B
    - i. Part A – Procedure + Execution + Viva =  $4 + 21 + 5 = 30$  Marks
    - ii. Part B – Procedure + Execution + Viva =  $10 + 49 + 11 = 70$  Marks



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**MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY**  
(Effective from the academic year 2018 -2019)

**SEMESTER – IV**

<b>Subject Code</b>	18CSL48	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs

**Credits – 2**

**Course Learning Objectives:** This course (18CSL48) will enable students to:

- Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148
- Conduct the experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

**Descriptions (if any):**

- 

**Programs List:**

**PART A** Conduct the following experiments by writing Assembly Language Program (ALP) using ARM7TDMI/LPC2148 using an evaluation board/simulator and the required software tool.

1. Write an ALP to multiply two 16 bit binary numbers.
2. Write an ALP to find the sum of first 10 integer numbers.
3. Write an ALP to find factorial of a number.
4. Write an ALP to add an array of 16 bit numbers and store the 32 bit result in internal RAM
5. Write an ALP to find the square of a number (1 to 10) using look-up table.
6. Write an ALP to find the largest/smallest number in an array of 32 numbers .
7. Write an ALP to arrange a series of 32 bit numbers in ascending/descending order.
8. Write an ALP to count the number of ones and zeros in two consecutive memory locations.

**PART –B** Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

9. Display "Hello World" message using Internal UART.
10. Interface and Control a DC Motor.
11. Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.
12. Determine Digital output for a given Analog input using Internal ADC of ARM controller.
13. Interface a DAC and generate Triangular and Square waveforms.
14. Interface a 4x4 keyboard and display the key code on an LCD.
15. Demonstrate the use of an external interrupt to toggle an LED On/Off.
16. Display the Hex digits 0 to F on a 7-segment LED interface, with an appropriate delay in between

**Laboratory Outcomes:** The student should be able to:

- Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148
- Conduct the following experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler.

**Conduct of Practical Examination:**

- All laboratory experiments, excluding the first, are to be included for practical examination.
- Experiment distribution
  - For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.
  - For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure part to be made

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- Marks Distribution (*Subjected to change in accordance with university regulations*)
  - g) For questions having only one part – Procedure + Execution + Viva-Voce:  $15+70+15 = 100$  Marks
  - h) For questions having part A and B
    - i. Part A – Procedure + Execution + Viva =  $4 + 21 + 5 = 30$  Marks
    - ii. Part B – Procedure + Execution + Viva =  $10 + 49 + 11 = 70$  Marks

*Nandini Srinivasan*

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**MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY**  
(Effective from the academic year 2018 -2019)

**SEMESTER – V**

<b>Subject Code</b>	18CS51	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	2:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS – 03</b>			
<b>Course Learning Objectives:</b> This course (18CS51) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain the principles of management, organization and entrepreneur.</li> <li>• Discuss on planning, staffing, ERP and their importance</li> <li>• Infer the importance of intellectual property rights and relate the institutional support</li> </ul>			
<b>Module – 1</b>			<b>Contact Hours</b>
<b>Introduction</b> - Meaning, nature and characteristics of management, scope and Functional areas of management, goals of management, levels of management, brief overview of evolution of management theories., Planning- Nature, importance, types of plans, steps in planning, Organizing- nature and purpose, types of Organization, Staffing- meaning, process of recruitment and selection			<b>08</b>
<b>Module – 2</b>			
<b>Directing and controlling-</b> meaning and nature of directing, leadership styles, motivation Theories, Communication- Meaning and importance, Coordination- meaning and importance, Controlling- meaning, steps in controlling, methods of establishing control.			<b>08</b>
<b>Module – 3</b>			
<b>Entrepreneur</b> – meaning of entrepreneur, characteristics of entrepreneurs, classification and types of entrepreneurs, various stages in entrepreneurial process, role of entrepreneurs in economic development, entrepreneurship in India and barriers to entrepreneurship. Identification of business opportunities, market feasibility study, technical feasibility study, financial feasibility study and social feasibility study.			<b>08</b>
<b>Module – 4</b>			
<b>Preparation of project and ERP</b> - meaning of project, project identification, project selection, project report, need and significance of project report, contents, formulation, guidelines by planning commission for project report, <b>Enterprise Resource Planning: Meaning and Importance-</b> ERP and Functional areas of Management – Marketing / Sales- Supply Chain Management – Finance and Accounting – Human Resources – Types of reports and methods of report generation			<b>08</b>
<b>Module – 5</b>			
<b>Micro and Small Enterprises:</b> Definition of micro and small enterprises, characteristics and advantages of micro and small enterprises, steps in establishing micro and small enterprises, Government of India industrial policy 2007 on micro and small enterprises, case study (Microsoft), Case study(Captain G R Gopinath),case study (N R Narayana Murthy & Infosys), <b>Institutional support:</b> MSME-DI, NSIC, SIDBI, KIADB, KSSIDC, TECSOK, KSFC, DIC and District level single window agency, <b>Introduction to IPR.</b>			<b>08</b>
<b>Course outcomes:</b> The students should be able to:			
<ul style="list-style-type: none"> <li>• Define management, organization, entrepreneur, planning, staffing, ERP and outline their importance in entrepreneurship</li> <li>• Utilize the resources available effectively through ERP</li> <li>• Make use of IPRs and institutional support in entrepreneurship</li> </ul>			

  
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**Question Paper Pattern:**

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. Principles of Management -P. C. Tripathi, P. N. Reddy; Tata McGraw Hill, 4th / 6<sup>th</sup> Edition, 2010.
2. Dynamics of Entrepreneurial Development & Management -Vasant Desai Himalaya Publishing House.
3. Entrepreneurship Development -Small Business Enterprises -Poornima M Charantimath Pearson Education – 2006.
4. Management and Entrepreneurship - Kanishka Bedi- Oxford University Press-2017

**Reference Books:**

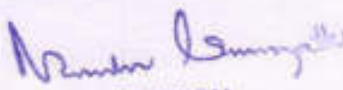
1. Management Fundamentals -Concepts, Application, Skill Development Robert Lusier – Thomson.
2. Entrepreneurship Development -S S Khanka -S Chand & Co.
3. Management -Stephen Robbins -Pearson Education /PHI -17th Edition, 2003

*Nandini Kumari*  
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COMPUTER NETWORKS (Effective from the academic year 2018 -2019) SEMESTER – V			
<b>Subject Code</b>	18CS52	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
CREDITS –4			
<b>Course Learning Objectives:</b> This course (18CS52) will enable students to:			
<ul style="list-style-type: none"> <li>• Demonstration of application layer protocols</li> <li>• Discuss transport layer services and understand UDP and TCP protocols</li> <li>• Explain routers, IP and Routing Algorithms in network layer</li> <li>• Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard</li> <li>• Illustrate concepts of Multimedia Networking, Security and Network Management</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Application Layer:</b> Principles of Network Applications: Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols. The Web and HTTP: Overview of HTTP, Non-persistent and Persistent Connections, HTTP Message Format, User-Server Interaction: Cookies, Web Caching, The Conditional GET, File Transfer: FTP Commands & Replies, Electronic Mail in the Internet: SMTP, Comparison with HTTP, Mail Message Format, Mail Access Protocols, DNS; The Internet's Directory Service: Services Provided by DNS, Overview of How DNS Works, DNS Records and Messages, Peer-to-Peer Applications: P2P File Distribution, Distributed Hash Tables, Socket Programming: creating Network Applications: Socket Programming with UDP, Socket Programming with TCP. <b>T1: Chap 2</b>			10
<b>Module 2</b>			
<b>Transport Layer :</b> Introduction and Transport-Layer Services: Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing: Connectionless Transport: UDP,UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N, Selective repeat, Connection-Oriented Transport TCP: The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control: The Causes and the Costs of Congestion, Approaches to Congestion Control, Network-assisted congestion-control example, ATM ABR Congestion control, TCP Congestion Control: Fairness. <b>T1: Chap 3</b>			10
<b>Module 3</b>			
<b>The Network layer:</b> What's Inside a Router?: Input Processing, Switching, Output Processing, Where Does Queuing Occur? Routing control plane, IPv6,A Brief foray into IP Security, Routing Algorithms: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet, Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter/AS Routing: BGP, Broadcast Routing Algorithms and Multicast. <b>T1: Chap 4: 4.3-4.7</b>			10
<b>Module 4</b>			

  
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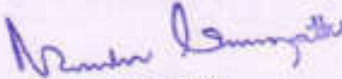
<p><b>Wireless and Mobile Networks:</b> Cellular Internet Access: An Overview of Cellular Network Architecture, 3G Cellular Data Networks: Extending the Internet to Cellular subscribers, On to 4G:LTE, Mobility management: Principles, Addressing, Routing to a mobile node, Mobile IP, Managing mobility in cellular Networks, Routing calls to a Mobile user, Handoffs in GSM, Wireless and Mobility: Impact on Higher-layer protocols.</p> <p><b>TI: Chap: 6 : 6.4-6.8</b></p>	10
<p><b>Module 5</b></p>	
<p><b>Multimedia Networking:</b> Properties of video, properties of Audio, Types of multimedia Network Applications, Streaming stored video: UDP Streaming, HTTP Streaming, Adaptive streaming and DASH, content distribution Networks, case studies: : Netflix, You Tube and Kankan.</p> <p><b>Network Support for Multimedia:</b> Dimensioning Best-Effort Networks, Providing Multiple Classes of Service, Diffserv, Per-Connection Quality-of-Service (QoS) Guarantees: Resource Reservation and Call Admission</p> <p><b>TI: Chap: 7: 7.1,7.2,7.5</b></p>	10
<p><b>Course Outcomes:</b> The student will be able to :</p>	
<ul style="list-style-type: none"> <li>• Explain principles of application layer protocols</li> <li>• Recognize transport layer services and infer UDP and TCP protocols</li> <li>• Classify routers, IP and Routing Algorithms in network layer</li> <li>• Understand the Wireless and Mobile Networks covering IEEE 802.11 Standard</li> <li>• Describe Multimedia Networking and Network Management</li> </ul>	
<p><b>Question Paper Pattern:</b></p>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<p><b>Textbooks:</b></p>	
<ol style="list-style-type: none"> <li>1. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson, 2017 .</li> </ol>	
<p><b>Reference Books:</b></p>	
<ol style="list-style-type: none"> <li>1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition</li> <li>2. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER</li> <li>3. Andrew S Tanenbaum, Computer Networks, fifth edition, Pearson</li> <li>4. Mayank Dave, Computer Networks, Second edition, Cengage Learning</li> </ol>	

  
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<b>DATABASE MANAGEMENT SYSTEM</b> (Effective from the academic year 2018 -2019) <b>SEMESTER – V</b>			
<b>Subject Code</b>	18CS53	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
CREDITS –4			
<b>Course Learning Objectives:</b> This course (18CS53) will enable students to:			
<ul style="list-style-type: none"> <li>• Provide a strong foundation in database concepts, technology, and practice.</li> <li>• Practice SQL programming through a variety of database problems.</li> <li>• Demonstrate the use of concurrency and transactions in database</li> <li>• Design and build database applications for real world problems.</li> </ul>			
Module 1			Contact Hours
<b>Introduction to Databases:</b> Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. <b>Overview of Database Languages and Architectures:</b> Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. <b>Conceptual Data Modelling using Entities and Relationships:</b> Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization. <b>Textbook 1:Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.10</b>			10
Module 2			
<b>Relational Model:</b> Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. <b>Relational Algebra:</b> Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. <b>Mapping Conceptual Design into a Logical Design:</b> Relational Database Design using ER-to-Relational mapping. <b>SQL:</b> SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL. <b>Textbook 1: Ch4.1 to 4.5, 5.1 to 5.3, 6.1 to 6.5, 8.1; Textbook 2: 3.5</b>			10
Module 3			
<b>SQL : Advances Queries:</b> More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. <b>Database Application Development:</b> Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop. <b>Internet Applications:</b> The three-Tier application architecture, The presentation layer, The Middle Tier <b>Textbook 1: Ch7.1 to 7.4; Textbook 2: 6.1 to 6.6, 7.5 to 7.7.</b>			10
Module 4			
<b>Normalization: Database Design Theory –</b> Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. <b>Normalization Algorithms:</b> Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms			10

  
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Textbook 1: Ch14.1 to 14.7, 15.1 to 15.6	
Module 5	
<p><b>Transaction Processing:</b> Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL. <b>Concurrency Control in Databases:</b> Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. <b>Introduction to Database Recovery Protocols:</b> Recovery Concepts, NO-UNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failures</p> <p>Textbook 1: 20.1 to 20.6, 21.1 to 21.7, 22.1 to 22.4, 22.7.</p>	10
<p><b>Course Outcomes:</b> The student will be able to :</p> <ul style="list-style-type: none"> <li>• Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS.</li> <li>• Use Structured Query Language (SQL) for database manipulation.</li> <li>• Design and build simple database systems</li> <li>• Develop application to interact with databases.</li> </ul>	
<p><b>Question Paper Pattern:</b></p> <ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.</li> <li>2. Database management systems, Ramakrishnan, and Gehrke, 3<sup>rd</sup> Edition, 2014, McGraw Hill</li> </ol>	
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Silberschatz Korth and Sudharshan, Database System Concepts, 6<sup>th</sup> Edition, Mc-GrawHill, 2013.</li> <li>2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.</li> </ol>	


  
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**AUTOMATA THEORY AND COMPUTABILITY**

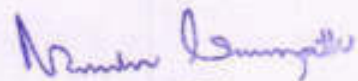
(Effective from the academic year 2018 -2019)

**SEMESTER – V**

<b>Subject Code</b>	18CS54	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS54) will enable students to:			
<ul style="list-style-type: none"> <li>• Introduce core concepts in Automata and Theory of Computation</li> <li>• Identify different Formal language Classes and their Relationships</li> <li>• Design Grammars and Recognizers for different formal languages</li> <li>• Prove or disprove theorems in automata theory using their properties</li> <li>• Determine the decidability and intractability of Computational problems</li> </ul>			
<b>Module 1</b>		<b>Contact Hours</b>	
<b>Why study the Theory of Computation, Languages and Strings:</b> Strings, Languages, A Language Hierarchy, Computation, <b>Finite State Machines (FSM):</b> Deterministic FSM, Regular languages, Designing FSM, Nondeterministic FSMs, From FSMs to Operational Systems, Simulators for FSMs, Minimizing FSMs, Canonical form of Regular languages, Finite State Transducers, Bidirectional Transducers. <b>Textbook 1: Ch 1,2, 3,4, 5.1 to 5.10</b>			08
<b>Module 2</b>			
<b>Regular Expressions (RE):</b> what is a RE?, Kleene's theorem, Applications of REs, Manipulating and Simplifying REs. <b>Regular Grammars:</b> Definition, Regular Grammars and Regular languages. <b>Regular Languages (RL) and Non-regular Languages:</b> How many RLs, To show that a language is regular, Closure properties of RLs, to show some languages are not RLs. <b>Textbook 1: Ch 6, 7, 8: 6.1 to 6.4, 7.1, 7.2, 8.1 to 8.4</b>			08
<b>Module 3</b>			
<b>Context-Free Grammars(CFG):</b> Introduction to Rewrite Systems and Grammars, CFGs and languages, designing CFGs, simplifying CFGs, proving that a Grammar is correct, Derivation and Parse trees, Ambiguity, Normal Forms. <b>Pushdown Automata (PDA):</b> Definition of non-deterministic PDA, Deterministic and Non-deterministic PDAs, Non-determinism and Halting, alternative equivalent definitions of a PDA, alternatives that are not equivalent to PDA. <b>Textbook 1: Ch 11, 12: 11.1 to 11.8, 12.1, 12.2, 12.4, 12.5, 12.6</b>			08
<b>Module 4</b>			
<b>Context-Free and Non-Context-Free Languages:</b> Where do the Context-Free Languages(CFL) fit, Showing a language is context-free, Pumping theorem for CFL, Important closure properties of CFLs, Deterministic CFLs. <b>Algorithms and Decision Procedures for CFLs:</b> Decidable questions, Un-decidable questions. <b>Turing Machine:</b> Turing machine model, Representation, Language acceptability by TM, design of TM, Techniques for TM construction. <b>Textbook 1: Ch 13: 13.1 to 13.5, Ch 14: 14.1, 14.2, Textbook 2: Ch 9.1 to 9.6</b>			08
<b>Module 5</b>			
<b>Variants of Turing Machines (TM), The model of Linear Bounded automata:</b> Decidability: Definition of an algorithm, decidability, decidable languages, Undecidable languages, halting problem of TM, Post correspondence problem. <b>Complexity:</b> Growth rate of functions, the classes of P and NP, <b>Quantum Computation:</b> quantum computers, Church-Turing thesis.			08

  
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Textbook 2: Ch 9.7 to 9.8, 10.1 to 10.7, 12.1, 12.2, 12.8, 12.8.1, 12.8.2
Course Outcomes: The student will be able to : <ul style="list-style-type: none"> <li>• Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation</li> <li>• Learn how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models).</li> <li>• Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.</li> <li>• Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness.</li> <li>• Classify a problem with respect to different models of Computation.</li> </ul>
Question Paper Pattern: <ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>
Textbooks: <ol style="list-style-type: none"> <li>1. Elaine Rich, Automata, Computability and Complexity, 1<sup>st</sup> Edition, Pearson education, 2012/2013</li> <li>2. K L P Mishra, N Chandrasekaran , 3<sup>rd</sup> Edition, Theory of Computer Science, PHI, 2012.</li> </ol>
Reference Books: <ol style="list-style-type: none"> <li>1. John E Hopcroft, Rajeev Motwani, Jeffery D Ullman, Introduction to Automata Theory, Languages, and Computation, 3rd Edition, Pearson Education, 2013</li> <li>2. Michael Sipser : Introduction to the Theory of Computation, 3rd edition, Cengage learning, 2013</li> <li>3. John C Martin, Introduction to Languages and The Theory of Computation, 3<sup>rd</sup> Edition, Tata McGraw -Hill Publishing Company Limited, 2013</li> <li>4. Peter Linz, "An Introduction to Formal Languages and Automata", 3rd Edition, Narosa Publishers, 1998</li> <li>5. Basavaraj S. Anami, Karibasappa K G, Formal Languages and Automata theory, Wiley India, 2012</li> <li>6. C K Nagpal, Formal Languages and Automata Theory, Oxford University press, 2012.</li> </ol>

  
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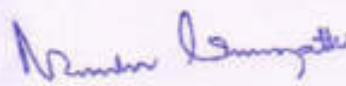


**RAPID APPLICATION DEVELOPMENT USING PYTHON**

[(Effective from the academic year 2018 -2019)

SEMESTER – V

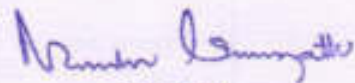
<b>Subject Code</b>	18CS55	<b>iA Marks</b>	40
<b>Number of Lecture Hours/Week</b>	03	<b>Exam Marks</b>	60
<b>Total Number of Lecture Hours</b>	40	<b>Exam Hours</b>	03
<b>CREDITS – 03</b>			
<b>Course Objectives:</b> This course (18CS55) will enable students to			
<ul style="list-style-type: none"><li>• Learn the syntax and semantics of Python programming language.</li><li>• Illustrate the process of retrieving substrings and employ regular expressions for text processing.</li><li>• Implement Object Oriented Programming concepts in Python.</li><li>• Appraise the need for working with various documents like Excel, PDF, Word and Others.</li><li>• Identify the modules for manipulating images and for sending emails using Python.</li></ul>			
<b>Module – 1</b>			<b>Teaching Hours</b>
Python Basics, Flow Control, Functions, Lists, Dictionaries and Structuring Data.			<b>8 Hours</b>
<b>Module – 2</b>			
Manipulating Strings, Pattern Matching with Regular Expressions, Reading and Writing Files, Organizing files, Debugging, Case study: data structure selection.			<b>8 Hours</b>
<b>Module – 3</b>			
Classes and Objects, Classes and Functions, Classes and Methods, Inheritance.			<b>8 Hours</b>
<b>Module – 4</b>			
Web Scraping, Working with Excel Spreadsheets, Working with PDF and Word Documents, Working with CSV Files and JSON Data.			<b>8 Hours</b>
<b>Module – 5</b>			
Keeping Time, Scheduling Tasks, and Launching Programs, Sending Email and Text Messages, Manipulating Images, Controlling the Keyboard and Mouse with GUI Automation.			<b>8 Hours</b>
<b>Course Outcomes:</b> After studying this course, students will be able to			
<ul style="list-style-type: none"><li>• Demonstrate proficiency in creating functions and handling of lists and dictionaries.</li><li>• Discover commonly used operations involving strings and regular expressions.</li><li>• Interpret the concepts of Object-Oriented Programming as used in Python.</li><li>• Determine the need for scraping websites and working with CSV, JSON and other file formats.</li><li>• Make use of modules for manipulating the images, keeping track of time and for sending emails using Python.</li></ul>			
<b>Question paper pattern:</b>			
The question paper will have ten questions. There will be 2 questions from each module. Each question will have questions covering all the topics under a module. The students will have to answer 5 full questions, selecting one full question from each module.			
<b>Text Books:</b>			
<ol style="list-style-type: none"><li>1. Al Sweigart, "Automate the Boring Stuff with Python", 1<sup>st</sup> Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <a href="https://automatetheboringstuff.com/">https://automatetheboringstuff.com/</a>) (Chapters 1 to 18)</li><li>2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2<sup>nd</sup> Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <a href="http://greenteapress.com/thinkpython2/thinkpython2.pdf">http://greenteapress.com/thinkpython2/thinkpython2.pdf</a>)</li></ol>			

  
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(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above links)

**Reference Books:**

1. Gowrishankar S, Veena A, **"Introduction to Python Programming"**, 1<sup>st</sup> Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2. Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data"**, 1<sup>st</sup> Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
3. Charles Dierbach, **"Introduction to Computer Science Using Python"**, 1<sup>st</sup> Edition, Wiley India Pvt Ltd, 2015. ISBN-13: 978-8126556014
4. Wesley J Chun, **"Core Python Applications Programming"**, 3<sup>rd</sup> Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365



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<p style="text-align: center;"><b>UNIX PROGRAMMING</b> (Effective from the academic year 2018 -2019) <b>SEMESTER – V</b></p>			
<b>Subject Code</b>	18CS56	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Objectives:</b> This course (18CS56) will enable students to			
<ul style="list-style-type: none"> <li>• Interpret the features of UNIX and basic commands.</li> <li>• Demonstrate different UNIX files and permissions</li> <li>• Implement shell programs.</li> <li>• Explain UNIX process, IPC and signals.</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<p><b>Introduction:</b> Unix Components/Architecture. Features of Unix. The UNIX Environment and UNIX Structure, Posix and Single Unix specification. General features of Unix commands/ command structure. Command arguments and options. Basic Unix commands such as echo, printf, ls, who, date, passwd, cal, Combining commands. Meaning of Internal and external commands. The type command: knowing the type of a command and locating it. The root login. Becoming the super user: su command.</p> <p><b>Unix files:</b> Naming files. Basic file types/categories. Organization of files. Hidden files. Standard directories. Parent child relationship. The home directory and the HOME variable. Reaching required files- the PATH variable, manipulating the PATH, Relative and absolute pathnames. Directory commands – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. File related commands – cat, mv, rm, cp, wc and od commands.</p>			08
<b>Module 2</b>			
<p><b>File attributes and permissions:</b> The ls command with options. Changing file permissions: the relative and absolute permissions changing methods. Recursively changing file permissions. Directory permissions.</p> <p><b>The shells interpretive cycle:</b> Wild cards. Removing the special meanings of wild cards. Three standard files and redirection. <b>Connecting commands:</b> Pipe. Basic and Extended regular expressions. The grep, egrep. Typical examples involving different regular expressions.</p> <p><b>Shell programming:</b> Ordinary and environment variables. The .profile. Read and readonly commands. Command line arguments. exit and exit status of a command. Logical operators for conditional execution. The test command and its shortcut. The if, while, for and case control statements. The set and shift commands and handling positional parameters. The here ( &lt;&lt; ) document and trap command. Simple shell program examples.</p>			08
<b>Module 3</b>			
<p><b>UNIX File APIs:</b> General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.</p> <p><b>UNIX Processes and Process Control:</b></p> <p><b>The Environment of a UNIX Process:</b> Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes.</p> <p><b>Process Control:</b> Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions.</p>			08



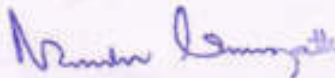
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<b>Module 4</b>	
Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection. <b>Overview of IPC Methods</b> , Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores. <b>Shared Memory</b> , Client-Server Properties, Stream Pipes, Passing File Descriptors, An Open Server-Version 1, Client-Server Connection Functions.	08
<b>Module 5</b>	
<b>Signals and Daemon Processes:</b> Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.1b Timers. Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.	08
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Explain Unix Architecture, File system and use of Basic Commands</li> <li>• Illustrate Shell Programming and to write Shell Scripts</li> <li>• Categorize, compare and make use of Unix System Calls</li> <li>• Build an application/service over a Unix system.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Sumitabha Das., Unix Concepts and Applications., 4<sup>th</sup> Edition., Tata McGraw Hill ( Chapter 1,2,3,4,5,6,8,13,14)</li> <li>2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005 ( Chapter 3,7,8,10,13,15)</li> <li>3. Unix System Programming Using C++ - Terrence Chan, PHI, 1999. ( Chapter 7,8,9,10)</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. M.G. Venkatesh Murthy: UNIX &amp; Shell Programming, Pearson Education.</li> <li>2. Richard Blum , Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2nd Edition, Wiley, 2014.</li> </ol>	

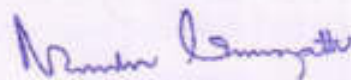
  
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**COMPUTER NETWORK LABORATORY**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – V**

<b>Subject Code</b>	18CSL57	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs
<b>Credits – 2</b>			
<b>Course Learning Objectives:</b> This course (18CSL57) will enable students to:			
<ul style="list-style-type: none"> <li>• Demonstrate operation of network and its management commands</li> <li>• Simulate and demonstrate the performance of GSM and CDMA</li> <li>• Implement data link layer and transport layer protocols.</li> </ul>			
<b>Descriptions (if any):</b>			
<ul style="list-style-type: none"> <li>• For the experiments below modify the topology and parameters set for the experiment and take multiple rounds of reading and analyze the results available in log files. Plot necessary graphs and conclude. Use NS2/NS3.</li> </ul>			
<b>Programs List:</b>			
<b>PART A</b>			
1.	Implement three nodes point – to – point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.		
2.	Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.		
3.	Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.		
4.	Implement simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.		
5.	Implement and study the performance of GSM on NS2/NS3 (Using MAC layer) or equivalent environment.		
6.	Implement and study the performance of CDMA on NS2/NS3 (Using stack called Call net) or equivalent environment		
<b>PART B (Implement the following in Java)</b>			
7.	Write a program for error detecting code using CRC-CCITT (16- bits).		
8.	Write a program to find the shortest path between vertices using bellman-ford algorithm.		
9.	Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.		
10.	Write a program on datagram socket for client/server to display the messages on client side, typed at the server side.		
11.	Write a program for simple RSA algorithm to encrypt and decrypt the data.		
12.	Write a program for congestion control using leaky bucket algorithm.		
<b>Laboratory Outcomes:</b> The student should be able to:			
<ul style="list-style-type: none"> <li>• Analyze and Compare various networking protocols.</li> <li>• Demonstrate the working of different concepts of networking.</li> <li>• Implement, analyze and evaluate networking protocols in NS2 / NS3 and JAVA programming language</li> </ul>			
<b>Conduct of Practical Examination:</b>			
<ul style="list-style-type: none"> <li>• All laboratory experiments, excluding the first, are to be included for practical examination.</li> <li>• Experiment distribution</li> </ul>			

  
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- For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.
- For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure part to be made zero.
- Marks Distribution (*Subjected to change in accordance with university regulations*)
  - i) For questions having only one part – Procedure + Execution + Viva-Voce:  $15+70+15 = 100$  Marks
  - j) For questions having part A and B
    - i. Part A – Procedure + Execution + Viva =  $4 + 21 + 5 = 30$  Marks
    - ii. Part B – Procedure + Execution + Viva =  $10 + 49 + 11 = 70$  Marks



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**DBMS LABORATORY WITH MINI PROJECT**  
(Effective from the academic year 2018 -2019)

**SEMESTER – V**

<b>Subject Code</b>	18CSL58	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs

**Credits – 2**

**Course Learning Objectives:** This course (18CSL58) will enable students to:

- Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
- Strong practice in SQL programming through a variety of database problems.
- Develop database applications using front-end tools and back-end DBMS.

**Descriptions (if any):**

**PART-A: SQL Programming (Max. Exam Mks. 50)**

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Create Schema and insert at least 5 records for each table. Add appropriate database constraints.

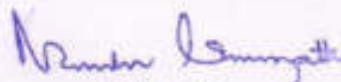
**PART-B: Mini Project (Max. Exam Mks. 30)**

- Use Java, C#, PHP, Python, or any other similar front-end tool. All applications must be demonstrated on desktop/laptop as a stand-alone or web based application (Mobile apps on Android/IOS are not permitted.)

**Programs List:**

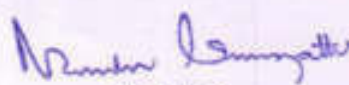
**PART A**

1.	<p>Consider the following schema for a Library Database:            BOOK(Book_id, Title, Publisher Name, Pub Year)            BOOK_AUTHORS(Book_id, Author Name)            PUBLISHER(Name, Address, Phone)            BOOK_COPIES(Book_id, Branch_id, No-of Copies)            BOOK_LENDING(Book_id, Branch_id, Card No, Date Out, Due Date)            LIBRARY_BRANCH(Branch_id, Branch Name, Address)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc.</li> <li>2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.</li> <li>3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.</li> <li>4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.</li> <li>5. Create a view of all books and its number of copies that are currently available in the Library.</li> </ol>
2.	<p>Consider the following schema for Order Database:            SALESMAN(Salesman_id, Name, City, Commission)            CUSTOMER(Customer_id, Cust Name, City, Grade, Salesman_id)            ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. Count the customers with grades above Bangalore's average.</li> <li>2. Find the name and numbers of all salesman who had more than one customer.</li> </ol>



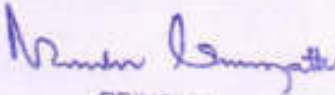
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	<ol style="list-style-type: none"> <li>List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation.)</li> <li>Create a view that finds the salesman who has the customer with the highest order of a day.</li> <li>Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.</li> </ol>
3.	<p>Consider the schema for Movie Database:          ACTOR(Act_id, Act_Name, Act_Gender)          DIRECTOR(Dir_id, Dir_Name, Dir_Phone)          MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)          MOVIE_CAST(Act_id, Mov_id, Role)          RATING(Mov_id, Rev_Stars)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>List the titles of all movies directed by 'Hitchcock'.</li> <li>Find the movie names where one or more actors acted in two or more movies.</li> <li>List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).</li> <li>Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.</li> <li>Update rating of all movies directed by 'Steven Spielberg' to 5.</li> </ol>
4.	<p>Consider the schema for College Database:          STUDENT(USN, SName, Address, Phone, Gender)          SEMSEC(SSID, Sem, Sec)          CLASS(USN, SSID)          SUBJECT(Subcode, Title, Sem, Credits)          IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>List all the student details studying in fourth semester 'C' section.</li> <li>Compute the total number of male and female students in each semester and in each section.</li> <li>Create a view of Test1 marks of student USN '1BI15CS101' in all subjects.</li> <li>Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.</li> <li>Categorize students based on the following criterion:              If FinalIA = 17 to 20 then CAT = 'Outstanding'              If FinalIA = 12 to 16 then CAT = 'Average'              If FinalIA &lt; 12 then CAT = 'Weak'              Give these details only for 8<sup>th</sup> semester A, B, and C section students.</li> </ol>
5.	<p>Consider the schema for Company Database:          EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo)          DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate)          DLOCATION(DNo, DLoc)          PROJECT(PNo, PName, PLocation, DNo)          WORKS_ON(SSN, PNo, Hours)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.</li> <li>Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.</li> </ol>

  
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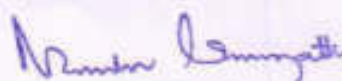


	<ol style="list-style-type: none"> <li>3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department</li> <li>4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).</li> <li>5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.</li> </ol>
<b>PART B: Mini Project</b>	
•	For any problem selected
•	Make sure that the application should have five or more tables
•	Indicative areas include; health care
<b>Laboratory Outcomes:</b> The student should be able to:	
<ul style="list-style-type: none"> <li>• Create, Update and query on the database.</li> <li>• Demonstrate the working of different concepts of DBMS</li> <li>• Implement, analyze and evaluate the project developed for an application.</li> </ul>	
<b>Conduct of Practical Examination:</b>	
<ul style="list-style-type: none"> <li>• All laboratory experiments, excluding the first, are to be included for practical examination.</li> <li>• Experiment distribution <ul style="list-style-type: none"> <li>○ For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.</li> <li>○ For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.</li> </ul> </li> <li>• Change of experiment is allowed only once and marks allotted for procedure part to be made zero.</li> <li>• Marks Distribution (<i>Subjected to change in accordance with university regulations</i>) <ol style="list-style-type: none"> <li>k) For questions having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks</li> <li>l) For questions having part A and B <ol style="list-style-type: none"> <li>i. Part A – Procedure + Execution + Viva = 4 + 21 + 5 = 30 Marks</li> <li>ii. Part B – Procedure + Execution + Viva = 10 + 49 + 11 = 70 Marks</li> </ol> </li> </ol> </li> </ul>	

  
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**SYSTEM SOFTWARE AND COMPILER**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VI**

<b>Subject Code</b>	18CS61	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS61) will enable students to:			
<ul style="list-style-type: none"> <li>• Define System Software such as Assemblers, Loaders, Linkers and Macroprocessors</li> <li>• Familiarize with source file, object file and executable file structures and libraries</li> <li>• Describe the front-end and back-end phases of compiler and their importance to students</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
Introduction to System Software, Machine Architecture of SIC and SIC/XE. <b>Assemblers:</b> Basic assembler functions, machine dependent assembler features, machine independent assembler features, assembler design options. <b>Macroprocessors:</b> Basic macro processor functions, <b>Text book 1: Chapter 1: 1.1,1.2,1.3.1,1.3.2, Chapter2 : 2.1-2.4,Chapter4: 4.1.1,4.1.2</b>			10
<b>Module 2</b>			
<b>Loaders and Linkers:</b> Basic Loader Functions, Machine Dependent Loader Features, Machine Independent Loader Features, Loader Design Options, Implementation Examples. <b>Text book 1 : Chapter 3 ,3.1 -3.5</b>			10
<b>Module 3</b>			
<b>Introduction:</b> Language Processors, The structure of a compiler, The evaluation of programming languages, The science of building compiler, Applications of compiler technology, Programming language basics <b>Lexical Analysis:</b> The role of lexical analyzer, Input buffering, Specifications of token, recognition of tokens, lexical analyzer generator, Finite automate. <b>Text book 2:Chapter 1 1.1-1.6 Chapter 3 3.1 – 3.6</b>			10
<b>Module 4</b>			
Syntax Analysis: Introduction, Role Of Parsers, Context Free Grammars, Writing a grammar, Top Down Parsers, Bottom-Up Parsers, Operator-Precedence Parsing <b>Text book 2: Chapter 4 4.1 4.2 4.3 4.4 4.5 4.6 Text book 1 : 5.1.3</b>			10
<b>Module 5</b>			
Syntax Directed Translation, Intermediate code generation, Code generation <b>Text book 2: Chapter 5.1, 5.2, 5.3, 6.1, 6.2, 8.1, 8.2</b>			10
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"> <li>• Explain system software such as assemblers, loaders, linkers and macroprocessors</li> <li>• Design and develop lexical analyzers, parsers and code generators</li> <li>• Utilize lex and yacc tools for implementing different concepts of system software</li> </ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>			
<b>Textbooks:</b>			
1. System Software by Leland. L. Beck, D Manjula, 3 <sup>rd</sup> edition, 2012			

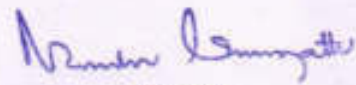


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2. Compilers-Principles, Techniques and Tools by Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman. Pearson. 2<sup>nd</sup> edition, 2007

**Reference Books:**

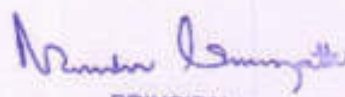
1. Systems programming – Srimanta Pal , Oxford university press, 2016
2. System programming and Compiler Design, K C Louden, Cengage Learning
3. System software and operating system by D. M. Dhamdhare TMG
4. Compiler Design, K Munceswaran, Oxford University Press 2013.



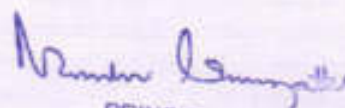
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**COMPUTER GRAPHICS AND VISUALIZATION**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VI**

<b>Subject Code</b>	18CS62	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS62) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain hardware, software and OpenGL Graphics Primitives.</li> <li>• Illustrate interactive computer graphic using the OpenGL.</li> <li>• Design and implementation of algorithms for 2D graphics Primitives and attributes.</li> <li>• Demonstrate Geometric transformations, viewing on both 2D and 3D objects.</li> <li>• Infer the representation of curves, surfaces, Color and Illumination models</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<p><b>Overview: Computer Graphics and OpenGL:</b> Computer Graphics:Basics of computer graphics, Application of Computer Graphics, Video Display Devices: Random Scan and Raster Scan displays, color CRT monitors, Flat panel displays. Raster-scan systems: video controller, raster scan Display processor, graphics workstations and viewing systems, Input devices, graphics networks, graphics on the internet, graphics software. OpenGL: Introduction to OpenGL ,coordinate reference frames, specifying two-dimensional world coordinate reference frames in OpenGL, OpenGL point functions, OpenGL line functions, point attributes, line attributes, curve attributes, OpenGL point attribute functions, OpenGL line attribute functions, Line drawing algorithms(DDA, Bresenham's), circle generation algorithms (Bresenham's).</p> <p><b>Text-1:Chapter -1: 1-1 to 1-9,2-1 to 2-9 (Excluding 2-5),3-1 to 3-5,3-9,3-20</b></p>			10
<b>Module 2</b>			
<p><b>Fill area Primitives, 2D Geometric Transformations and 2D viewing:</b> Fill area Primitives: Polygon fill-areas, OpenGL polygon fill area functions, fill area attributes, general scan line polygon fill algorithm, OpenGL fill-area attribute functions. 2DGeometric Transformations: Basic 2D Geometric Transformations, matrix representations and homogeneous coordinates. Inverse transformations, 2DComposite transformations, other 2D transformations, raster methods for geometric transformations, OpenGL raster transformations, OpenGL geometric transformations function, 2D viewing: 2D viewing pipeline, OpenGL 2D viewing functions.</p> <p><b>Text-1:Chapter 3-14 to 3-16,4-9,4-10,4-14,5-1 to 5-7,5-17,6-1,6-4</b></p>			10
<b>Module 3</b>			
<p><b>Clipping,3D Geometric Transformations, Color and Illumination Models:</b> Clipping: clipping window, normalization and viewport transformations, clipping algorithms,2D point clipping, 2D line clipping algorithms: cohen-sutherland line clipping only -polygon fill area clipping: Sutherland-Hodgeman polygon clipping algorithm only.3DGeometric Transformations: 3D translation, rotation, scaling, composite 3D transformations, other 3D transformations, affine transformations, OpenGL geometric transformations functions. Color Models: Properties of light, color models, RGB and CMY color models. Illumination Models: Light sources, basic illumination models-Ambient light, diffuse reflection, specular and phong model, Corresponding openGL functions.</p> <p><b>Text-1:Chapter :6-2 to 6-08 (Excluding 6-4),5-9 to 5-17(Excluding 5-15),12-1,12-2,12-4,12-6,10-1,10-3</b></p>			10
<b>Module 4</b>			
<b>3D Viewing and Visible Surface Detection:</b> 3DViewing:3D viewing concepts, 3D viewing			10

  
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<p>pipeline, 3D viewing coordinate parameters . Transformation from world to viewing coordinates, Projection transformation, orthogonal projections, perspective projections, The viewport transformation and 3D screen coordinates. OpenGL 3D viewing functions. Visible Surface Detection Methods: Classification of visible surface Detection algorithms, back face detection, depth buffer method and OpenGL visibility detection functions.</p> <p><b>Text-1:Chapter: 7-1 to 7-10(Excluding 7-7), 9-1 to 9-3, 9-14</b></p>	
<p><b>Module 5</b></p>	
<p><b>Input&amp; interaction, Curves and Computer Animation:</b> Input and Interaction: Input devices, clients and servers, Display Lists, Display Lists and Modelling, Programming Event Driven Input, Menus Picking, Building Interactive Models, Animating Interactive programs, Design of Interactive programs, Logic operations .Curved surfaces, quadric surfaces, OpenGL Quadric-Surface and Cubic-Surface Functions, Bezier Spline Curves, Bezier surfaces, OpenGL curve functions. Corresponding openGL functions.</p> <p><b>Text-1:Chapter :8-3 to 8-6 (Excluding 8-5),8-9,8-10,8-11,3-8,8-18,13-11,3-2,13-3,13-4,13-10</b></p> <p><b>Text-2:Chapter 3: 3-1 to 3.11: Input&amp; interaction</b></p>	10
<p><b>Course Outcomes:</b> The student will be able to :</p>	
<ul style="list-style-type: none"> <li>• Design and implement algorithms for 2D graphics primitives and attributes.</li> <li>• Illustrate Geometric transformations on both 2D and 3D objects.</li> <li>• Apply concepts of clipping and visible surface detection in 2D and 3D viewing, and Illumination Models.</li> </ul>	
<p>Decide suitable hardware and software for developing graphics packages using OpenGL.</p>	
<p><b>Question Paper Pattern:</b></p>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<p><b>Textbooks:</b></p>	
<ol style="list-style-type: none"> <li>1. Donald Hearn &amp; Pauline Baker: Computer Graphics with OpenGL Version,3<sup>rd</sup> / 4<sup>th</sup> Edition, Pearson Education,2011</li> <li>2. Edward Angel: Interactive Computer Graphics- A Top Down approach with OpenGL, 5<sup>th</sup> edition. Pearson Education, 2008</li> </ol>	
<p><b>Reference Books:</b></p>	
<ol style="list-style-type: none"> <li>1. James D Foley, Andries Van Dam, Steven K Feiner, John F Huges Computer graphics with OpenGL: pearson education</li> <li>2. Xiang, Plastock : Computer Graphics , sham's outline series, 2<sup>nd</sup> edition, TMG.</li> <li>3. Kelvin Sung, Peter Shirley, steven Baer : Interactive Computer Graphics, concepts and applications, Cengage Learning</li> <li>4. M M Raiker, Computer Graphics using OpenGL, Filip learning/Elsevier</li> </ol>	

  
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**CLOUD COMPUTING AND ITS APPLICATIONS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VI**

<b>Subject Code</b>	18CS63	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:2:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS63) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain the fundamentals of cloud computing</li> <li>• Illustrate the cloud application programming and aneka platform</li> <li>• Contrast different cloud platforms used in industry</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
Introduction ,Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjrasoft Aneka Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples Xen: Paravirtualization, VMware: Full Virtualization, Microsoft Hyper-V			10
<b>Module 2</b>			<b>Contact Hours</b>
Cloud Computing Architecture, Introduction, Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Definition, Cloud Interoperability and Standards Scalability and Fault Tolerance Security, Trust, and Privacy Organizational Aspects Aneka: Cloud Application Platform, Framework Overview, Anatomy of the Aneka Container, From the Ground Up: Platform Abstraction Layer, Fabric Services, foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management, Aneka SDK, Management Tools			10
<b>Module 3</b>			<b>Contact Hours</b>
Concurrent Computing: Thread Programming, Introducing Parallelism for Single Machine Computation, Programming Applications with Threads, What is a Thread?, Thread APIs, Techniques for Parallel Computation with Threads, Multithreading with Aneka, Introducing the Thread Programming Model, Aneka Thread vs. Common Threads, Programming Applications with Aneka Threads, Aneka Threads Application Model, Domain Decomposition: Matrix Multiplication, Functional Decomposition: Sine, Cosine, and Tangent. High-Throughput Computing: Task Programming, Task Computing, Characterizing a Task, Computing Categories, Frameworks for Task Computing, Task-based Application Models, Embarrassingly Parallel Applications, Parameter Sweep Applications, MPI Applications, Workflow Applications with Task Dependencies, Aneka Task-Based Programming, Task Programming Model, Developing Applications with the Task Model, Developing Parameter			10

  
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Sweep Application, Managing Workflows	
<b>Module 4</b>	
Data Intensive Computing: Map-Reduce Programming, What is Data-Intensive Computing?, Characterizing Data-Intensive Computations, Challenges Ahead, Historical Perspective, Technologies for Data-Intensive Computing, Storage Systems, Programming Platforms, Aneka MapReduce Programming, Introducing the MapReduce Programming Model, Example Application	10
<b>Module 5</b>	
Cloud Platforms in Industry, Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google AppEngine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Applications Scientific Applications, Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Biology: Gene Expression Data Analysis for Cancer Diagnosis, Geoscience: Satellite Image Processing, Business and Consumer Applications, CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.	10
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Explain cloud computing, virtualization and classify services of cloud computing</li> <li>• Illustrate architecture and programming in cloud</li> <li>• Describe the platforms for development of cloud applications and List the application of cloud.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education	
<b>Reference Books:</b>	
1. Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, Elsevier 2013.	

  
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**DATA MINING AND DATA WAREHOUSING**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VI**

<b>Subject Code</b>	18CS641	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS641) will enable students to:			
<ul style="list-style-type: none"> <li>• Define multi-dimensional data models.</li> <li>• Explain rules related to association, classification and clustering analysis.</li> <li>• Compare and contrast between different classification and clustering algorithms</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Data Warehousing &amp; modeling:</b> Basic Concepts: Data Warehousing: A multitier Architecture, Data warehouse models: Enterprise warehouse, Data mart and virtual warehouse, Extraction, Transformation and loading, Data Cube: A multidimensional data model, Stars, Snowflakes and Fact constellations: Schemas for multidimensional Data models, Dimensions: The role of concept Hierarchies, Measures: Their Categorization and computation, Typical OLAP Operations			08
<b>Module 2</b>			
<b>Data warehouse implementation&amp; Data mining:</b> Efficient Data Cube computation: An overview, Indexing OLAP Data: Bitmap index and join index, Efficient processing of OLAP Queries, OLAP server Architecture ROLAP versus MOLAP Versus HOLAP. : Introduction: What is data mining, Challenges, Data Mining Tasks, Data: Types of Data, Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity.			08
<b>Module 3</b>			
<b>Association Analysis:</b> Association Analysis: Problem Definition, Frequent Item set Generation, Rule generation. Alternative Methods for Generating Frequent Item sets, FP-Growth Algorithm, Evaluation of Association Patterns.			08
<b>Module 4</b>			
<b>Classification :</b> Decision Trees Induction, Method for Comparing Classifiers, Rule Based Classifiers, Nearest Neighbor Classifiers, Bayesian Classifiers.			08
<b>Module 5</b>			
<b>Clustering Analysis:</b> Overview, K-Means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation, Density-Based Clustering, Graph-Based Clustering, Scalable Clustering Algorithms.			08
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"> <li>• Identify data mining problems and implement the data warehouse</li> <li>• Write association rules for a given data pattern.</li> <li>• Choose between classification and clustering solution.</li> </ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>			
<b>Textbooks:</b>			
1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson, First			

  
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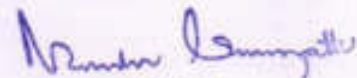


impression,2014.

2. Jiawei Han, Micheline Kamber, Jian Pei: Data Mining -Concepts and Techniques, 3<sup>rd</sup> Edition, Morgan Kaufmann Publisher, 2012.

**Reference Books:**

1. Sam Anahory, Dennis Murray: Data Warehousing in the Real World, Pearson,Tenth Impression,2012.
2. Michael J.Berry,Gordon S.Linoff: Mastering Data Mining , Wiley Edition, second edition,2012.



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**OBJECT ORIENTED MODELING AND DESIGN**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VI**

<b>Subject Code</b>	18CS642	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS –3**

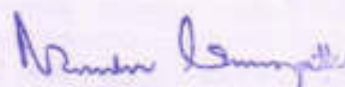
**Course Learning Objectives:** This course (18CS642) will enable students to:

- Describe the concepts involved in Object-Oriented modelling and their benefits.
- Demonstrate concept of use-case model, sequence model and state chart model for a given problem.
- Explain the facets of the unified process approach to design and build a Software system.
- Translate the requirements into implementation for Object Oriented design.
- Choose an appropriate design pattern to facilitate development procedure.

<b>Module 1</b>	<b>Contact Hours</b>
<p><b>Introduction, Modelling Concepts and Class Modelling:</b> What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique; Modelling; abstraction; The Three models. Class Modelling: Object and Class Concept; Link and associations concepts; Generalization and Inheritance; A sample class model; Navigation of class models; Advanced Class Modelling, Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived Data; Packages.</p> <p><b>Text Book-1: Ch 1, 2, 3 and 4</b></p>	08
<p><b>Module 2</b></p> <p>UseCase Modelling and Detailed Requirements: Overview; Detailed object-oriented Requirements definitions; System Processes-A use case/Scenario view; Identifying Input and outputs-The System sequence diagram; Identifying Object Behaviour-The state chart Diagram; Integrated Object-oriented Models.</p> <p><b>Text Book-2:Chapter- 6:Page 210 to 250</b></p>	08
<p><b>Module 3</b></p> <p>Process Overview, System Conception and Domain Analysis: Process Overview: Development stages; Development life Cycle; System Conception: Devising a system concept; elaborating a concept; preparing a problem statement. Domain Analysis: Overview of analysis; Domain Class model: Domain state model; Domain interaction model; Iterating the analysis.</p> <p><b>Text Book-1:Chapter- 10,11,and 12</b></p>	08
<p><b>Module 4</b></p> <p>Use case Realization :The Design Discipline within up iterations: Object Oriented Design-The Bridge between Requirements and Implementation; Design Classes and Design within Class Diagrams; Interaction Diagrams-Realizing Use Case and defining methods; Designing with Communication Diagrams; Updating the Design Class Diagram; Package Diagrams-Structuring the Major Components; Implementation Issues for Three-Layer Design.</p> <p><b>Text Book-2: Chapter 8: page 292 to 346</b></p>	08
<p><b>Module 5</b></p> <p>Design Patterns: Introduction; what is a design pattern?, Describing design patterns, the catalogue of design patterns, Organizing the catalogue, How design patterns solve design problems, how to select a design patterns, how to use a design pattern; Creational patterns:</p>	08

  
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prototype and singleton (only); structural patterns adaptor and proxy (only).
<b>Text Book-3: Ch-1: 1.1, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8,Ch-3,Ch-4.</b>
<b>Course Outcomes:</b> The student will be able to :
<ul style="list-style-type: none"> <li>• Describe the concepts of object-oriented and basic class modelling.</li> <li>• Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.</li> <li>• Choose and apply a befitting design pattern for the given problem.</li> </ul>
<b>Question Paper Pattern:</b>
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>
<b>Textbooks:</b>
<ol style="list-style-type: none"> <li>1. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML,2<sup>nd</sup> Edition, Pearson Education,2005</li> <li>2. Satzinger, Jackson and Burd: Object-Oriented Analysis &amp; Design with the Unified Process, Cengage Learning, 2005.</li> <li>3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides: Design Patterns –Elements of Reusable Object-Oriented Software, Pearson Education,2007.</li> </ol>
<b>Reference Books:</b>
<ol style="list-style-type: none"> <li>1. Grady Booch et. al.: Object-Oriented Analysis and Design with Applications,3<sup>rd</sup> Edition,Pearson Education,2007.</li> <li>2. Frank Buschmann, RegineMeunier, Hans Rohnert, Peter Sommerlad, Michel Stal: Pattern – Oriented Software Architecture. A system of patterns , Volume 1, John Wiley and Sons.2007.</li> <li>3. Booch, Jacobson, Rumbaugh : Object-Oriented Analysis and Design with Applications, 3<sup>rd</sup> edition, pearson, Reprint 2013</li> </ol>

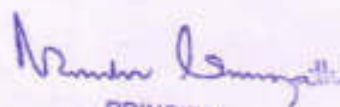
  
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**CRYPTOGRAPHY, NETWORK SECURITY AND CYBERLAW**

(Effective from the academic year 2018 -2019)

**SEMESTER – VI**

<b>Subject Code</b>	18CS643	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS643) will enable students to:			
<ul style="list-style-type: none"><li>• Explain the concepts of Cyber security</li><li>• Illustrate key management issues and solutions.</li><li>• Familiarize with Cryptography and very essential algorithms</li><li>• Introduce cyber Law and ethics to be followed.</li></ul>			
<b>Module 1</b>			<b>Contact Hours</b>
Introduction - Cyber Attacks, Defence Strategies and Techniques, Guiding Principles, Mathematical Background for Cryptography - Modulo Arithmetic's, The Greatest Comma Divisor, Useful Algebraic Structures, Chinese Remainder Theorem, Basics of Cryptography - Preliminaries, Elementary Substitution Ciphers, Elementary Transport Ciphers, Other Cipher Properties, Secret Key Cryptography – Product Ciphers, DES Construction.			08
<b>Module 2</b>			<b>Contact Hours</b>
Public Key Cryptography and RSA – RSA Operations, Why Does RSA Work?, Performance, Applications, Practical Issues, Public Key Cryptography Standard (PKCS), Cryptographic Hash - Introduction, Properties, Construction, Applications and Performance, The Birthday Attack, Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications.			08
<b>Module 3</b>			<b>Contact Hours</b>
Key Management - Introduction, Digital Certificates, Public Key Infrastructure, Identity-based Encryption, Authentication-I - One way Authentication, Mutual Authentication, Dictionary Attacks, Authentication – II – Centralised Authentication, The Needham-Schroeder Protocol, Kerberos, Biometrics, IPSec-Security at the Network Layer – Security at Different layers: Pros and Cons, IPSec in Action, Internet Key Exchange (IKE) Protocol, Security Policy and IPSEC, Virtual Private Networks, Security at the Transport Layer - Introduction, SSL Handshake Protocol, SSL Record Layer Protocol, OpenSSL.			08
<b>Module 4</b>			<b>Contact Hours</b>
IEEE 802.11 Wireless LAN Security - Background, Authentication, Confidentiality and Integrity, Viruses, Worms, and Other Malware, Firewalls – Basics, Practical Issues, Intrusion Prevention and Detection - Introduction, Prevention Versus Detection, Types of Intrusion Detection Systems, DDoS Attacks Prevention/Detection, Web Service Security – Motivation, Technologies for Web Services, WS- Security, SAML, Other Standards.			08
<b>Module 5</b>			<b>Contact Hours</b>
IT act aim and objectives, Scope of the act, Major Concepts, Important provisions, Attribution, acknowledgement, and dispatch of electronic records, Secure electronic records and secure digital signatures, Regulation of certifying authorities: Appointment of Controller and Other officers, Digital Signature certificates, Duties of Subscribers, Penalties and adjudication, The cyber regulations appellate tribunal, Offences, Network service providers not to be liable in certain cases, Miscellaneous Provisions.			08
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"><li>• Discuss cryptography and its need to various applications</li></ul>			

  
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- Design and develop simple cryptography algorithms
- Understand cyber security and need cyber Law

**Question Paper Pattern:**

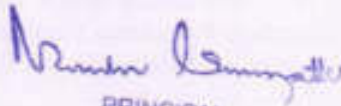
- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition (Chapters-1,3,4,5,6,7,8,9,10,11,12,13,14,15,19(19.1-19.5),21(21.1-21.2),22(22.1-22.4),25)

**Reference Books:**

1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyay, Mc-GrawHill, 3<sup>rd</sup> Edition, 2015
2. Cryptography and Network Security- William Stallings, Pearson Education, 7<sup>th</sup> Edition
3. Cyber Law simplified- Vivek Sood, Mc-GrawHill, 11<sup>th</sup> reprint , 2013
4. Cyber security and Cyber Laws, Alfred Basta, Nadine Basta, Mary brown, ravindra kumar, Cengage learning

  
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MOBILE APPLICATION DEVELOPMENT (OPEN ELECTIVE) (Effective from the academic year 2018 -2019) SEMESTER – VI			
Subject Code	18CS651	CIE Marks	40
Number of Contact Hours/Week	3:0:0	SEE Marks	60
Total Number of Contact Hours	40	Exam Hours	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS651) will enable students to:			
<ul style="list-style-type: none"> <li>• Learn to setup Android application development environment</li> <li>• Illustrate user interfaces for interacting with apps and triggering actions</li> <li>• Interpret tasks used in handling multiple activities</li> <li>• Identify options to save persistent application data</li> <li>• Appraise the role of security and performance in Android applications</li> </ul>			
<b>Module – 1</b>			<b>Teaching Hours</b>
Get started, Build your first app, Activities, Testing, debugging and using support libraries			<b>8 Hours</b>
<b>Module – 2</b>			<b>8 Hours</b>
User Interaction, Delightful user experience, Testing your UI			<b>8 Hours</b>
<b>Module – 3</b>			<b>8 Hours</b>
Background Tasks, Triggering, scheduling and optimizing background tasks			<b>8 Hours</b>
<b>Module – 4</b>			<b>8 Hours</b>
All about data, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders			<b>8 Hours</b>
<b>Module – 5</b>			<b>8 Hours</b>
Permissions, Performance and Security, Firebase and AdMob, Publish			<b>8 Hours</b>
<b>Course outcomes:</b> The students should be able to:			
<ul style="list-style-type: none"> <li>• Create, test and debug Android application by setting up Android development environment</li> <li>• Implement adaptive, responsive user interfaces that work across a wide range of devices.</li> <li>• Infer long running tasks and background work in Android applications</li> <li>• Demonstrate methods in storing, sharing and retrieving data in Android applications</li> <li>• Analyze performance of android applications and understand the role of permissions and security</li> <li>• Describe the steps involved in publishing Android application to share with the world</li> </ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> </ul> <p>The students will have to answer 5 full questions, selecting one full question from each module.</p>			
<b>Textbooks:</b>			
1. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. <a href="https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details">https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details</a> (Download pdf file from the above link)			
<b>Reference Books:</b>			

*Nandha Kumar*

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5. Erik Hellman, "Android Programming – Pushing the Limits", 1<sup>st</sup> Edition, Wiley India Pvt Ltd, 2014.
6. Dawn Griffiths and David Griffiths, "Head First: Android Development", 1<sup>st</sup> Edition, O'Reilly SPD Publishers, 2015.
7. J F DiMarzio, "Beginning Android Programming with Android Studio", 4<sup>th</sup> Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
8. Anubhav Pradhan, Anil V Deshpande, " Composing Mobile Apps" using Android, Wiley 2014, ISBN: 978-81-265-4660-2

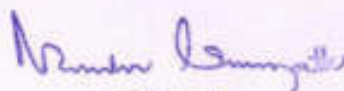
  
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**INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS**

(Effective from the academic year 2018 -2019)

**SEMESTER – VI**

<b>Subject Code</b>	18CS652	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS652) will enable students to:			
<b>Module 1</b>			<b>Contact Hours</b>
Introduction to C, constants, variables, data types, input output operations, operators and expressions, control statements, arrays, strings, built-in functions, user defined functions, structures, unions and pointers			08
<b>Text Book 1: Chapter 1 and 2</b>			
<b>Module 2</b>			
Algorithms, Asymptotic notations, Introduction to data structures, Types of data structures, Arrays.			08
<b>Text Book 1: Chapter 3 and 4</b>			
<b>Module 3</b>			
Linked lists, Stacks			08
<b>Text Book 1: Chapter 5 and 6</b>			
<b>Module 4</b>			
Queues, Trees			08
<b>Text Book 1: Chapter 7 and 8</b>			
<b>Module 5</b>			
Graphs, Sorting ,(selection, insertion, bubble, quick)and searching(Linear, Binary, Hash)			08
<b>Text Book 1: Chapter 7 and 8</b>			
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"><li>• Identify different data structures in C programming language</li><li>• Appraise the use of data structures in problem solving</li><li>• Implement data structures using C programming language.</li></ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"><li>• The question paper will have ten questions.</li><li>• Each full Question consisting of 20 marks</li><li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li><li>• Each full question will have sub questions covering all the topics under a module.</li><li>• The students will have to answer 5 full questions, selecting one full question from each module.</li></ul>			
<b>Textbooks:</b>			
1. Data structures using C , E Balagurusamy, McGraw Hill education (India) Pvt. Ltd, 2013.			
<b>Reference Books:</b>			
NIL			

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PYTHON APPLICATION PROGRAMMING (OPEN ELECTIVE) (Effective from the academic year 2018 -2019) SEMESTER – VI			
<b>Subject Code</b>	18CS653	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS653) will enable students to:			
<ul style="list-style-type: none"> <li>• Learn Syntax and Semantics and create Functions in Python.</li> <li>• Handle Strings and Files in Python.</li> <li>• Understand Lists, Dictionaries and Regular expressions in Python.</li> <li>• Implement Object Oriented Programming concepts in Python</li> <li>• Build Web Services and introduction to Network and Database Programming in Python.</li> </ul>			
<b>Module – 1</b>			<b>Teaching Hours</b>
Why should you learn to write programs, Variables, expressions and statements, Conditional execution, Functions			<b>8 Hours</b>
<b>Module – 2</b>			
Iteration, Strings, Files			<b>8 Hours</b>
<b>Module – 3</b>			
Lists, Dictionaries, Tuples, Regular Expressions			<b>8 Hours</b>
<b>Module – 4</b>			
Classes and objects, Classes and functions, Classes and methods			<b>8 Hours</b>
<b>Module – 5</b>			
Networked programs, Using Web Services, Using databases and SQL			<b>8 Hours</b>
<b>Course outcomes:</b> The students should be able to:			
<ul style="list-style-type: none"> <li>• Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.</li> <li>• Demonstrate proficiency in handling Strings and File Systems.</li> <li>• Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.</li> <li>• Interpret the concepts of Object-Oriented Programming as used in Python.</li> <li>• Implement exemplary applications related to Network Programming, Web Services and Databases in Python.</li> </ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>			
<b>Text Books:</b>			
3. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1 <sup>st</sup> Edition, CreateSpace Independent Publishing Platform, 2016. ( <a href="http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf">http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf</a> ) (Chapters 1 – 13, 15)			



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4. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2<sup>nd</sup> Edition, Green Tea Press, 2015. (<http://greenteapress.com/thinkpython2/thinkpython2.pdf>) (Chapters 15, 16, 17) (Download pdf files from the above links)

**Reference Books:**

1. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014
2. Mark Lutz, "Programming Python", 4th Edition, O'Reilly Media, 2011. ISBN-13: 978-9350232873
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176
5. Reema Thareja, "Python Programming using problem solving approach", Oxford university press, 2017

*Nanda Lakshmi*

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**SYSTEM SOFTWARE AND OPERATING SYSTEM LABORATORY**

(Effective from the academic year 2018 -2019)

**SEMESTER – VI**

<b>Subject Code</b>	18CSL66	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs

**Credits – 2**

**Course Learning Objectives:** This course (18CSL66) will enable students to:

- To make students familiar with Lexical Analysis and Syntax Analysis phases of Compiler Design and implement programs on these phases using LEX & YACC tools and/or C/C++/Java
- To enable students to learn different types of CPU scheduling algorithms used in operating system.
- To make students able to implement memory management - page replacement and deadlock handling algorithms

**Descriptions (if any):**

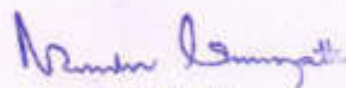
Exercises to be prepared with minimum three files (Where ever necessary):

1. Header file.
2. Implementation file.
3. Application file where main function will be present.

The idea behind using three files is to differentiate between the developer and user sides. In the developer side, all the three files could be made visible. For the user side only header file and application files could be made visible, which means that the object code of the implementation file could be given to the user along with the interface given in the header file, hiding the source file, if required. Avoid I/O operations (printf/scanf) and use *data input file* where ever it is possible.

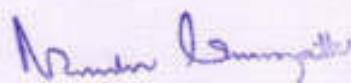
**Programs List:**

1.	
a.	Write a LEX program to recognize valid <i>arithmetic expression</i> . Identifiers in the expression could be only integers and operators could be + and *. Count the identifiers & operators present and print them separately.
b.	Write YACC program to evaluate <i>arithmetic expression</i> involving operators: +, -, *, and /
2.	Develop, Implement and Execute a program using YACC tool to recognize all strings ending with <i>b</i> preceded by <i>n a</i> 's using the grammar $a^n b$ (note: input <i>n</i> value)
3.	Design, develop and implement YACC/C program to construct <i>Predictive / LL(1) Parsing Table</i> for the grammar rules: $A \rightarrow aBa, B \rightarrow bB \mid \epsilon$ Use this table to parse the sentence: <i>abbaS</i>
4.	Design, develop and implement YACC/C program to demonstrate <i>Shift Reduce Parsing</i> technique for the grammar rules: $E \rightarrow E+T \mid T, T \rightarrow T^*F \mid F, F \rightarrow (E) \mid id$ and parse the sentence: <i>id + id * id.</i>
5.	Design, develop and implement a C/Java program to generate the machine code using <i>Triples</i> for the statement $A = -B * (C + D)$ whose intermediate code in three-address form: $T1 = -B$ $T2 = C + D$ $T3 = T1 + T2$ $A = T3$
6.	



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a.	Write a LEX program to eliminate <i>comment lines</i> in a C program and copy the resulting program into a separate file.
b.	Write YACC program to recognize valid <i>identifier, operators and keywords</i> in the given text (C program) file.
7.	Design, develop and implement a C/C++/Java program to simulate the working of Shortest remaining time and Round Robin (RR) scheduling algorithms. Experiment with different quantum sizes for RR algorithm.
8.	Design, develop and implement a C/C++/Java program to implement Banker's algorithm. Assume suitable input required to demonstrate the results
9.	Design, develop and implement a C/C++/Java program to implement page replacement algorithms LRU and FIFO. Assume suitable input required to demonstrate the results.
<b>Laboratory Outcomes:</b> The student should be able to:	
<ul style="list-style-type: none"> <li>• Implement and demonstrate Lexer's and Parser's</li> <li>• Evaluate different algorithms required for management, scheduling, allocation and communication used in operating system.</li> </ul>	
<b>Conduct of Practical Examination:</b>	
<ul style="list-style-type: none"> <li>• All laboratory experiments, excluding the first, are to be included for practical examination.</li> <li>• Experiment distribution <ul style="list-style-type: none"> <li>○ For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.</li> <li>○ For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.</li> </ul> </li> <li>• Change of experiment is allowed only once and marks allotted for procedure part to be made zero.</li> <li>• Marks Distribution (<i>Subjected to change in accordance with university regulations</i>) <ul style="list-style-type: none"> <li>m) For questions having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks</li> <li>n) For questions having part A and B <ul style="list-style-type: none"> <li>i. Part A – Procedure + Execution + Viva = 4 + 21 + 5 = 30 Marks</li> <li>ii. Part B – Procedure + Execution + Viva = 10 + 49+ 11 = 70 Marks</li> </ul> </li> </ul> </li> </ul>	



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**COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT**  
(Effective from the academic year 2018 -2019)

**SEMESTER – VI**

<b>Subject Code</b>	18CSL67	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:2:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs

**Credits – 2**

**Course Learning Objectives:** This course (18CSL67) will enable students to:

- Demonstrate simple algorithms using OpenGL Graphics Primitives and attributes.
- Implementation of line drawing and clipping algorithms using OpenGL functions
- Design and implementation of algorithms Geometric transformations on both 2D and 3D objects.

**Descriptions (if any):**

**Programs List:**

**PART A**

**Design, develop, and implement the following programs using OpenGL API**

1.	Implement Brenham's line drawing algorithm for all types of slope. Refer:Text-1: Chapter 3.5 Refer:Text-2: Chapter 8
2.	Create and rotate a triangle about the origin and a fixed point. <b>Refer:Text-1: Chapter 5-4</b>
3.	Draw a colour cube and spin it using OpenGL transformation matrices. <b>Refer:Text-2: Modelling a Coloured Cube</b>
4.	Draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing. <b>Refer:Text-2: Topic: Positioning of Camera</b>
5.	Clip a lines using Cohen-Sutherland algorithm <b>Refer:Text-1: Chapter 6.7</b> <b>Refer:Text-2: Chapter 8</b>
6.	To draw a simple shaded scene consisting of a tea pot on a table. Define suitably the position and properties of the light source along with the properties of the surfaces of the solid object used in the scene. <b>Refer:Text-2: Topic: Lighting and Shading</b>
7.	Design, develop and implement recursively subdivide a tetrahedron to form 3D sierpinski gasket. The number of recursive steps is to be specified by the user. <b>Refer: Text-2: Topic: sierpinski gasket.</b>
8.	Develop a menu driven program to animate a flag using Bezier Curve algorithm <b>Refer: Text-1: Chapter 8-10</b>
9.	Develop a menu driven program to fill the polygon using scan line algorithm

**PART B MINI PROJECT**

Student should develop mini project on the topics mentioned below or similar applications using Open GL API. Consider all types of attributes like color, thickness, styles, font, background, speed etc., while doing mini project.

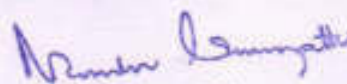
**(During the practical exam: the students should demonstrate and answer Viva-Voce)**

**Sample Topics:**

**Simulation of concepts of OS, Data structures, algorithms etc.**

**Laboratory Outcomes:** The student should be able to:

- Apply the concepts of computer graphics
- Implement computer graphics applications using OpenGL.

  
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- Animate real world problems using OpenGL

**Conduct of Practical Examination:**

- All laboratory experiments, excluding the first, are to be included for practical examination.
- Experiment distribution
  - For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.
  - For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure part to be made zero.
- Marks Distribution (*Subjected to change in accordance with university regulations*)
  - o) For questions having only one part – Procedure + Execution + Viva-Voce:  $15+70+15 = 100$  Marks
  - p) For questions having part A and B
    - i. Part A – Procedure + Execution + Viva =  $4 + 21 + 5 = 30$  Marks
    - ii. Part B – Procedure + Execution + Viva =  $10 + 49 + 11 = 70$  Marks

*Nandini Srinivasan*

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**MOBILE APPLICATION DEVELOPMENT**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VI**

<b>Subject Code</b>	18CSMP68	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:0:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	3 Hrs/Week	<b>Exam Hours</b>	3 Hrs

**Credits – 2**

**Course Learning Objectives:** This course (18CSMP68) will enable students to:

- Learn and acquire the art of Android Programming.
- Configure Android studio to run the applications.
- Understand and implement Android's User interface functions.
- Create, modify and query on SQLite database.
- Inspect different methods of sharing data using services.


**Descriptions (if any):**

**Programs List:**

**PART A**

**Design, develop, and implement the following programs using OpenGL API**

1. Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number.

COMPANY NAME 

Name  
Job Title  
Phone Number  
Address  
Email, website, fax details

2. Develop an Android application using controls like Button, TextView, EditText for designing a calculator having basic functionality like Addition, Subtraction, Multiplication, and Division.

*Manjunath*  
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### SIMPLE CALCULATOR

Result



3. Create a SIGN Up activity with Username and Password. Validation of password should happen based on the following rules:

- Password should contain uppercase and lowercase letters.
- Password should contain letters and numbers.
- Password should contain special characters.
- Minimum length of the password (the default value is 8).

On successful **SIGN UP** proceed to the next Login activity. Here the user should **SIGN IN** using the Username and Password created during signup activity. If the Username and Password are matched then navigate to the next activity which displays a message saying "Successful Login" or else display a toast message saying "Login Failed". The user is given only two attempts and after that display a toast message saying "Failed Login Attempts" and disable the SIGN IN button. Use Bundle to transfer information from one activity to another.

### SIGNUP ACTIVITY

Username:

Password:

  
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	<p style="text-align: center;"><b>LOGIN ACTIVITY</b></p> <p>Username <input type="text"/></p> <p>Password <input type="password"/></p> <p style="text-align: center;"><b>SIGN IN</b></p>
<p>4.</p>	<p>Develop an application to set an image as wallpaper. On click of a button, the wallpaper image should start to change randomly every 30 seconds.</p> <p style="text-align: center;"><b>CHANGING WALLPAPER APPLICATION</b></p> <p style="text-align: center;"><b>CLICK HERE TO CHANGE WALLPAPER</b></p>
<p>5.</p>	<p>Write a program to create an activity with two buttons <b>START</b> and <b>STOP</b>. On pressing of the <b>START</b> button, the activity must start the counter by displaying the numbers from One and the counter must keep on counting until the <b>STOP</b> button is pressed. Display the counter value in a <b>TextView</b> control.</p> <p style="text-align: center;"><b>COUNTER APPLICATION</b></p> <p style="text-align: center;">Counter Value</p> <p style="text-align: center;"><b>START</b></p> <p style="text-align: center;"><b>STOP</b></p>
<p>6.</p>	<p>Create two files of XML and JSON type with values for City_Name, Latitude, Longitude, Temperature, and Humidity. Develop an application to create an activity with two buttons to parse the XML and JSON files which when clicked should display the data in their respective layouts side by side.</p>

  
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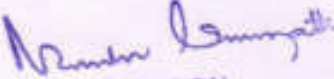
PARSING XML AND JSON DATA		
PARSING XML AND JSON DATA	XML DATA	JSON Data
<input type="button" value="Parse XML Data"/>  <input type="button" value="Parse JSON Data"/>	City_Name: Mysore Latitude: 12.295 Longitude: 76.639 Temperature: 22 Humidity: 90%	City_Name: Mysore Latitude: 12.295 Longitude: 76.639 Temperature: 22 Humidity: 90%

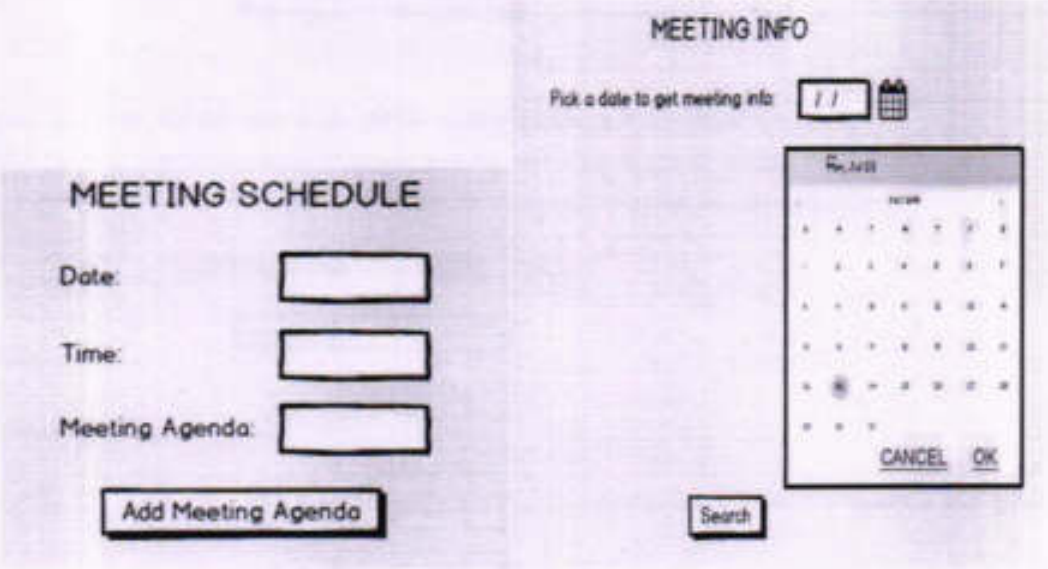
7.	<p>Develop a simple application with one EditText so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.</p> <p style="text-align: center;"><b>TEXT TO SPEECH APPLICATION</b></p> <p style="text-align: center;"><input type="button" value="Convert Text to Speech"/></p>
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8.	<p>Create an activity like a phone dialer with CALL and SAVE buttons. On pressing the CALL button, it must call the phone number and on pressing the SAVE button it must save the number to the phone contacts.</p> <p style="text-align: center;"><b>CALL AND SAVE APPLICATION</b></p> <p style="text-align: center;"> <input type="text" value="1234567890"/> <input type="button" value="DEL"/> </p> <p style="text-align: center;"> <input type="button" value="1"/> <input type="button" value="2"/> <input type="button" value="3"/>  <input type="button" value="4"/> <input type="button" value="5"/> <input type="button" value="6"/>  <input type="button" value="7"/> <input type="button" value="8"/> <input type="button" value="9"/>  <input type="button" value="*"/> <input type="button" value="0"/> <input type="button" value="#"/> </p> <p style="text-align: center;"> <input type="button" value="CALL"/> <input type="button" value="SAVE"/> </p>
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**PART B**

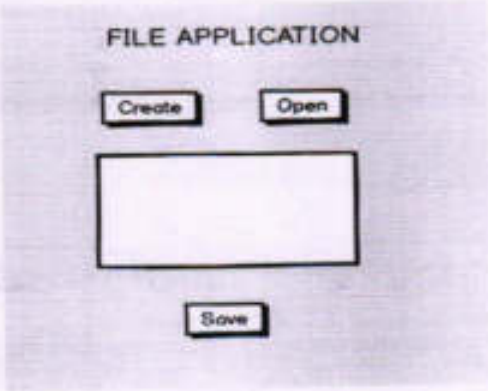

1.	<p>Write a program to enter Medicine Name, Date and Time of the Day as input from the user and store it in the SQLite database. Input for Time of the Day should be either Morning or Afternoon or Evening or Night. Trigger an alarm based on the Date and Time of the Day and display the Medicine Name.</p>
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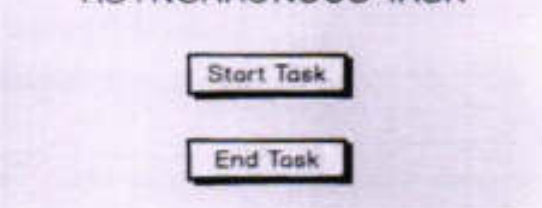

	<p style="text-align: center;"><b>MEDICINE DATABASE</b></p> <p>Medicine Name: <input type="text"/></p> <p>Date: <input type="text"/></p> <p>Time of the Day: <input type="text"/></p> <p style="text-align: center;"><input type="button" value="Insert"/></p>
<p>2.</p>	<p>Develop a content provider application with an activity called "Meeting Schedule" which takes Date, Time and Meeting Agenda as input from the user and store this information into the SQLite database. Create another application with an activity called "Meeting Info" having DatePicker control, which on the selection of a date should display the Meeting Agenda information for that particular date, else it should display a toast message saying "No Meeting on this Date".</p>  <p>The image shows two application screens. On the left is the 'MEETING SCHEDULE' screen with input fields for Date, Time, and Meeting Agenda, and an 'Add Meeting Agenda' button. On the right is the 'MEETING INFO' screen with a date picker and a 'Search' button. A calendar picker is also shown, displaying a grid of dates with 'CANCEL' and 'OK' options.</p>
<p>3.</p>	<p>Create an application to receive an incoming SMS which is notified to the user. On clicking this SMS notification, the message content and the number should be displayed on the screen. Use appropriate emulator control to send the SMS message to your application.</p>

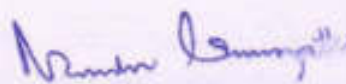
*Nandini Kumari*

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	<p style="text-align: center;">SMS APPLICATION</p> <p style="text-align: center;">Display SMS Number Display SMS Message</p>
<p>4.</p>	<p>Write a program to create an activity having a Text box, and also Save, Open and Create buttons. The user has to write some text in the Text box. On pressing the Create button the text should be saved as a text file in Mksdcard. On subsequent changes to the text, the Save button should be pressed to store the latest content to the same file. On pressing the Open button, it should display the contents from the previously stored files in the Text box. If the user tries to save the contents in the Textbox to a file without creating it, then a toast message has to be displayed saying "First Create a File".</p> <div style="text-align: center;">  </div>
<p>5.</p>	<p>Create an application to demonstrate a basic media player that allows the user to Forward, Backward, Play and Pause an audio. Also, make use of the indicator in the seek bar to move the audio forward or backward as required.</p> <div style="text-align: center;">  </div>
<p>6.</p>	<p>Develop an application to demonstrate the use of Asynchronous tasks in android. The asynchronous task should implement the functionality of a simple moving banner. On pressing the <b>Start Task</b> button, the banner message should scroll from right to left. On pressing the <b>Stop Task</b> button, the banner message should stop. Let the banner</p>

  
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	<p>message be "Demonstration of Asynchronous Task".</p> <div style="text-align: center;"> <p><b>ASYNCHRONOUS TASK</b></p>  </div>
7.	<p>Develop an application that makes use of the clipboard framework for copying and pasting of the text. The activity consists of two EditText controls and two Buttons to trigger the copy and paste functionality.</p> <div style="text-align: center;"> <p><b>CLIPBOARD ACTIVITY</b></p>  </div>
8.	<p>Create an AIDL service that calculates Car Loan EMI. The formula to calculate EMI is</p> $E = P * (r(1+r)^n)/((1+r)^n-1)$ <p>where</p> <ul style="list-style-type: none"> <li>E = The EMI payable on the car loan amount</li> <li>P = The Car loan Principal Amount</li> <li>r = The interest rate value computed on a monthly basis</li> <li>n = The loan tenure in the form of months</li> </ul> <p>The down payment amount has to be deducted from the principal amount paid towards buying the Car. Develop an application that makes use of this AIDL service to calculate the EMI. This application should have four EditText to read the PrincipalAmount, Down Payment, Interest Rate, Loan Term (in months) and a button named as "Calculate Monthly EMI". On click of this button, the result should be shown in a TextView. Also, calculate the EMI by varying the Loan Term and Interest Rate values.</p>

  
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CAR EMI CALCULATOR	
Principal Amount:	<input style="width: 100%;" type="text"/>
Down Payment:	<input style="width: 100%;" type="text"/>
Interest Rate:	<input style="width: 100%;" type="text"/>
Loan Term (in months):	<input style="width: 100%;" type="text"/>
<input style="width: 150px; height: 20px;" type="button" value="Calculate Monthly EMI"/>	
	EMI: Result

**Laboratory Outcomes:** The student should be able to:

- Apply the concepts of computer graphics
- Implement computer graphics applications using OpenGL
- Animate real world problems using OpenGL

**Conduct of Practical Examination:**

- All laboratory experiments, excluding the first, are to be included for practical examination.
- Experiment distribution
  - For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.
  - For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
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  - q) For questions having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks
  - r) For questions having part A and B
    - i. Part A – Procedure + Execution + Viva = 4 + 21 + 5 = 30 Marks
    - ii. Part B – Procedure + Execution + Viva = 10 + 49 + 11 = 70 Marks

**Text Books:**

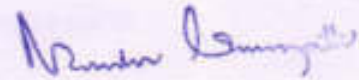
1. Google Developer Training, "**Android Developer Fundamentals Course – Concept Reference**", Google Developer Training Team, 2017.  
<https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details>  
 (Download pdf file from the above link)

**Reference Books:**

1. Erik Hellman, "**Android Programming – Pushing the Limits**", 1<sup>st</sup> Edition, Wiley India Pvt Ltd, 2014. ISBN-13: 978-8126547197

  
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2. Dawn Griffiths and David Griffiths, "**Head First Android Development**", 1<sup>st</sup> Edition, O'Reilly SPD Publishers, 2015. ISBN-13: 978-9352131341
3. Bill Phillips, Chris Stewart and Kristin Marsicano, "**Android Programming: The Big Nerd Ranch Guide**", 3<sup>rd</sup> Edition, Big Nerd Ranch Guides, 2017. ISBN-13: 978-0134706054



PRINCIPAL  
SIET, TUMAKURU

**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

<b>Subject Code</b>	18CS71	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	4:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS71) will enable students to:			
<ul style="list-style-type: none"> <li>• Explain Artificial Intelligence and Machine Learning</li> <li>• Illustrate AI and ML algorithm and their use in appropriate applications</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
What is artificial intelligence?, Problems, problem spaces and search, Heuristic search techniques			10
<b>Textbook 1: Chapter 1, 2 and 3</b>			
<b>Module 2</b>			<b>Contact Hours</b>
Knowledge representation issues, Predicate logic, Representaiton knowledge using rules.			10
Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Candidate Elimination Algorithm, Inductive bias of Candidate Elimination Algorithm.			
<b>Textbook 1: Chapter 4, 5 and 6</b>			
<b>Textbook2: Chapter 2 (2.1-2.5, 2.7)</b>			
<b>Module 3</b>			<b>Contact Hours</b>
Decision Tree Learning: Introduction, Decision tree representation, Appropriate problems, ID3 algorithm, Inductive bias of ID3 algorithm.			10
Artificial Neural Network: Introduction, NN representation, Appropriate problems, Perceptrons, Backpropagation algorithm.			
<b>Textbook2: Chapter 3 (3.1-3.4, 3.6), Chapter 4 (4.1-4.5)</b>			
<b>Module 4</b>			<b>Contact Hours</b>
Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting, MDL principle, Bates optimal classifier, Gibbs algorithm, Navic Bayes classifier, BBN, EM Algorithm			10
<b>Textbook2: Chapter 6</b>			
<b>Module 5</b>			<b>Contact Hours</b>
Instance-Base Learning: Introduction, k-Nearest Neighbour Learning, Locally weighted regression, Radial basis function, Case-Based reasoning.			10
Reinforcement Learning: Introduction, The learning task, Q-Learning.			
<b>Textbook 1: Chapter 8 (8.1-8.5), Chapter 13 (13.1 – 13.3)</b>			
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"> <li>• Appaise the theory of Artificial intelligence and Machine Learning.</li> <li>• Illustrate the working of AI and ML Algorithms.</li> <li>• Demonstrate the applications of AI and ML.</li> </ul>			
<b>Question Paper Pattern:</b>			

*Manish Kumar*  
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UNIVERSITY



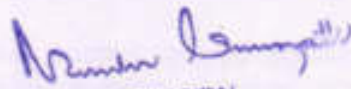
- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. Tom M Mitchell, Machine Learning, McGraw Hill Education Pvt Ltd., Chennai.
2. Elaine Rich, Kevin K and S B Nair, Artificial Intelligence, 3<sup>rd</sup> Ed, McGraw Hill Education Pvt Ltd., Chennai.

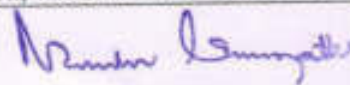
**Reference Books:**

1. Stuart Russell, Peter Norving . Artificial Intelligence: A Modern Approach, Pearson Education 2nd Edition
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.
3. Ethem Alpaydin, Introduction to machine learning, second edition, MIT press

  
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**BIG DATA AND ANALYTICS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

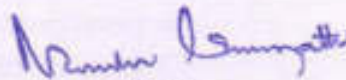
<b>Subject Code</b>	18CS72	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	4:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	50	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –4</b>			
<b>Course Learning Objectives:</b> This course (18CS72) will enable students to:			
<ul style="list-style-type: none"> <li>• Understand Hadoop Distributed File system and examine MapReduce Programming</li> <li>• Explore Hadoop tools and manage Hadoop with Ambari</li> <li>• Appraise the role of Business intelligence and its applications across industries</li> <li>• Assess core data mining techniques for data analytics</li> <li>• Identify various Text Mining techniques</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
Hadoop Distributed File System Basics, Running Example Programs and Benchmarks, Hadoop MapReduce Framework, MapReduce Programming			10
<b>Module 2</b>			<b>Contact Hours</b>
Essential Hadoop Tools, Hadoop YARN Applications, Managing Hadoop with Apache Ambari, Basic Hadoop Administration Procedures			10
<b>Module 3</b>			<b>Contact Hours</b>
Business Intelligence Concepts and Application, Data Warehousing, Data Mining, Data Visualization			10
<b>Module 4</b>			<b>Contact Hours</b>
Decision Trees, Regression, Artificial Neural Networks, Cluster Analysis, Association Rule Mining			10
<b>Module 5</b>			<b>Contact Hours</b>
Text Mining, Naïve-Bayes Analysis, Support Vector Machines, Web Mining, Social Network Analysis			10
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"> <li>• Master the concepts of HDFS and MapReduce framework</li> <li>• Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop Administration</li> <li>• Recognize the role of Business Intelligence, Data warehousing and Visualization in decision making</li> <li>• Infer the importance of core data mining techniques for data analytics</li> <li>• Compare and contrast different Text Mining Techniques</li> </ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>			
<b>Textbooks:</b>			
<ol style="list-style-type: none"> <li>1. Douglas Eadline, "Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem", 1<sup>st</sup> Edition, Pearson Education, 2016. ISBN-13: 978-9332570351</li> <li>2. Anil Maheshwari, "Data Analytics", 1<sup>st</sup> Edition, McGraw Hill Education, 2017. ISBN-13: 978-</li> </ol>			

  
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**Reference Books:**

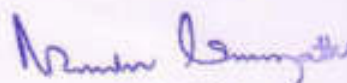
1. Tom White, "**Hadoop: The Definitive Guide**", 4<sup>th</sup> Edition, O'Reilly Media, 2015. ISBN-13: 978-9352130672
2. Boris Lublinsky, Kevin T. Smith, Alexey Yakubovich, "**Professional Hadoop Solutions**", 1<sup>st</sup> Edition, Wrox Press, 2014. ISBN-13: 978-8126551071
3. Eric Sammer, "**Hadoop Operations: A Guide for Developers and Administrators**", 1<sup>st</sup> Edition, O'Reilly Media, 2012. ISBN-13: 978-9350239261



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**SOFTWARE ARCHITECTURE AND DESIGN PATTERNS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

<b>Subject Code</b>	18CS731	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS731) will enable students to:			
<ul style="list-style-type: none"> <li>• Learn How to add functionality to designs while minimizing complexity.</li> <li>• What code qualities are required to maintain to keep code flexible?</li> <li>• To Understand the common design patterns.</li> <li>• To explore the appropriate patterns for design problems</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Introduction:</b> what is a design pattern? describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern. What is object-oriented development? , key concepts of object oriented design other related concepts, benefits and drawbacks of the paradigm			08
<b>Module 2</b>			
<b>Analysis a System:</b> overview of the analysis phase, stage 1: gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain. Design and Implementation, discussions and further reading.			08
<b>Module 3</b>			
<b>Design Pattern Catalog:</b> Structural patterns, Adapter, bridge, composite, decorator, facade, flyweight, proxy.			08
<b>Module 4</b>			
<b>Interactive systems and the MVC architecture:</b> Introduction , The MVC architectural pattern, analyzing a simple drawing program , designing the system, designing of the subsystems, getting into implementation , implementing undo operation , drawing incomplete items, adding a new feature , pattern based solutions.			08
<b>Module 5</b>			
<b>Designing with Distributed Objects:</b> Client server system, java remote method invocation, implementing an object oriented system on the web (discussions and further reading) a note on input and output, selection statements, loops arrays.			08
<b>Course Outcomes:</b> The student will be able to :			
<ul style="list-style-type: none"> <li>• Design and implement codes with higher performance and lower complexity</li> <li>• Be aware of code qualities needed to keep code flexible</li> <li>• Experience core design principles and be able to assess the quality of a design with respect to these principles.</li> <li>• Capable of applying these principles in the design of object oriented systems.</li> <li>• Demonstrate an understanding of a range of design patterns. Be capable of comprehending a design presented using this vocabulary.</li> <li>• Be able to select and apply suitable patterns in specific contexts</li> </ul>			
<b>Question Paper Pattern:</b>			
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> </ul>			



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T. S. RAMESH

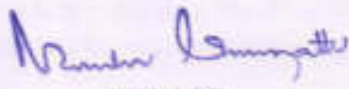
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. Object-oriented analysis, design and implementation, brahma dathan, sarnath rammath, universities press,2013
2. Design patterns, erich gamma, Richard helan, Ralph johman , john vlissides ,PEARSON Publication,2013.

**Reference Books:**

1. Frank Bachmann, RegineMeunier, Hans Rohnert "Pattern Oriented Software Architecture" –Volume 1, 1996.
2. William J Brown et al., "Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wiley, 1998.

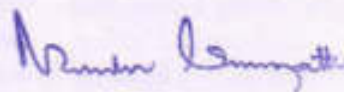
  
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**ADVANCED JAVA AND J2EE**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

<b>Subject Code</b>	18CS732	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS732) will enable students to:			
<ul style="list-style-type: none"> <li>• Identify the need for advanced Java concepts like Enumerations and Collections</li> <li>• Construct client-server applications using Java socket API</li> <li>• Make use of JDBC to access database through Java Programs</li> <li>• Adapt servlets to build server side programs</li> <li>• Demonstrate the use of JavaBeans to develop component-based Java software</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Enumerations, Autoboxing and Annotations(metadata):</b> Enumerations, Enumeration fundamentals, the values() and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations.			08
<b>Module 2</b>			
<b>The collections and Framework:</b> Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections?, The legacy Classes and Interfaces, Parting Thoughts on Collections.			08
<b>Module 3</b>			
String Handling :The String Constructors, String Length, Special String Operations, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString( ) Character Extraction, charAt( ), getChars( ), getBytes( ) toCharArray(), String Comparison, equals( ) and equalsIgnoreCase( ), regionMatches( ) startsWith( ) and endsWith( ), equals( ) Versus == , compareTo( ) Searching Strings, Modifying a String, substring( ), concat( ), replace( ), trim( ), Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer , StringBuffer Constructors, length( ) and capacity( ), ensureCapacity( ), setLength( ), charAt( ) and setCharAt( ), getChars( ),append( ), insert( ), reverse( ), delete( ) and deleteCharAt( ), replace( ), substring( ), Additional StringBuffer Methods, StringBuilder			08
<b>Text Book I: Ch 15</b>			
<b>Module 4</b>			
Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The javax.servlet Package; Reading Servlet Parameter; The javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects			08

  
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Text Book 1: Ch 31 Text Book 2: Ch 11	
<b>Module 5</b>	
The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions.	08
<b>Text Book 2: Ch 06</b>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs</li> <li>• Build client-server applications and TCP/IP socket programs</li> <li>• Illustrate database access and details for managing information using the JDBC API</li> <li>• Describe how servlets fit into Java-based web application architecture</li> <li>• Develop reusable software components using Java Beans</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
<ol style="list-style-type: none"> <li>1. Herbert Schildt: JAVA the Complete Reference, 7<sup>th</sup>/9th Edition, Tata McGraw Hill, 2007.</li> <li>2. Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Y. Daniel Liang: Introduction to JAVA Programming, 7<sup>th</sup> Edition, Pearson Education, 2007.</li> <li>2. Stephanie Bodoff et al: The J2EE Tutorial, 2<sup>nd</sup> Edition, Pearson Education, 2004.</li> <li>3. Uttam K Roy, Advanced JAVA programming. Oxford University press, 2015.</li> </ol>	



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**STORAGE AREA NETWORKS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

<b>Subject Code</b>	18CS733	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS733) will enable students to:			
<ul style="list-style-type: none"> <li>• Evaluate storage architectures,</li> <li>• Define backup, recovery, disaster recovery, business continuity, and replication</li> <li>• Examine emerging technologies including IP-SAN</li> <li>• Understand logical and physical components of a storage infrastructure</li> <li>• Identify components of managing and monitoring the data center</li> <li>• Define information security and identify different storage virtualization technologies</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
<b>Storage System</b> Introduction to evolution of storage architecture, key data center elements, virtualization, and cloud computing. Key data center elements – Host (or compute), connectivity, storage, and application in both classic and virtual environments. RAID implementations, techniques, and levels along with the impact of RAID on application performance. Components of intelligent storage systems and virtual storage provisioning and intelligent storage system implementations.			08
<b>Module 2</b>			
<b>Storage Networking Technologies and Virtualization</b> Fibre Channel SAN components, connectivity options, and topologies including access protection mechanism ‘zoning’, FC protocol stack, addressing and operations, SAN-based virtualization and VSAN technology, iSCSI and FCIP protocols for storage access over IP network, Converged protocol FCoE and its components, Network Attached Storage (NAS) - components, protocol and operations, File level storage virtualization, Object based storage and unified storage platform.			08
<b>Module 3</b>			
<b>Backup, Archive, and Replication</b> This unit focuses on information availability and business continuity solutions in both virtualized and non-virtualized environments. Business continuity terminologies, planning and solutions, Clustering and multipathing architecture to avoid single points of failure, Backup and recovery - methods, targets and topologies, Data deduplication and backup in virtualized environment, Fixed content and data archive, Local replication in classic and virtual environments, Remote replication in classic and virtual environments, Three-site remote replication and continuous data protection			08
<b>Module 4</b>			
<b>Cloud Computing Characteristics and benefits</b> This unit focuses on the business drivers, definition, essential characteristics, and phases of journey to the Cloud. Business drivers for Cloud computing, Definition of Cloud computing, Characteristics of Cloud computing, Steps involved in transitioning from Classic data center to Cloud computing environment Services and deployment models, Cloud infrastructure components, Cloud migration considerations			08
<b>Module 5</b>			
<b>Securing and Managing Storage Infrastructure</b> This chapter focuses on framework and domains of storage security along with covering security. implementation at storage networking. Security threats, and countermeasures in various domains Security solutions for FC-SAN, IP-SAN and NAS environments, Security in virtualized and cloud environments,			08

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Monitoring and managing various information infrastructure components in classic and virtual environments. Information lifecycle management (ILM) and storage tiering. Cloud service management activities
<b>Course Outcomes:</b> The student will be able to :
<ul style="list-style-type: none"> <li>• Identify key challenges in managing information and analyze different storage networking technologies and virtualization</li> <li>• Explain components and the implementation of NAS</li> <li>• Describe CAS architecture and types of archives and forms of virtualization</li> <li>• Illustrate the storage infrastructure and management activities</li> </ul>
<b>Question Paper Pattern:</b>
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>
<b>Textbooks:</b>
<ol style="list-style-type: none"> <li>1. Information Storage and Management, Author :EMC Education Services, Publisher: Wiley ISBN: 9781118094839</li> <li>2. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company ISBN : 9780321262516</li> </ol>
<b>Reference Books:</b>

  
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**DIGITAL IMAGE PROCESSING**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

<b>Subject Code</b>	18CS741	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS –3**

**Course Learning Objectives:** This course (18CS741) will enable students to:

- Define the fundamental concepts in image processing
- Evaluate techniques followed in image enhancements
- Illustrate image segmentation and compression algorithms

<b>Module 1</b>	<b>Contact Hours</b>
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<b>Introduction</b> Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships Between Pixels- Neighbors and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing.	08
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<b>Module 2</b>	
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<b>Image Enhancement In The Spatial Domain:</b> Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	08
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<b>Module 3</b>	
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<b>Image Enhancement In Frequency Domain:</b> Introduction, Fourier Transform, Discrete Fourier Transform (DFT), properties of DFT, Discrete Cosine Transform (DCT), Image filtering in frequency domain.	08
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<b>Module 4</b>	
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<b>Image Segmentation:</b> Introduction, Detection of isolated points, line detection, Edge detection, Edge linking, Region based segmentation- Region growing, split and merge technique, local processing, regional processing, Hough transform, Segmentation using Threshold.	08
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<b>Module 5</b>	
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<b>Image Compression:</b> Introduction, coding Redundancy, Inter-pixel redundancy, image compression model, Lossy and Lossless compression, Huffman Coding, Arithmetic Coding, LZW coding, Transform Coding, Sub-image size selection, blocking, DCT implementation using FFT, Run length coding.	08
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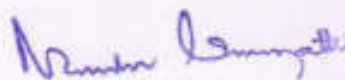
**Course Outcomes:** The student will be able to :

- Explain fundamentals of image processing
- Compare transformation algorithms
- Contrast enhancement, segmentation and compression techniques

**Question Paper Pattern:**

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

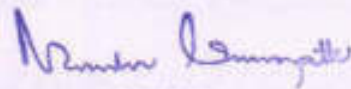
**Textbooks:**

  
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1. Rafael C G., Woods R E. and Eddins S L, Digital Image Processing. Prentice Hall, 3<sup>rd</sup> edition, 2008.

**Reference Books:**

1. Milan Sonka, "Image Processing, analysis and Machine Vision", Thomson Press India Ltd, Fourth Edition.
2. Fundamentals of Digital Image Processing- Anil K. Jain, 2nd Edition, Prentice Hall of India.
3. S. Sridhar , Digital Image Processing, Oxford University Press, 2<sup>nd</sup> Ed, 2016.



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**NETWORK MANAGEMENT**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

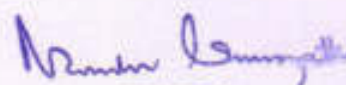
<b>Subject Code</b>	18CS742	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS –3**

**Course Learning Objectives:** This course (18CS742) will enable students to:

- Illustrate the need for interoperable network management.
- Explain the concepts and architecture behind standards based network management.
- Differentiate the concepts and terminology associated with SNMP and TMN
- Describe network management as a typical distributed application

<b>Module 1</b>	<b>Contact Hours</b>
<p><b>Introduction:</b> Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments, TCP/IP-Based Networks: The Internet and Intranets, Communications Protocols and Standards- Communication Architectures, Protocol Layers and Services; Case Histories of Networking and Management – The Importance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.</p>	08
<p><b>Module 2</b> Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Managed Object Perspectives, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model.</p>	08
<p><b>Module 3</b> SNMPv1 Network Management: Managed Network: The History of SNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, System Overview. The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base. The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP MIB Group, Functional Model SNMP Management – RMON: Remote Monitoring, RMON SMI and MIB, RMONII- RMONI Textual Conventions, RMONI Groups and Functions, Relationship Between Control and Data Tables, RMONI Common and Ethernet Groups, RMON Token Ring Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications.</p>	08
<p><b>Module 4</b> Broadband Access Networks, Broadband Access Technology; HFCT Technology: The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable, Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology</p>	08



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<p>– Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes, ADSL Management – ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management, ADSL Performance Management, SNMP-Based ADSL Line MIB, MIB Integration with Interfaces Groups in MIB-2, ADSL Configuration Profiles</p>	
<p><b>Module 5</b></p>	
<p>Network Management Applications: Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault Detection, Fault Location and Isolation 24 Techniques, Performance Management – Performance Metrics, Data Monitoring, Problem Isolation, Performance Statistics; Event Correlation Techniques – Rule-Based Reasoning, Model-Based Reasoning, CaseBased Reasoning, Codebook correlation Model, State Transition Graph Model, Finite State Machine Model, Security Management – Policies and Procedures, Security Breaches and the Resources Needed to Prevent Them, Firewalls, Cryptography, Authentication and Authorization, Client/Server Authentication Systems, Messages Transfer Security, Protection of Networks from Virus Attacks, Accounting Management, Report Management, Policy- Based Management, Service Level Management.</p>	08
<p><b>Course Outcomes:</b> The student will be able to :</p>	
<ul style="list-style-type: none"> <li>• Analyze the issues and challenges pertaining to management of emerging network technologies such as wired/wireless networks and high-speed internets.</li> <li>• Apply network management standards to manage practical networks</li> <li>• Formulate possible approaches for managing OSI network model.</li> <li>• Use on SNMP for managing the network</li> <li>• Use RMON for monitoring the behavior of the network</li> <li>• Identify the various components of network and formulate the scheme for the managing them</li> </ul>	
<p><b>Question Paper Pattern:</b></p>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<p><b>Textbooks:</b></p>	
<p>1. Mani Subramanian; Network Management- Principles and Practice, 2nd Pearson Education, 2010.</p>	
<p><b>Reference Books:</b></p>	
<p>1. J. Richard Burke: Network management Concepts and Practices: a Hands-On Approach, PHI, 2008.</p>	

  
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**WEB TECHNOLOGY AND ITS APPLICATIONS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VII**

<b>Subject Code</b>	18CS743	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS –3**

**Course Learning Objectives:** This course (18CS743) will enable students to:

- Illustrate the Semantic Structure of HTML and CSS
- Compose forms and tables using HTML and CSS
- Design Client-Side programs using JavaScript and Server-Side programs using PHP
- Infer Object Oriented Programming capabilities of PHP
- Examine JavaScript frameworks such as jQuery and Backbone

<b>Module 1</b>	<b>Contact Hours</b>
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Introduction to HTML, What is HTML and Where did it come from?, HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements, Introduction to CSS, What is CSS, CSS Syntax, Location of Styles, Selectors, The Cascade: How Styles Interact, The Box Model, CSS Text Styling.	08
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<b>Module 2</b>	<b>Contact Hours</b>
HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, Table and Form Accessibility, Microformats, Advanced CSS: Layout, Normal Flow, Positioning Elements, Floating Elements, Constructing Multicolumn Layouts, Approaches to CSS Layout, Responsive Design, CSS Frameworks.	08

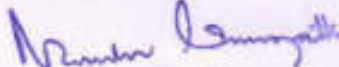
<b>Module 3</b>	<b>Contact Hours</b>
JavaScript: Client-Side Scripting, What is JavaScript and What can it do?, JavaScript Design Principles, Where does JavaScript Go?, Syntax, JavaScript Objects, The Document Object Model (DOM), JavaScript Events, Forms, Introduction to Server-Side Development with PHP, What is Server-Side Development, A Web Server's Responsibilities, Quick Tour of PHP, Program Control, Functions	08

<b>Module 4</b>	<b>Contact Hours</b>
PHP Arrays and Superglobals, Arrays, \$_GET and \$_POST Superglobal Arrays, \$_SERVER Array, \$_FILES Array, Reading/Writing Files, PHP Classes and Objects, Object-Oriented Overview, Classes and Objects in PHP, Object Oriented Design, Error Handling and Validation, What are Errors and Exceptions?, PHP Error Reporting, PHP Error and Exception Handling	08

<b>Module 5</b>	<b>Contact Hours</b>
Managing State, The Problem of State in Web Applications, Passing Information via Query Strings, Passing Information via the URL Path, Cookies, Serialization, Session State, HTML5 Web Storage, Caching, Advanced JavaScript and jQuery, JavaScript Pseudo-Classes, jQuery Foundations, AJAX, Asynchronous File Transmission, Animation, Backbone MVC Frameworks, XML Processing and Web Services, XML Processing, JSON, Overview of Web Services.	08

**Course Outcomes:** The student will be able to :

- Adapt HTML and CSS syntax and semantics to build web pages.
- Construct and visually format tables and forms using HTML and CSS
- Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.

  
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- Appraise the principles of object oriented development using PHP
- Inspect JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features.

**Question Paper Pattern:**

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1<sup>st</sup> Edition, Pearson Education India. (ISBN:978-9332575271)

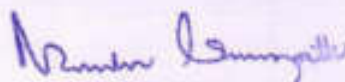
**Reference Books:**

1. Robin Nixon, "Learning PHP, MySQL & JavaScript with jQuery, CSS and HTML5", 4<sup>th</sup> Edition, O'Reilly Publications, 2015. (ISBN:978-9352130153)
2. Luke Welling, Laura Thomson, "PHP and MySQL Web Development", 5<sup>th</sup> Edition, Pearson Education, 2016. (ISBN:978-9332582736)
3. Nicholas C Zakas, "Professional JavaScript for Web Developers", 3<sup>rd</sup> Edition, Wrox/Wiley India, 2012. (ISBN:978-8126535088)
4. David Sawyer Mcfarland, "JavaScript & jQuery: The Missing Manual", 1<sup>st</sup> Edition, O'Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014

  
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**INTRODUCTION TO BIG DATA ANALYTICS  
(OPEN ELECTIVE)  
(Effective from the academic year 2018 -2019)  
SEMESTER – VII**

<b>Subject Code</b>	18CS751	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS751) will enable students to:			
<ul style="list-style-type: none"> <li>• Interpret the data in the context of the business.</li> <li>• Identify an appropriate method to analyze the data</li> <li>• Show analytical model of a system</li> </ul>			
<b>Module – 1</b>			<b>Teaching Hours</b>
<p><b>Introduction to Data Analytics and Decision Making:</b> Introduction, Overview of the Book, The Methods, The Software, Modeling and Models, Graphical Models, Algebraic Models, Spreadsheet Models, Seven-Step Modeling Process. <b>Describing the Distribution of a Single Variable:</b> Introduction, Basic Concepts, Populations and Samples, Data Sets, Variables, and Observations, Types of Data, Descriptive Measures for Categorical Variables, Descriptive Measures for Numerical Variables, Numerical Summary Measures, Numerical Summary Measures with StatTools, Charts for Numerical Variables, Time Series Data, Outliers and Missing Values, Outliers, Missing Values, Excel Tables for Filtering, Sorting, and Summarizing.</p> <p><b>Finding Relationships among Variables:</b> Introduction, Relationships among Categorical Variables, Relationships among Categorical Variables and a Numerical Variable, Stacked and Unstacked Formats, Relationships among Numerical Variables, Scatterplots, Correlation and Covariance, Pivot Tables.</p>			<b>8 Hours</b>
<b>Module – 2</b>			<b>8 Hours</b>
<p><b>Probability and Probability Distributions:</b> Introduction, Probability Essentials, Rule of Complements, Addition Rule, Conditional Probability and the Multiplication Rule, Probabilistic Independence, Equally Likely Events, Subjective Versus Objective Probabilities, Probability Distribution of a Single Random Variable, Summary Measures of a Probability Distribution, Conditional Mean and Variance, Introduction to Simulation.</p> <p><b>Normal, Binormal, Poisson, and Exponential Distributions:</b> Introduction, The Normal Distribution, Continuous Distributions and Density Functions, The Normal Density, Standardizing: Z-Values, Normal Tables and Z-Values, Normal Calculations in Excel, Empirical Rules Revisited, Weighted Sums of Normal Random Variables, Applications of the Normal Random Distribution, The Binomial Distribution, Mean and Standard Deviation of the Binomial Distribution, The Binomial Distribution in the Context of Sampling, The Normal Approximation to the Binomial, Applications of the Binomial Distribution, The Poisson and Exponential Distributions, The Poisson Distribution, The Exponential Distribution.</p>			<b>8 Hours</b>
<b>Module – 3</b>			<b>8 Hours</b>
<p><b>Decision Making under Uncertainty:</b> Introduction, Elements of Decision Analysis, Payoff Tables, Possible Decision Criteria, Expected Monetary Value (EMV), Sensitivity Analysis, Decision Trees, Risk Profiles, The Precision Tree Add-In, Bayes' Rule, Multistage Decision Problems and the Value of Information, The Value of Information, Risk Aversion and</p>			<b>8 Hours</b>



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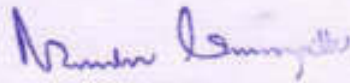
<p>Expected Utility, Utility Functions, Exponential Utility, Certainty Equivalents, Is Expected Utility Maximization Used?</p> <p><b>Sampling and Sampling Distributions:</b> Introduction, Sampling Terminology, Methods for Selecting Random Samples, Simple Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling, Multistage Sampling Schemes, Introduction to Estimation, Sources of Estimation Error, Key Terms in Sampling, Sampling Distribution of the Sample Mean, The Central Limit Theorem, Sample Size Selection, Summary of Key Ideas for Simple Random Sampling.</p>	
<p><b>Module – 4</b></p>	
<p><b>Confidence Interval Estimation:</b> Introduction, Sampling Distributions, The t Distribution, Other Sampling Distributions, Confidence Interval for a Mean, Confidence Interval for a Total, Confidence Interval for a Proportion, Confidence Interval for a Standard Deviation, Confidence Interval for the Difference between Means, Independent Samples, Paired Samples, Confidence Interval for the Difference between Proportions, Sample Size Selection, Sample Size Selection for Estimation of the Mean, Sample Size Selection for Estimation of Other Parameters.</p> <p><b>Hypothesis Testing:</b> Introduction, Concepts in Hypothesis Testing, Null and Alternative Hypothesis, One-Tailed Versus Two-Tailed Tests, Types of Errors, Significance Level and Rejection Region, Significance from p-values, Type II Errors and Power, Hypothesis Tests and Confidence Intervals, Practical versus Statistical Significance, Hypothesis Tests for a Population Mean, Hypothesis Tests for Other Parameters, Hypothesis Tests for a Population Proportion, Hypothesis Tests for Differences between Population Means, Hypothesis Test for Equal Population Variances, Hypothesis Tests for Difference between Population Proportions, Tests for Normality, Chi-Square Test for Independence.</p>	<p><b>8 Hours</b></p>
<p><b>Module – 5</b></p>	
<p><b>Regression Analysis: Estimating Relationships:</b> Introduction, Scatterplots : Graphing Relationships, Linear versus Nonlinear Relationships, Outliers, Unequal Variance, No Relationship, Correlations: Indications of Linear Relationships, Simple Linear Regression, Least Squares Estimation, Standard Error of Estimate, The Percentage of Variation Explained: R-Square, Multiple Regression, Interpretation of Regression Coefficients, Interpretation of Standard Error of Estimate and R-Square, Modeling Possibilities, Dummy Variables, Interaction Variables, Nonlinear Transformations, Validation of the Fit.</p> <p><b>Regression Analysis: Statistical Inference:</b> Introduction, The Statistical Model, Inferences About the Regression Coefficients, Sampling Distribution of the Regression Coefficients, Hypothesis Tests for the Regression Coefficients and p-Values, A Test for the Overall Fit: The ANOVA Table, Multicollinearity, Include/Exclude Decisions, Stepwise Regression, Outliers, Violations of Regression Assumptions, Nonconstant Error Variance, Nonnormality of Residuals, Autocorrelated Residuals, Prediction.</p>	<p><b>8 Hours</b></p>
<p><b>Course outcomes:</b> The students should be able to:</p>	
<ul style="list-style-type: none"> <li>• Explain the importance of data and data analysis</li> <li>• Interpret the probabilistic models for data</li> <li>• Define hypothesis, uncertainty principle</li> <li>• Evaluate regression analysis</li> </ul>	
<p><b>Question Paper Pattern:</b></p>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	

  
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**Text Books:**

1. S C Albright and W L Winston, Business analytics: data analysis and decision making, 5/e Cengage Learning

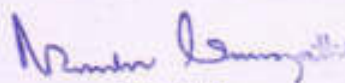
**Reference Books:**



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**PROGRAMMING IN JAVA**  
**(OPEN ELECTIVE)**  
**(Effective from the academic year 2018 -2019)**  
**SEMESTER – VII**

<b>Subject Code</b>	18CS752	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS752) will enable students to:			
<ul style="list-style-type: none"> <li>• Learn fundamental features of object oriented language and JAVA</li> <li>• Set up Java JDK environment to create, debug and run simple Java programs.</li> <li>• Learn object oriented concepts using programming examples.</li> <li>• Study the concepts of importing of packages and exception handling mechanism.</li> <li>• Discuss the String Handling examples with Object Oriented concepts</li> </ul>			
<b>Module – 1</b>			<b>Teaching Hours</b>
An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings <b>Text book 1: Ch 2, Ch 3</b>			<b>8 Hours</b>
<b>Module – 2</b>			
Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements. <b>Text book 1: Ch 4, Ch 5</b>			<b>8 Hours</b>
<b>Module – 3</b>			
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class. <b>Text book 1: Ch 6, Ch 7.1-7.9, Ch 8.</b>			<b>8 Hours</b>
<b>Module – 4</b>			
Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions. <b>Text book 1: Ch 9, Ch 10</b>			<b>8 Hours</b>
<b>Module – 5</b>			
Enumerations, Type Wrappers, I/O, Applets, and Other Topics: I/O Basics, Reading			<b>8 Hours</b>



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<p>Console Input, Writing Console Output, The PrintWriter Class, Reading and Writing Files, Applet Fundamentals, The transient and volatile Modifiers, Using instanceof, strictfp, Native Methods, Using assert, Static Import, Invoking Overloaded Constructors Through this( ), String Handling: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf( ), Changing the Case of Characters Within a String , Additional String Methods, StringBuffer, StringBuilder.</p> <p><b>Text book 1: Ch 12.1,12.2, Ch 13, Ch 15</b></p>	
<p><b>Course outcomes:</b> The students should be able to:</p>	
<ul style="list-style-type: none"> <li>• Explain the object-oriented concepts and JAVA.</li> <li>• Develop computer programs to solve real world problems in Java.</li> </ul> <p>Develop simple GUI interfaces for a computer program to interact with users</p>	
<p><b>Question Paper Pattern:</b></p>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<p><b>Text Books:</b></p>	
<p>1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 2, 3, 4, 5, 6,7, 8, 9,10, 12,13,15)</p>	
<p><b>Reference Books:</b></p>	

  
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**INTRODUCTION TO OPERATING SYSTEM  
(OPEN ELECTIVE)  
(Effective from the academic year 2018 -2019)  
SEMESTER – VII**

<b>Subject Code</b>	18CS753	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS –3**

**Course Learning Objectives:** This course (18CS753) will enable students to:

- Explain the fundamentals of operating system
- Comprehend multithreaded programming, process management, memory management and storage management.
- Familiar with various types of operating systems

<b>Module – 1</b>	<b>Teaching Hours</b>
<p>Introduction: What OS do, Computer system organization, architecture, structure, Operations, Process, memory and storage management, Protection and security, Distributed systems, Special purpose systems, computing environments.</p> <p>System Structure: OS Services, User OSI, System calls, Types of system calls, System programs, OS design and implementation, OS structure, Virtual machines, OS generation, system boot</p> <p><b>Textbook1: Chapter 1, 2</b></p>	<b>8 Hours</b>

<b>Module – 2</b>	<b>8 Hours</b>
<p>Process Concept: Overview, Process scheduling, Operations on process, IPC, Examples in IPC, Communication in client-server systems.</p> <p>Multithreaded Programming: Overview, Models, Libraries, Issues, OS Examples</p> <p><b>Textbook1: Chapter 3,4</b></p>	

<b>Module – 3</b>	<b>8 Hours</b>
<p>Process Scheduling: Basic concept, Scheduling criteria, Algorithm, multiple processor scheduling, thread scheduling, OS Examples, Algorithm Evaluation.</p> <p>Synchronization: Background, the critical section problem, Petersons solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Atomic transactions</p> <p><b>Textbook1: Chapter 5, 6</b></p>	

<b>Module – 4</b>	<b>8 Hours</b>
<p>Deadlocks: System model, Deadlock characterization, Method of handling deadlock, Deadlock prevention, Avoidance, Detection, Recovery from deadlock</p> <p>Memory management strategies: Background, swapping, contiguous memory</p>	

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allocation, paging, structure of page table, segmentation,	
<b>Textbook1: Chapter 7, 8</b>	
<b>Module - 5</b>	
Virtual Memory management: Background, Demand paging, Copy-on-write, Page replacement, allocation of frames, Trashing, Memory mapped files, Allocating Kernel memory, Operating system examples	<b>8 Hours</b>
File system: File concept, Access methods, Directory structure, File system mounting, File sharing, protection	
<b>Textbook1: Chapter 9, 10</b>	
<b>Course outcomes:</b> The students should be able to:	
<ul style="list-style-type: none"> <li>• Explain the fundamentals of operating system</li> <li>• Comprehend process management, memory management and storage management.</li> <li>• Familiar with various types of operating systems</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Text Books:</b>	
1. A. Silberschatz, P B Galvin, G Gagne, Operating systems, 7 <sup>th</sup> edition, John Wiley and sons,.	
<b>Reference Books:</b>	

  
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**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LABORATORY**

(Effective from the academic year 2018 -2019)

**SEMESTER – VII**

<b>Subject Code</b>	18CSL76	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	0:0:2	<b>SEE Marks</b>	60
<b>Total Number of Lab Contact Hours</b>	36	<b>Exam Hours</b>	3 Hrs

**Credits – 2**

**Course Learning Objectives:** This course (18CSL76) will enable students to:

- Implement and evaluate AI and ML algorithms in and Python programming language.

**Descriptions (if any):**

**Programs List:**

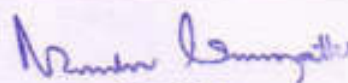
1.	Implement A* Search algorithm.
2.	Implement AO* Search algorithm.
3.	For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
4.	Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5.	Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
6.	Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
7.	Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
8.	Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
9.	Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs

**Laboratory Outcomes:** The student should be able to:

- Implement and demonstrate AI and ML algorithms.
- Evaluate different algorithms.

**Conduct of Practical Examination:**

- All laboratory experiments, excluding the first, are to be included for practical examination.
- Experiment distribution
  - For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.
  - For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
- Change of experiment is allowed only once and marks allotted for procedure part to be made zero.
- Marks Distribution (*Subjected to change in accordance with university regulations*)
  - s) For questions having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks



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t) For questions having part A and B

- i. Part A – Procedure + Execution + Viva = 4 + 21 + 5 = 30 Marks
- ii. Part B – Procedure + Execution + Viva = 10 + 49 + 11 = 70 Marks

  
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**INTERNET OF THINGS**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VIII**

<b>Subject Code</b>	18CS81	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS -3**

**Course Learning Objectives:** This course (18CS81) will enable students to:

- Assess the genesis and impact of IoT applications, architectures in real world.
- Illustrate diverse methods of deploying smart objects and connect them to network.
- Compare different Application protocols for IoT.
- Infer the role of Data Analytics and Security in IoT.
- Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

<b>Module 1</b>	<b>Contact Hours</b>
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What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.	08
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**Module 2**

Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies.	08
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**Module 3**

IP as the IoT Network Layer, The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances, Application Protocols for IoT, The Transport Layer, IoT Application Transport Methods.	08
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**Module 4**

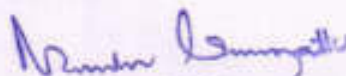
Data and Analytics for IoT, An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment	08
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**Module 5**

IoT Physical Devices and Endpoints - Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture, Smart City Security Architecture, Smart City Use-Case Examples.	08
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**Course Outcomes:** The student will be able to :

- Interpret the impact and challenges posed by IoT networks leading to new architectural models.
- Compare and contrast the deployment of smart objects and the technologies to connect them to network.
- Appraise the role of IoT protocols for efficient network communication.



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- Elaborate the need for Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

**Question Paper Pattern:**

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1<sup>st</sup> Edition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
2. Srinivasa K G, "Internet of Things", CENGAGE Learning India, 2017

**Reference Books:**

1. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1<sup>st</sup> Edition, VPT, 2014. (ISBN: 978-8173719547)
2. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1<sup>st</sup> Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)

  
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**MOBILE COMPUTING**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VIII**

<b>Subject Code</b>	18CS821	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

**CREDITS –3**

**Course Learning Objectives:** This course (18CS821) will enable students to:

- Define concepts of wireless communication.
- Compare and contrast propagation methods, Channel models, capacity calculations multiple antennas and multiple user techniques used in the mobile communication.
- Explain CDMA, GSM, Mobile IP, Wimax and Different Mobile OS
- Illustrate various Markup Languages CDC, CLDC, MIDP; Programming for CLDC, MIDlet model and security concerns

<b>Module 1</b>	<b>Contact Hours</b>
Mobile Computing Architecture: Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing. Wireless Networks : Global Systems for Mobile Communication ( GSM and Short Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS, Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Introduction to WiMAX.	08
<b>Module 2</b>	
Mobile Client: Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, Design Constraints in applications for handheld devices. Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Mobile IP with IPv6	08
<b>Module 3</b>	
Mobile OS and Computing Environment : Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development: The development process, Need analysis phase, Design phase, Implementation and Testing phase. Deployment phase, Development Tools, Device Emulators.	08
<b>Module 4</b>	
Building, Mobile Internet Applications: Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML.	08
<b>Module 5</b>	
J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life-cycle, Creating new application, MIDlet event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP.	08

  
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**Course Outcomes:** The student will be able to :

The students shall able to:

- Explain state of art techniques in wireless communication.
- Discover CDMA, GSM, Mobile IP, Wimax
- Demonstrate program for CLDC, MIDP let model and security concerns

**Question paper pattern:**

The question paper will have ten questions.

There will be 2 questions from each module.

Each question will have questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**

1. Ashok Talukder, Roopa Yavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.
2. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003

**Reference Books:**

1. Raj kamal: Mobile Computing, Oxford University Press, 2007.
2. Iti Saha Misra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.

The students shall able to:

- Explain state of art techniques in wireless communication.
- Discover CDMA, GSM, Mobile IP, Wimax
- Demonstrate program for CLDC, MIDP let model and security concerns

**Question paper pattern:**

The question paper will have ten questions.

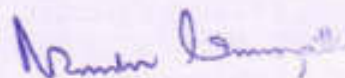
There will be 2 questions from each module.

Each question will have questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

**Text Books:**

3. Ashok Talukder, Roopa Yavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.
4. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003



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**ADVANCED COMPUTER ARCHITECTURES**  
(Effective from the academic year 2018 -2019)  
**SEMESTER – VIII**

<b>Subject Code</b>	18CS822	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs

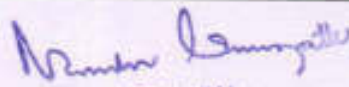
**CREDITS –3**

**Course Learning Objectives:** This course (18CS822) will enable students to:

- Describe computer architecture.
- Measure the performance of architectures in terms of right parameters.
- Summarize parallel architecture and the software used for them

<b>Module 1</b>	<b>Contact Hours</b>
Theory of Parallelism: Parallel Computer Models, The State of Computing, Multiprocessors and Multicomputer, Multivector and SIMD Computers, PRAM and VLSI Models, Program and Network Properties, Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures, Principles of Scalable Performance, Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches.	08
<b>Module 2</b>	
Hardware Technologies: Processors and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.	08
<b>Module 3</b>	
Bus, Cache, and Shared Memory, Bus Systems, Cache Memory Organizations, Shared Memory Organizations, Sequential and Weak Consistency Models, Pipelining and Superscalar Techniques, Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design (Upto 6.4).	08
<b>Module 4</b>	
Parallel and Scalable Architectures: Multiprocessors and Multicomputers, Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Three Generations of Multicomputers, Message-Passing Mechanisms, Multivector and SIMD Computers, Vector Processing Principles, Multivector Multiprocessors, Compound Vector Processing, SIMD Computer Organizations (Upto 8.4), Scalable, Multithreaded, and Dataflow Architectures, Latency-Hiding Techniques, Principles of Multithreading, Fine-Grain Multicomputers, Scalable and Multithreaded Architectures, Dataflow and Hybrid Architectures.	08
<b>Module 5</b>	
Software for parallel programming: Parallel Models, Languages, and Compilers, Parallel Programming Models, Parallel Languages and Compilers, Dependence Analysis of Data Arrays, Parallel Program Development and Environments, Synchronization and Multiprocessing Modes. Instruction and System Level Parallelism, Instruction Level Parallelism, Computer Architecture, Contents, Basic Design Issues, Problem Definition, Model of a Typical Processor, Compiler-detected Instruction Level Parallelism, Operand Forwarding, Reorder Buffer, Register Renaming, Tomasulo's Algorithm, Branch Prediction, Limitations in Exploiting Instruction Level Parallelism, Thread Level Parallelism.	08

**Course Outcomes:** The student will be able to :

  
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- Explain the concepts of parallel computing and hardware technologies
- Compare and contrast the parallel architectures
- Illustrate parallel programming concepts

**Question Paper Pattern:**

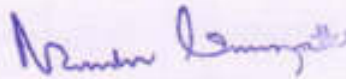
- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

**Textbooks:**

1. Kai Hwang and Naresh Jotwani, Advanced Computer Architecture (SIE): Parallelism, Scalability, Programmability, McGraw Hill Education 3/e. 2015

**Reference Books:**

1. John L. Hennessy and David A. Patterson, Computer Architecture: A quantitative approach, 5th edition, Morgan Kaufmann Elseveir, 2013



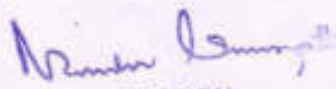
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<b>NOSQL DATABASE</b> (Effective from the academic year 2018 -2019) <b>SEMESTER – VIII</b>			
<b>Subject Code</b>	18CS823	<b>CIE Marks</b>	40
<b>Number of Contact Hours/Week</b>	3:0:0	<b>SEE Marks</b>	60
<b>Total Number of Contact Hours</b>	40	<b>Exam Hours</b>	3 Hrs
<b>CREDITS –3</b>			
<b>Course Learning Objectives:</b> This course (18CS823) will enable students to: <ul style="list-style-type: none"> <li>• Define, compare and use the four types of NoSQL Databases (Document-oriented, Key-Value Pairs, Column-oriented and Graph).</li> <li>• Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.</li> <li>• Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.</li> </ul>			
<b>Module 1</b>			<b>Contact Hours</b>
Why NoSQL? The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, A (Mostly) Standard Model, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Aggregate Data Models; Aggregates, Example of Relations and Aggregates, Consequences of Aggregate Orientation, Key-Value and Document Data Models, Column-Family Stores, Summarizing Aggregate-Oriented Databases. More Details on Data Models; Relationships, Graph Databases, Schemaless Databases, Materialized Views, Modeling for Data Access,			08
<b>Textbook1: Chapter 1,2,3</b>			
<b>Module 2</b>			
Distribution Models; Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication. Consistency, Update Consistency, Read Consistency, Relaxing Consistency, The CAP Theorem, Relaxing Durability, Quorums. Version Stamps, Business and System Transactions, Version Stamps on Multiple Nodes			08
<b>Textbook1: Chapter 4,5,6</b>			
<b>Module 3</b>			
Map-Reduce, Basic Map-Reduce, Partitioning and Combining, Composing Map-Reduce Calculations, A Two Stage Map-Reduce Example, Incremental Map-Reduce Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preference, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets			08
<b>Textbook1: Chapter 7,8</b>			
<b>Module 4</b>			
Document Databases, What Is a Document Database?, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E-Commerce Applications, When Not to Use, Complex Transactions Spanning Different			08

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Operations, Queries against Varying Aggregate Structure	
<b>Textbook1: Chapter 9</b>	
<b>Module 5</b>	
Graph Databases, What Is a Graph Database?, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use.	08
<b>Textbook1: Chapter 11</b>	
<b>Course Outcomes:</b> The student will be able to :	
<ul style="list-style-type: none"> <li>• Define, compare and use the four types of NoSQL Databases (Document-oriented, Key/Value Pairs, Column-oriented and Graph).</li> <li>• Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.</li> <li>• Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.</li> </ul>	
<b>Question Paper Pattern:</b>	
<ul style="list-style-type: none"> <li>• The question paper will have ten questions.</li> <li>• Each full Question consisting of 20 marks</li> <li>• There will be 2 full questions (with a maximum of four sub questions) from each module.</li> <li>• Each full question will have sub questions covering all the topics under a module.</li> <li>• The students will have to answer 5 full questions, selecting one full question from each module.</li> </ul>	
<b>Textbooks:</b>	
Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson Addison Wesley, 2012	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. Dan Sullivan, "NoSQL For Mere Mortals", 1st Edition, Pearson Education India, 2015. (ISBN-13: 978-9332557338)</li> <li>2. Dan McCreary and Ann Kelly, "Making Sense of NoSQL: A guide for Managers and the Rest of us", 1st Edition, Manning Publication/Dreamtech Press, 2013. (ISBN-13: 978-9351192022)</li> <li>3. Kristina Chodorow, "Mongodb: The Definitive Guide- Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Publications, 2013. (ISBN-13: 978-9351102694)</li> </ol>	

  
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ESTD: 2002



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(Approved by AICTE, New Delhi, Recognised by Govt. of Karnataka and Affiliated to Visvesvaraya Technological University, Belagavi)

## Criteria 1.1

### Curriculum Planning and Implementation

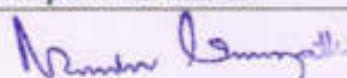
# Syllabus Copy (CSE)

## 2021 scheme

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TUMKUR - 572106.

### III Semester

<b>TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES</b>			
Course Code:	21MAT31	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Objectives:</b>			
<p>CLO 1. To have an insight into solving ordinary differential equations by using Laplace transform techniques</p> <p>CLO 2. Learn to use the Fourier series to represent periodical physical phenomena in engineering analysis.</p> <p>CLO 3. To enable the students to study Fourier Transforms and concepts of infinite Fourier Sine and Cosine transforms and to learn the method of solving difference equations by the z-transform method.</p> <p>CLO 4. To develop the proficiency in solving ordinary and partial differential equations arising in engineering applications, using numerical methods</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p>Definition and Laplace transforms of elementary functions (statements only). Problems on Laplace transform of <math>e^{at}f(t)</math>, <math>t^n f(t)</math>, <math>\frac{f(t)}{t}</math>. Laplace transforms of Periodic functions (statement only) and unit-step function - problems.</p> <p>Inverse Laplace transforms definition and problems, Convolution theorem to find the inverse Laplace transforms (without Proof) and problems. Laplace transforms of derivatives, solution of differential equations.</p> <p><b>Self-study:</b> Solution of simultaneous first-order differential equations.</p>			
<b>Teaching-Learning Process</b>	Chalk and talk method /		
<b>Module-2</b>			
<p>Introduction to infinite series, convergence and divergence. Periodic functions, Dirichlet's condition. Fourier series of periodic functions with period <math>2\pi</math> and arbitrary period. Half range Fourier series. Practical harmonic analysis.</p> <p><b>Self-study:</b> Convergence of series by D'Alembert's Ratio test and, Cauchy's root test</p>			
<b>Teaching-Learning Process</b>	Chalk and talk method / Powerpoint Presentation		

  
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<b>Module-3</b>	
<p>Infinite Fourier transforms definition, Fourier sine and cosine transforms. Inverse Fourier transforms, Inverse Fourier cosine and sine transforms. Problems.</p> <p>Difference equations, z-transform-definition, Standard z-transforms, Damping and shifting rules, Problems. Inverse z-transform and applications to solve difference equations.</p> <p><b>Self-Study:</b> Initial value and final value theorems, problems.</p>	
<b>Teaching-Learning Process</b>	Chalk and talk method / Powerpoint Presentation
<b>Module-4</b>	
<p>Classifications of second-order partial differential equations, finite difference approximations to derivatives, Solution of Laplace's equation using standard five-point formula. Solution of heat equation by Schmidt explicit formula and Crank- Nicholson method, Solution of the Wave equation. Problems.</p> <p><b>Self-Study:</b> Solution of Poisson equations using standard five-point formula.</p>	
<b>Teaching-Learning Process</b>	Chalk and talk method / Powerpoint Presentation
<b>Module-5</b>	
<p>Second-order differential equations - Runge-Kutta method and Milne's predictor and corrector method. (No derivations of formulae).</p> <p>Calculus of Variations: Functionals, Euler's equation, Problems on extremals of functional. Geodesics on a plane, Variational problems.</p> <p><b>Self-Study:</b> Hanging chain problem</p>	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<p><b>Course Outcomes (Course Skill Set)</b></p> <p>At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>CO 1. To solve ordinary differential equations using Laplace transform.</li> <li>CO 2. Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.</li> <li>CO 3. To use Fourier transforms to analyze problems involving continuous-time signals and to apply Z-Transform techniques to solve difference equations</li> <li>CO 4. To solve mathematical models represented by initial or boundary value problems involving partial differential equations</li> <li>CO 5. Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.</li> </ul>	
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together</p> <p><b>Continuous Internal Evaluation:</b></p> <p>Three Unit Tests each of <b>20 Marks (duration 01 hour)</b></p> <ol style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol> <p>Two assignments each of <b>10 Marks</b></p> <ol style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol> <p>Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b></p>	

  
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6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

**Reference Books:**

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed.
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Reprint, 2016.
3. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, Latest edition.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw - Hill Book Co.Newyork, Latest ed.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H.K.Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication (2014).
7. James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019

**Weblinks and Video Lectures (e-Resources):**

1. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
2. <http://academicearth.org/>
3. <http://www.bookstreet.in>.
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes
- Assignments
- Seminars

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### III Semester

DATA STRUCTURES AND APPLICATIONS			
Course Code:	21CS32	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 T + 20 P	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Objectives:</b>			
CLO 1. Explain the fundamentals of data structures and their applications essential for implementing solutions to problems.			
CLO 2. Illustrate representation of data structures: Stack, Queues, Linked Lists, Trees and Graphs.			
CLO 3. Design and Develop Solutions to problems using Arrays, Structures, Stack, Queues, Linked Lists.			
CLO 4. Explore usage of Trees and Graph for application development.			
CLO 5. Apply the Hashing techniques in mapping key value pairs.			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"><li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li><li>2. Use of Video/Animation to explain functioning of various concepts.</li><li>3. Encourage collaborative (Group Learning) Learning in the class.</li><li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li><li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li><li>6. Introduce Topics in manifold representations.</li><li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li><li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li></ol>			
<b>Module-1</b>			
<b>Introduction:</b> Data Structures, Classifications (Primitive & Non-Primitive), Data structure operations (Traversing, inserting, deleting, searching, and sorting). Review of Arrays. Structures: Array of structures Self-Referential Structures. Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, dynamically allocated arrays and Multidimensional Arrays. Demonstration of representation of Polynomials and Sparse Matrices with arrays.			
<b>Textbook 1: Chapter 1: 1.2, Chapter 2: 2.2 - 2.7, Text Textbook 2: Chapter 1: 1.1 - 1.4, Chapter 3: 3.1 - 3.3, 3.5, 3.7, Chapter 4: 4.1 - 4.9, 4.14 Textbook 3: Chapter 1: 1.3</b>			
<b>Laboratory Component:</b>			
<ol style="list-style-type: none"><li>1. Design, Develop and Implement a menu driven Program in C for the following Array Operations<ol style="list-style-type: none"><li>a. Creating an Array of N Integer Elements</li><li>b. Display of Array Elements with Suitable Headings</li><li>c. Exit.</li></ol>Support the program with functions for each of the above operations.</li><li>2. Design, Develop and Implement a menu driven Program in C for the following Array operations<ol style="list-style-type: none"><li>a. Inserting an Element (ELEM) at a given valid Position (POS)</li><li>b. Deleting an Element at a given valid Position POS)</li></ol></li></ol>			

  
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<p>c. Display of Array Elements d. Exit. Support the program with functions for each of the above operations.</p>	
<p><b>Teaching-Learning Process</b></p>	<p>Problem based learning (Implementation of different programs to illustrate application of arrays and structures. <a href="https://www.youtube.com/watch?v=3Xo6P_V-qns&amp;t=201s">https://www.youtube.com/watch?v=3Xo6P_V-qns&amp;t=201s</a>  <a href="https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html">https://ds2-iiith.vlabs.ac.in/exp/selection-sort/index.html</a> <a href="https://ds1-iiith.vlabs.ac.in/data-structures-1/List%20of%20experiments.html">https://ds1-iiith.vlabs.ac.in/data-structures-1/List%20of%20experiments.html</a></p>
<p><b>Module-2</b></p>	
<p><b>Stacks:</b> Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays. Different representation of expression. Stack Applications: Infix to postfix conversion, Infix to prefix conversion, evaluation of postfix expression, recursion.</p> <p><b>Queues:</b> Definition, Array Representation of Queues, Queue Operations, Circular Queues, Queues and Circular queues using Dynamic arrays, Dequeues, Priority Queues.</p> <p><b>Textbook 1: Chapter 3: 3.1 -3.4, 3.6 Textbook 2: Chapter 6: 6.1 -6.4, 6.5, 6.7-6.13</b></p>	
<p><b>Laboratory Component:</b></p> <ol style="list-style-type: none"> <li>Design, Develop and Implement a menu driven Program in C for the following operations on STACK of Integers (Array Implementation of Stack with maximum size MAX) <ol style="list-style-type: none"> <li>Push an Element on to Stack</li> <li>Pop an Element from Stack</li> <li>Demonstrate <i>Overflow</i> and <i>Underflow</i> situations on Stack</li> <li>Display the status of Stack</li> <li>Exit</li> </ol> <p>Support the program with appropriate functions for each of the above operations</p> </li> <li>Design, Develop and Implement a Program in C for the following Stack Applications <ol style="list-style-type: none"> <li>Evaluation of Suffix expression with single digit operands and operators: +, -, *, /, %, ^</li> <li>Solving Tower of Hanoi problem with n disks</li> </ol> </li> </ol>	
<p><b>Teaching-Learning Process</b></p>	<p>Active Learning, Problem based learning <a href="https://nptel.ac.in/courses/106/102/106102064/">https://nptel.ac.in/courses/106/102/106102064/</a> <a href="https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html">https://ds1-iiith.vlabs.ac.in/exp/stacks-queues/index.html</a></p>
<p><b>Module-3</b></p>	
<p><b>Linked Lists:</b> Definition, classification of linked lists. Representation of different types of linked lists in Memory, Traversing, Insertion, Deletion, Searching, Sorting, and Concatenation Operations on Singly linked list, Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists – Polynomials, Sparse matrix representation. Programming Examples.</p> <p><b>Textbook 1: Chapter 4: 4.1 - 4.4, 4.5.2, 4.7, 4.8, Textbook 2: Chapter 5: 5.1 - 5.9</b></p>	
<p><b>Laboratory Component:</b></p> <ol style="list-style-type: none"> <li>Singly Linked List (SLL) of Integer Data <ol style="list-style-type: none"> <li>Create a SLL stack of N integer.</li> <li>Display of SLL</li> <li>Linear search. Create a SLL queue of N Students Data Concatenation of two SLL of integers.</li> </ol> </li> <li>Design, Develop and Implement a menu driven Program in C for the following operationson Doubly Linked List (DLL) of Professor Data with the fields: ID, Name, Branch, Area of specialization</li> </ol>	

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- a. Create a DLL stack of N Professor's Data.
  - b. Create a DLL queue of N Professor's Data
- Display the status of DLL and count the number of nodes in it.

**Teaching-Learning Process**

MOOC, Active Learning, Problem solving based on linked lists.  
<https://nptel.ac.in/courses/106/102/106102064/>  
<https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html>  
<https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html>  
<https://ds1-iiith.vlabs.ac.in/exp/linked-list/basics/overview.html>  
<https://ds1-iiith.vlabs.ac.in/List%20of%20experiments.html>

**Module-4**

**Trees 1:** Terminologies, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, and Searching operation on Binary search tree. Application of Trees-Evaluation of Expression.

**Textbook 1: Chapter 5: 5.1 -5.5, 5.7; Textbook 2: Chapter 7: 7.1 - 7.9**

**Laboratory Component:**

1. Given an array of elements, construct a complete binary tree from this array in level order fashion. That is, elements from left in the array will be filled in the tree level wise starting from level 0. Ex: Input :  
arr[] = {1, 2, 3, 4, 5, 6}  
Output : Root of the following tree

```

      1
     /\
    2 3
   /\  /\
  4 5 6

```
2. Design, Develop and Implement a menu driven Program in C for the following operations on Binary Search Tree (BST) of Integers
  - a. Create a BST of N Integers
  - b. Traverse the BST in Inorder, Preorder and Post Order

**Teaching-Learning Process**

Problem based learning  
<http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>  
<https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/index.html>  
<https://ds1-iiith.vlabs.ac.in/exp/tree-traversal/depth-first-traversal/dft-practice.html>

**Module-5**

**Trees 2:** AVL tree, Red-black tree, Splay tree, B-tree.

**Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Traversal methods: Breadth First Search and Depth FirstSearch.

**Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.

**Textbook 1: Chapter 10:10.2, 10.3, 10.4, Textbook 2:7.10 - 7.12, 7.15 Chapter 11: 11.2, Textbook 1: Chapter 6 : 6.1-6.2, Chapter 8 : 8.1-8.3, Textbook 2: 8.1 - 8.3, 8.5, 8.7**

**Textbook 3: Chapter 15:15.1, 15.2,15.3, 15.4,15.5 and 15.7**

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**Laboratory Component:**

1. Design, Develop and implement a program in C for the following operations on Graph (G) of cities
  - a. Create a Graph of N cities using Adjacency Matrix.
  - b. Print all the nodes reachable from a given starting node in a diagraph using DFS/BFS method.
2. Design and develop a program in C that uses Hash Function  $H:K \rightarrow L$  as  $H(K)=K \bmod m$  (reminder method) and implement hashing technique to map a given key K to the address space L. Resolve the collision (if any) using linear probing.

**Teaching-Learning Process**

NPTL, MOOC etc. courses on trees and graphs.  
<http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>

**Course Outcomes (Course Skill Set)**

At the end of the course the student will be able to:

- CO 1. Identify different data structures and their applications.
- CO 2. Apply stack and queues in solving problems.
- CO 3. Demonstrate applications of linked list.
- CO 4. Explore the applications of trees and graphs to model and solve the real-world problem.
- CO 5. Make use of Hashing techniques and resolve collisions during mapping of key value pairs

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

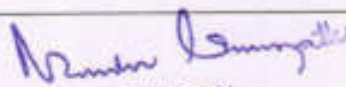
Practical Sessions need to be assessed by appropriate rubrics and viva-voce method. This will contribute to **20 marks**.

- Rubrics for each Experiment taken average for all Lab components - 15 Marks.
- Viva-Voce- 5 Marks (more emphasized on demonstration topics)

The sum of three tests, two assignments, and practical sessions will be out of 100 marks and will be **scaled down to 50 marks**

(to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

  
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**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 Marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:****Textbooks:**

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.
3. Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.

**Reference Books:**

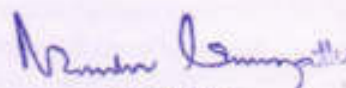
1. Gilberg and Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning, 2014.
2. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013
3. A M Tenenbaum, Data Structures using C, PHI, 1989
4. Robert Kruse, Data Structures and Program Design in C, 2nd Ed, PHI, 1996.

**Weblinks and Video Lectures (e-Resources):**

1. <http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html>
2. <https://nptel.ac.in/courses/106/105/106105171/>
3. <http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

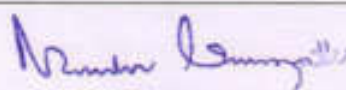
- Real world problem solving using group discussion.
- Back/Forward stacks on browsers.
- Undo/Redo stacks in Excel or Word.
- Linked list representation of real-world queues -Music player, image viewer



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### III Semester

<b>ANALOG AND DIGITAL ELECTRONICS</b>			
Course Code	<b>21CS33</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 T + 20 P	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Learning Objectives:</b>			
CLO 1. Explain the use of photo electronics devices, 555 timer IC, Regulator ICs and uA741			
CLO 2. Make use of simplifying techniques in the design of combinational circuits.			
CLO 3. Illustrate combinational and sequential digital circuits			
CLO 4. Demonstrate the use of flipflops and apply for registers			
CLO 5. Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techniques.			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"><li>1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.</li><li>2. Show Video/animation films to explain functioning of various concepts.</li><li>3. Encourage collaborative (Group Learning) Learning in the class.</li><li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li><li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li><li>6. Topics will be introduced in a multiple representation.</li><li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li><li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li></ol>			
<b>Module-1</b>			
BJT Biasing: Fixed bias, Collector to base Bias, voltage divider bias			
Operational Amplifier Application Circuits: Peak Detector, Schmitt trigger, Active Filters, Non-Linear Amplifier, Relaxation Oscillator, Current-to-Voltage and Voltage-to-Current Converter, Regulated Power Supply Parameters, adjustable voltage regulator, D to A and A to D converter.			
<b>Textbook 1: Part A: Chapter 4 (Sections 4.2, 4.3, 4.4), Chapter 7 (Sections 7.4, 7.6 to 7.11), Chapter 8 (Sections 8.1 and 8.5), Chapter 9.</b>			
<b>Laboratory Component:</b>			
<ol style="list-style-type: none"><li>1. Simulate BJT CE voltage divider biased voltage amplifier using any suitable circuit simulator.</li><li>2. Using ua 741 Opamp, design a 1 kHz Relaxation Oscillator with 50% duty cycle</li><li>3. Design an astable multivibrator circuit for three cases of duty cycle (50%, &lt;50% and &gt;50%) using NE 555 timer IC.</li><li>4. Using ua 741 opamp, design a window comparator for any given UTP and LTP.</li></ol>			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"><li>1. Demonstration of circuits using simulation.</li><li>2. Project work: Design a integrated power supply and function generator operating at audio frequency. Sine, square and triangular functions are to be generated.</li><li>3. Chalk and Board for numerical</li></ol>		
<b>Module-2</b>			



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Karnaugh maps: minimum forms of switching functions, two and three variable Karnaugh maps, four variable Karnaugh maps, determination of minimum expressions using essential prime implicants, Quine-McClusky Method: determination of prime implicants, the prime implicant chart, Petricks method, simplification of incompletely specified functions, simplification using map-entered variables

**Textbook 1: Part B: Chapter 5 (Sections 5.1 to 5.4) Chapter 6 (Sections 6.1 to 6.5)**

**Laboratory Component:**

1. Given a 4-variable logic expression, simplify it using appropriate technique and implement the same using basic gates.

**Teaching-Learning Process**

1. Chalk and Board for numerical
2. Laboratory Demonstration

**Module-3**

Combinational circuit design and simulation using gates: Review of Combinational circuit design, design of circuits with limited Gate Fan-in, Gate delays and Timing diagrams, Hazards in combinational Logic, simulation and testing of logic circuits

Multiplexers, Decoders and Programmable Logic Devices: Multiplexers, three state buffers, decoders and encoders, Programmable Logic devices.

**Textbook 1: Part B: Chapter 8, Chapter 9 (Sections 9.1 to 9.6)**

**Laboratory Component:**

1. Given a 4-variable logic expression, simplify it using appropriate technique and realize the simplified logic expression using 8:1 multiplexer IC.
2. Design and implement code converter I) Binary to Gray (II) Gray to Binary Code

**Teaching-Learning Process**

1. Demonstration using simulator
2. Case study: Applications of Programmable Logic device
3. Chalk and Board for numerical

**Module-4**

Introduction to VHDL: VHDL description of combinational circuits, VHDL Models for multiplexers, VHDL Modules.

Latches and Flip-Flops: Set Reset Latch, Gated Latches, Edge-Triggered D Flip Flop 3, SR Flip Flop, J K Flip Flop, T Flip Flop.

**Textbook 1: Part B: Chapter 10(Sections 10.1 to 10.3), Chapter 11 (Sections 11.1 to 11.7)**

**Laboratory Component:**

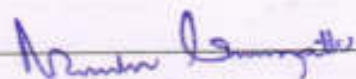
1. Given a 4-variable logic expression, simplify it using appropriate technique and simulate the same in HDL simulator
2. Realize a J-K Master / Slave Flip-Flop using NAND gates and verify its truth table. And implement the same in HDL.

**Teaching-Learning Process**

1. Demonstration using simulator
2. Case study: Arithmetic and Logic unit in VHDL
3. Chalk and Board for numerical

**Module-5**

Registers and Counters: Registers and Register Transfers, Parallel Adder with accumulator, shift registers, design of Binary counters, counters for other sequences, counter design using SR and J K Flip Flops.



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**Textbook 1: Part B: Chapter 12 (Sections 12.1 to 12.5)****Laboratory Component:**

1. Design and implement a mod-n ( $n < 8$ ) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working.
2. Design and implement an asynchronous counter using decade counter IC to count up from 0 to n ( $n <= 9$ ) and demonstrate on 7-segment display (using IC-7447)

**Teaching-Learning Process**

1. Demonstration using simulator
2. Project Work: Designing any counter, use LED / Seven-segment display to display the output
3. Chalk and Board for numerical

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

- CO 1. Design and analyze application of analog circuits using photo devices, timer IC, power supply and regulator IC and op-amp.
- CO 2. Explain the basic principles of A/D and D/A conversion circuits and develop the same.
- CO 3. Simplify digital circuits using Karnaugh Map, and Quine-McClusky Methods
- CO 4. Explain Gates and flip flops and make us in designing different data processing circuits, registers and counters and compare the types.
- CO 5. Develop simple HDL programs

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Practical Sessions need to be assessed by appropriate rubrics and viva-voce method. This will contribute to **20 marks**.

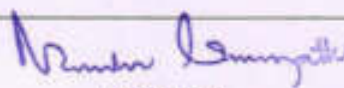
- Rubrics for each Experiment taken average for all Lab components – 15 Marks.
- Viva-Voce– 5 Marks (more emphasized on demonstration topics)

The sum of three tests, two assignments, and practical sessions will be out of 100 marks and will be **scaled down to 50 marks**

(to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

  
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Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Charles H Roth and Larry L Kinney and Raghunandan G H Analog and Digital Electronics, Cengage Learning, 2019

**Reference Books**

1. Anil K Maini, Varsha Agarwal, Electronic Devices and Circuits, Wiley, 2012.
2. Donald P Leach, Albert Paul Malvino & Goutam Saha, Digital Principles and Applications, 8th Edition, Tata McGraw Hill, 2015.
3. M. Morris Mani, Digital Design, 4th Edition, Pearson Prentice Hall, 2008.
4. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008

**Weblinks and Video Lectures (e-Resources):**

1. Analog Electronic Circuits: <https://nptel.ac.in/courses/108/102/108102112/>
2. Digital Electronic Circuits: <https://nptel.ac.in/courses/108/105/108105132/>
3. Analog Electronics Lab: <http://vlabs.iitkgp.ac.in/be/>
4. Digital Electronics Lab: <http://vlabs.iitkgp.ac.in/dec>

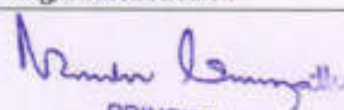
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

1. Real world problem solving - applying the design concepts of oscillator, amplifier, switch, Digital circuits using Opamps, 555 timer, transistor, Digital ICs and design a application like tone generator, temperature sensor, digital clock, dancing lights etc.

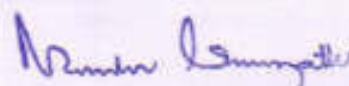
  
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### III Semester

<b>COMPUTER ORGANIZATION AND ARCHITECTURE</b>			
Course Code	<b>21CS34</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Understand the organization and architecture of computer systems, their structure and operation</p> <p>CLO 2. Illustrate the concept of machine instructions and programs</p> <p>CLO 3. Demonstrate different ways of communicating with I/O devices</p> <p>CLO 4. Describe different types memory devices and their functions</p> <p>CLO 5. Explain arithmetic and logical operations with different data types</p> <p>CLO 6. Demonstrate processing unit with parallel processing and pipeline architecture</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Basic Structure of Computers:</b> Basic Operational Concepts, Bus Structures, Performance - Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement.			
<b>Machine Instructions and Programs:</b> Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes			
<b>Textbook 1: Chapter1 - 1.3, 1.4, 1.6 (1.6.1-1.6.4, 1.6.7), Chapter2 - 2.2 to 2.5</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<b>Input/Output Organization:</b> Accessing I/O Devices, Interrupts - Interrupt Hardware, Direct Memory Access, Buses, Interface Circuits			
<b>Textbook 1: Chapter4 - 4.1, 4.2, 4.4, 4.5, 4.6</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<b>Memory System:</b> Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories - Mapping Functions, Virtual memories			
<b>Textbook 1: Chapter 5 - 5.1 to 5.4, 5.5 (5.5.1, 5.5.2)</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration		

  
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<b>Module-4</b>	
<b>Arithmetic:</b> Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers.	
<b>Basic Processing Unit:</b> Fundamental Concepts, Execution of a Complete Instruction, Hardwired control, Microprogrammed control	
<b>Textbook 1: Chapter 2-2.1, Chapter 6 - 6.1 to 6.3</b>	
<b>Textbook 1: Chapter 7 - 7.1, 7.2, 7.4, 7.5</b>	
<b>Teaching-Learning Process</b>	Chalk & board, Problem based learning
<b>Module-5</b>	
<b>Pipeline and Vector Processing:</b> Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors	
<b>Textbook 2: Chapter 9 - 9.1, 9.2, 9.3, 9.4, 9.6, 9.7</b>	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Explain the organization and architecture of computer systems with machine instructions and programs	
CO 2. Analyze the input/output devices communicating with computer system	
CO 3. Demonstrate the functions of different types of memory devices	
CO 4. Apply different data types on simple arithmetic and logical unit	
CO 5. Analyze the functions of basic processing unit, Parallel processing and pipelining	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
6. At the end of the 13 <sup>th</sup> week of the semester	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	
<b>CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b>	
<b>Semester End Examination:</b>	
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject ( <b>duration 03 hours</b> )	



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1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Textbooks**

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5<sup>th</sup> Edition, Tata McGraw Hill
2. M. Morris Mano, Computer System Architecture, PHI, 3<sup>rd</sup> Edition

**Reference:**

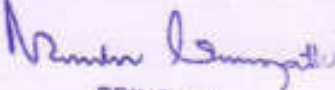
1. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/103/106103068/>
2. <https://nptel.ac.in/content/storage2/courses/106103068/pdf/coa.pdf>
3. <https://nptel.ac.in/courses/106/105/106105163/>
4. <https://nptel.ac.in/courses/106/106/106106092/>
5. <https://nptel.ac.in/courses/106/106/106106166/>
6. <http://www.nptelvideos.in/2012/11/computer-organization.html>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Discussion and literature survey on real world use cases
- Quizzes

  
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### III Semester

OBJECT ORIENTED PROGRAMMING WITH JAVA LABORATORY			
Course Code	21CSL35	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	24	Total Marks	100
Credits	1	Exam Hours	03
<b>Course Objectives:</b>			
CLO 1. Demonstrate the use of Eclipse/Netbeans IDE to create Java Applications.			
CLO 2. Using java programming to develop programs for solving real-world problems.			
CLO 3. Reinforce the understanding of basic object-oriented programming concepts.			
<b>Note: two hours tutorial is suggested for each laboratory sessions.</b>			
<b>Prerequisite</b>			
<ul style="list-style-type: none"> <li>Students should be familiarized about java installation and setting the java environment.</li> <li>Usage of IDEs like Eclipse/Netbeans should be introduced.</li> </ul>			
<b>Sl. No.</b>	<b>PART A - List of problems for which student should develop program and execute in the Laboratory</b>		
1	Aim: Introduce the java fundamentals, data types, operators in java  Program: Write a java program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$ . Read in a, b, c and use the quadratic formula.		
2	Aim: Demonstrating creation of java classes, objects, constructors, declaration and initialization of variables.  Program: Create a Java class called <b>Student</b> with the following details as variables within it. USN Name Branch Phone Write a java program to create n Student objects and print the USN, Name, Branch, and Phone of these objects with suitable headings.		
3	Aim: Discuss the various Decision-making statements, loop constructs in java  Program: A. Write a program to check prime number B. Write a program for Arithmetic calculator using switch case menu		
4	Aim: Demonstrate the core object-oriented concept of Inheritance, polymorphism  Design a super class called <b>Staff</b> with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.		
5	Aim: Introduce concepts of method overloading, constructor overloading, overriding.  Program: Write a java program demonstrating Method overloading and Constructor overloading.		
6	Aim: Introduce the concept of Abstraction, packages.  Program: Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa), time converter (hours to minutes, seconds and vice versa) using packages.		
7	Aim: Introduction to abstract classes, abstract methods, and Interface in java		

  
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	Program: Write a program to generate the resume. Create 2 Java classes Teacher (data: personal information, qualification, experience, achievements) and Student (data: personal information, result, discipline) which implements the java interface Resume with the method biodata().
8	Aim: Demonstrate creation of threads using Thread class and Runnable interface, multi-threaded programming.  Program: Write a Java program that implements a <b>multi-thread</b> application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.
9	Aim: Introduce java Collections.  Program: Write a program to perform string operations using ArrayList. Write functions for the following a. Append - add at end b. Insert - add at particular index c. Search d. List all string starts with given letter.
10	Aim: Exception handling in java, introduction to throwable class, throw, throws, finally.  Program: Write a Java program to read two integers a and b. <b>Compute</b> a/b and print, when b is not zero. Raise an exception when b is equal to zero.
11	Aim: Introduce File operations in java.  Program: Write a java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes
12	Aim: Introduce java Applet, awt, swings.  Programs: Develop an applet that displays a simple message in center of the screen. Develop a simple calculator using Swings.
<b>PART B - Practical Based Learning</b>	
01	A problem statement for each batch is to be generated in consultation with the co-examiner and student should develop an algorithm, program and execute the program for the given problem with appropriate outputs.

#### Course Outcome (Course Skill Set)

At the end of the course the student will be able to:

- CO 1. Use Eclipse/NetBeans IDE to design, develop, debug Java Projects.
- CO 2. Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP.
- CO 3. Demonstrate the ability to design and develop java programs, analyze, and interpret object-oriented data and document results.
- CO 4. Apply the concepts of multiprogramming, exception/event handling, abstraction to develop robust programs.
- CO 5. Develop user friendly applications using File I/O and GUI concepts.

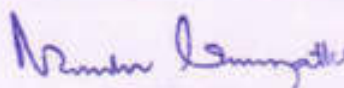
#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).

#### Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.



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- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

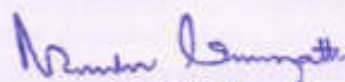
The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

#### **Semester End Evaluation (SEE):**

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- *Students can pick one experiment from the questions lot of PART A with equal choice to all the students in a batch. For PART B examiners should frame a question for each batch, student should develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem.*
- *Weightage of marks for PART A is 80% and for PART B is 20%. General rubrics suggested to be followed for part A and part B.*
- Change of experiment is allowed only once and Marks allotted to the procedure part to be made zero (Not allowed for Part B).
- The duration of SEE is 03 hours
- Rubrics suggested in Annexure-II of Regulation book

#### **Suggested Learning Resources:**

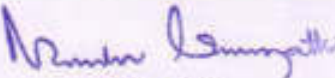
1. E Balagurusamy, Programming with Java, Graw Hill, 6<sup>th</sup> Edition, 2019.
2. Herbert Schildt, C: Java the Complete Reference, McGraw Hill, 11<sup>th</sup> Edition, 2020



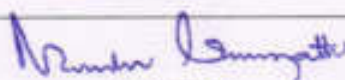
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### III Semester

<b>MASTERING OFFICE (Practical based)</b>			
Course Code	21CSL381	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	12T + 12P	Total Marks	100
Credits	01	Exam Hours	02
<b>Course Objectives:</b>			
<p>CLO 1. Understand the basics of computers and prepare documents and small presentations.</p> <p>CLO 2. Attain the knowledge about spreadsheet/worksheet with various options.</p> <p>CLO 3. Create simple presentations using templates various options available.</p> <p>CLO 4. Demonstrate the ability to apply application software in an office environment.</p> <p>CLO 5. Use MS Office to create projects, applications.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>MS-Word</b> -Working with Files, Text - Formatting, Moving, copying and pasting text, Styles - Lists - Bulleted and numbered lists, Nested lists, Formatting lists. Table Manipulations. Graphics - Adding clip Art, add an image from a file, editing graphics, Page formatting - Header and footers, page numbers, Protect the Document, Mail Merge, Macros - Creating &amp; Saving web pages, Hyperlinks.</p>			
<b>Textbook 1: Chapter 2</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-2</b>			
<p><b>MS-Excel</b>- Modifying a Worksheet - Moving through cells, adding worksheets, rows and columns, Resizing rows and columns, selecting cells, Moving and copying cells, freezing panes - Macros - recording and running. Linking worksheets - Sorting and Filling, Alternating text and numbers with Auto fill, Auto filling functions. Graphics - Adding clip art, add an image from a file, Charts - Using chart Wizard, Copy a chart to Microsoft Word.</p>			
<b>Textbook 1: Chapter 3</b>			
<b>Teaching-Learning Process</b>	Active Learning, Demonstration, presentation,		
<b>Module-3</b>			
<p><b>MS-Power Point</b> -Create a Presentation from a template- Working with Slides - Insert a new slide, applying a design template, changing slide layouts - Resizing a text box, Text box properties, delete a text box - Video and Audio effects, Color Schemes &amp; Backgrounds Adding clip art, adding an image from a file, Save as a web page.</p>			

  
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<b>Textbook 1: Chapter 5</b>	
<b>Teaching-Learning Process</b>	Demonstration, presentation preparation for case studies
<b>Module-4</b>	
MS-Access - Using Access database wizard, pages and projects. Creating Tables – Create a Table in design view. Datasheet Records – Adding, Editing, deleting records, Adding and deleting columns Resizing rows and columns, finding data in a table & replacing, Print a datasheet. Queries - MS-Access.	
<b>Textbook 1: Chapter 4</b>	
<b>Teaching-Learning Process</b>	Chalk& board, Practical based learning.
<b>Module-5</b>	
Microsoft Outlook- Introduction, Starting Microsoft Outlook, Outlook Today, Different Views In Outlook, Outlook Data Files	
<b>Textbook 1: Chapter 7</b>	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC
<b>Course Outcomes (Course Skill Set):</b>	
At the end of the course the student will be able to:	
CO 1. Know the basics of computers and prepare documents, spreadsheets, make small presentations with audio, video and graphs and would be acquainted with internet.	
CO 2. Create, edit, save and print documents with list tables, header, footer, graphic, spellchecker, mail merge and grammar checker	
CO 3. Attain the knowledge about spreadsheet with formula, macros spell checker etc.	
CO 4. Demonstrate the ability to apply application software in an office environment.	
CO 5. Use Google Suite for office data management tasks	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).	
<b>Continuous Internal Evaluation (CIE):</b>	
<b>NOTE: List of experiments to be prepared by the faculty based on the syllabus mentioned above</b>	
CIE marks for the practical course is <b>50 Marks</b> .	
The split-up of CIE marks for record/ journal and test are in the ratio <b>60:40</b> .	
<ul style="list-style-type: none"> <li>• Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.</li> <li>• Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.</li> <li>• Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).</li> <li>• Weightage to be given for neatness and submission of record/write-up on time.</li> <li>• Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.</li> <li>• In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.</li> <li>• The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book</li> <li>• The average of 02 tests is scaled down to <b>20 marks</b> (40% of the maximum marks).</li> </ul>	
The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.	
<b>Semester End Evaluation (SEE):</b>	



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- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- The duration of SEE is 02 hours

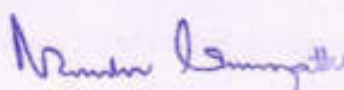
Rubrics suggested in Annexure-II of Regulation book

**Weblinks and Video Lectures (e-Resources):**

1. <https://youtu.be/9VRmgC2GRFE>
2. <https://youtu.be/rjPWl5x0g3I>
3. <https://youtu.be/tcj2BhhCMN4>
4. <https://youtu.be/ubmwp8kbfPc>
5. <https://youtu.be/i6eNvfQ8ftw>
6. <http://office.microsoft.com/en-us/training/CR010047968.aspx>
7. <https://gsuite.google.com/learning-center>
8. <http://spoken-tutorial.org>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

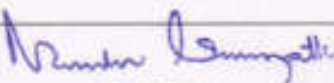
- Real world problem solving using group discussion.
- Real world examples of Windows Framework.



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### III Semester

PROGRAMMING IN C++			
Course Code	21CS382	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	12	Total Marks	100
Credits	01	Exam Hours	01
<b>Course Objectives:</b>			
<p>CLO 1. Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object.</p> <p>CLO 2. Understand the capability of a class to rely upon another class and functions.</p> <p>CLO 3. Understand about constructors which are special type of functions.</p> <p>CLO 4. Create and process data in files using file I/O functions</p> <p>CLO 5. Use the generic programming features of C++ including Exception handling.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to Object Oriented Programming:</b> Computer programming background- C++ overview- First C++ Program -Basic C++ syntax, Object Oriented Programming: What is an object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism.			
<b>Textbook 1: Chapter 1(1.1 to 1.8)</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-2</b>			
<b>Functions in C++:</b> Tokens – Keywords – Identifiers and constants – Operators in C++ – Scope resolution operator – Expressions and their types – Special assignment expressions – Function prototyping – Call by reference – Return by reference – Inline functions -Default arguments – Function overloading.			
<b>Textbook 2: Chapter 3(3.2,3.3,3.4,3.13,3.14,3.19, 3.20) , chapter 4(4.3,4.4,4.5,4.6,4.7,4.9)</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration, presentation, problem solving		
<b>Module-3</b>			
<b>Inheritance &amp; Polymorphism:</b> Derived class Constructors, destructors-Types of Inheritance- Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance.			
<b>Textbook 2: Chapter 6 (6.2,6.11) chapter 8 (8.1 to,8.8)</b>			

  
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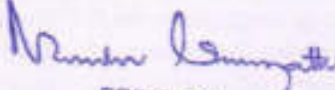
<b>Teaching-Learning Process</b>	Chalk and board, Demonstration, problem solving
<b>Module-4</b>	
I/O Streams: C++ Class Hierarchy- File Stream-Text File Handling- Binary File Handling during file operations.	
<b>Textbook 1: Chapter 12(12.5) , Chapter 13 (13.6,13.7)</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Practical based learning, practical's
<b>Module-5</b>	
<b>Exception Handling:</b> Introduction to Exception - Benefits of Exception handling- Try and catch block-Throw statement- Pre-defined exceptions in C++ .	
<b>Textbook 2: Chapter 13 (13.2 to13.6)</b>	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC
<b>Course Outcomes (Course Skill Set):</b> At the end of the course the student will be able to:	
CO 1. Able to understand and design the solution to a problem using object-oriented programming concepts.	
CO 2. Able to reuse the code with extensible Class types, User-defined operators and function Overloading.	
CO 3. Achieve code reusability and extensibility by means of Inheritance and Polymorphism	
CO 4. Identify and explore the Performance analysis of I/O Streams.	
CO 5. Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems.	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
6. At the end of the 13 <sup>th</sup> week of the semester	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b> (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	
<b>CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b>	
<b>Semester End Examination:</b>	
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject ( <b>duration 01 hours</b> )	
SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 01 hours	



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<b>Textbooks</b> <ol style="list-style-type: none"><li>1. Bhushan Trivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012.</li><li>2. Balagurusamy E, Object Oriented Programming with C++. Tata McGraw Hill Education Pvt.Ltd , Fourth Edition 2010.</li></ol>
<b>Reference Books</b> <ol style="list-style-type: none"><li>1. Bhave , " Object Oriented Programming With C++", Pearson Education , 2004.</li><li>2. Ray Lischner, "Exploring C++ : The programmer's introduction to C++" , apress, 2010</li><li>3. Bhave , " Object Oriented Programming With C++", Pearson Education , 2004</li></ol>
<b>Weblinks and Video Lectures (e-Resources):</b> <ol style="list-style-type: none"><li>1. Basics of C++ - <a href="https://www.youtube.com/watch?v=BCIS40yzssA">https://www.youtube.com/watch?v=BCIS40yzssA</a></li><li>2. Functions of C++ - <a href="https://www.youtube.com/watch?v=pBehAjZWjPw">https://www.youtube.com/watch?v=pBehAjZWjPw</a></li></ol>
<b>Tutorial Link:</b> <ol style="list-style-type: none"><li>1. <a href="https://www.w3schools.com/cpp/cpp_intro.asp">https://www.w3schools.com/cpp/cpp_intro.asp</a></li><li>2. <a href="https://www.edx.org/course/introduction-to-c-3">https://www.edx.org/course/introduction-to-c-3</a></li></ol>
<b>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</b> <ul style="list-style-type: none"><li>• <b>Demonstration of simple projects</b></li></ul>

  
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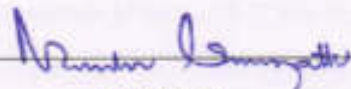
**IV Semester**

<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>			
Course Code	<b>21CS42</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 T + 20 P	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Learning Objectives:</b>			
<p>CLO 1. Explain the methods of analysing the algorithms and to analyze performance of algorithms.</p> <p>CLO 2. State algorithm's efficiencies using asymptotic notations.</p> <p>CLO 3. Solve problems using algorithm design methods such as the brute force method, greedy method, divide and conquer, decrease and conquer, transform and conquer, dynamic programming, backtracking and branch and bound.</p> <p>CLO 4. Choose the appropriate data structure and algorithm design method for a specified application.</p> <p>CLO 5. Introduce P and NP classes.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.</li> <li>Show Video/animation films to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Topics will be introduced in a multiple representation.</li> <li>Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Introduction:</b> What is an Algorithm? It's Properties. Algorithm Specification-using natural language, using Pseudo code convention, Fundamentals of Algorithmic Problem solving, Analysis Framework-Time efficiency and space efficiency, Worst-case, Best-case and Average case efficiency.</p> <p><b>Performance Analysis:</b> Estimating Space complexity and Time complexity of algorithms.</p> <p><b>Asymptotic Notations:</b> Big-Oh notation (<math>O</math>), Omega notation (<math>\Omega</math>), Theta notation (<math>\Theta</math>) with examples, Basic efficiency classes, Mathematical analysis of Non-Recursive and Recursive Algorithms with Examples.</p> <p><b>Brute force design technique:</b> Selection sort, sequential search, string matching algorithm with complexity Analysis.</p> <p><b>Textbook 1:</b> Chapter 1 (Sections 1.1,1.2), Chapter 2(Sections 2.1,2.2,2.3,2.4), Chapter 3(Section 3.1,3.2)</p> <p><b>Textbook 2:</b> Chapter 1(section 1.1,1.2,1.3)</p>			



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<b>Laboratory Component:</b>	
<p>1. Sort a given set of n integer elements using Selection Sort method and compute its time complexity. Run the program for varied values of n&gt; 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C++/Java how the brute force method works along with its time complexity analysis: worst case, average case and best case.</p>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Problem based Learning.</li> <li>2. Chalk &amp; board, Active Learning.</li> <li>3. Laboratory Demonstration.</li> </ol>
<b>Module-2</b>	
<p><b>Divide and Conquer:</b> General method, Recurrence equation for divide and conquer, solving it using Master's theorem. , Divide and Conquer algorithms and complexity Analysis of Finding the maximum &amp; minimum, Binary search, Merge sort, Quick sort.</p> <p><b>Decrease and Conquer Approach:</b> Introduction, Insertion sort, Graph searching algorithms, Topological Sorting, It's efficiency analysis.</p> <p><b>Textbook 2: Chapter 3(Sections 3.1,3.3,3.4,3.5,3.6)</b></p> <p><b>Textbook 1: Chapter 4 (Sections 4.1,4.2,4.3), Chapter 5(Section 5.1,5.2,5.3)</b></p>	
<b>Laboratory Component:</b>	
<p>1. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n&gt; 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C++/Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.</p> <p>2. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n&gt; 5000, and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C++/Java how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.</p>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Chalk &amp; board, Active Learning, MOOC, Problem based Learning.</li> <li>2. Laboratory Demonstration.</li> </ol>
<b>Module-3</b>	
<p><b>Greedy Method:</b> General method, Coin Change Problem, Knapsack Problem, solving Job sequencing with deadlines Problems.</p> <p><b>Minimum cost spanning trees:</b> Prim's Algorithm, Kruskal's Algorithm with performance analysis.</p> <p><b>Single source shortest paths:</b> Dijkstra's Algorithm.</p> <p><b>Optimal Tree problem:</b> Huffman Trees and Codes.</p> <p><b>Transform and Conquer Approach:</b> Introduction, Heaps and Heap Sort.</p> <p><b>Textbook 2: Chapter 4(Sections 4.1,4.3,4.5)</b></p>	



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<b>Textbook 1: Chapter 9(Section 9.1,9.2,9.3,9.4), Chapter 6( section 6.4)</b>	
<b>Laboratory Component:</b> Write & Execute C++/Java Program	
<ol style="list-style-type: none"> <li>1. To solve Knapsack problem using Greedy method.</li> <li>2. To find shortest paths to other vertices from a given vertex in a weighted connected graph, using Dijkstra's algorithm.</li> <li>3. To find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. Use Union-Find algorithms in your program.</li> <li>4. To find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm.</li> </ol>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Chalk &amp; board, Active Learning, MOOC, Problem based Learning.</li> <li>2. Laboratory Demonstration.</li> </ol>
<b>Module-4</b>	
<p><b>Dynamic Programming:</b> General method with Examples, Multistage Graphs.</p> <p><b>Transitive Closure:</b> Warshall's Algorithm. <b>All Pairs Shortest Paths:</b> Floyd's Algorithm,</p> <p>Knapsack problem, Bellman-Ford Algorithm, Travelling Sales Person problem.</p> <p><b>Space-Time Tradeoffs:</b> Introduction, Sorting by Counting, Input Enhancement in String Matching-Harspool's algorithm.</p>	
<b>Textbook 2: Chapter 5 (Sections 5.1,5.2,5.4,5.9)</b>	
<b>Textbook 1: Chapter 8(Sections 8.2,8.4), Chapter 7 (Sections 7.1,7.2)</b>	
<b>Laboratory Component:</b> Write C++ / Java programs to	
<ol style="list-style-type: none"> <li>1. Solve All-Pairs Shortest Paths problem using Floyd's algorithm.</li> <li>2. Solve Travelling Sales Person problem using Dynamic programming.</li> <li>3. Solve 0/1 Knapsack problem using Dynamic Programming method.</li> </ol>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Chalk &amp; board, Active Learning, MOOC, Problem based Learning.</li> <li>2. Laboratory Demonstration.</li> </ol>
<b>Module-5</b>	
<p><b>Backtracking:</b> General method, solution using back tracking to N-Queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles Problems.</p> <p><b>Branch and Bound:</b> Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem</p> <p><b>NP-Complete and NP-Hard problems:</b> Basic concepts, non- deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.</p>	
<b>Textbook 1: Chapter 12 (Sections 12.1,12.2) Chapter 11(11.3)</b>	
<b>Textbook 2: Chapter 7 (Sections 7.1,7.2,7.3,7.4,7.5) Chapter 11 (Section 11.1)</b>	
<b>Laboratory Component:</b>	

  
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<ol style="list-style-type: none"> <li>Design and implement C++/Java Program to find a subset of a given set <math>S = \{S_1, S_2, \dots, S_n\}</math> of <math>n</math> positive integers whose SUM is equal to a given positive integer <math>d</math>. For example, if <math>S = \{1, 2, 5, 6, 8\}</math> and <math>d = 9</math>, there are two solutions <math>\{1, 2, 6\}</math> and <math>\{1, 8\}</math>. Display a suitable message, if the given problem instance doesn't have a solution.</li> <li>Design and implement C++/Java Program to find all Hamiltonian Cycles in a connected undirected Graph <math>G</math> of <math>n</math> vertices using backtracking principle.</li> </ol>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>Chalk &amp; board, Active Learning, MOOC, Problem based learning.</li> <li>Laboratory Demonstration.</li> </ol>
<p><b>Course outcome (Course Skill Set)</b></p> <p>At the end of the course the student will be able to:</p> <p>CO 1. Analyze the performance of the algorithms, state the efficiency using asymptotic notations and analyze mathematically the complexity of the algorithm.</p> <p>CO 2. Apply divide and conquer approaches and decrease and conquer approaches in solving the problems analyze the same</p> <p>CO 3. Apply the appropriate algorithmic design technique like greedy method, transform and conquer approaches and compare the efficiency of algorithms to solve the given problem.</p> <p>CO 4. Apply and analyze dynamic programming approaches to solve some problems. and improve an algorithm time efficiency by sacrificing space.</p> <p>CO 5. Apply and analyze backtracking, branch and bound methods and to describe P, NP and NP-Complete problems.</p>	
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together</p> <p><b>Continuous Internal Evaluation:</b></p> <p>Three Unit Tests each of <b>20 Marks (duration 01 hour)</b></p> <ol style="list-style-type: none"> <li>First test at the end of 5<sup>th</sup> week of the semester</li> <li>Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol> <p>Two assignments each of <b>10 Marks</b></p> <ol style="list-style-type: none"> <li>First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol> <p>Practical Sessions need to be assessed by appropriate rubrics and viva-voce method. This will contribute to <b>20 marks</b>.</p> <ul style="list-style-type: none"> <li>Rubrics for each Experiment taken average for all Lab components - 15 Marks.</li> </ul>	

  
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- Viva-Voce- 5 Marks (more emphasized on demonstration topics)

The sum of three tests, two assignments, and practical sessions will be out of 100 marks and will be **scaled down to 50 marks**

(to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### **Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

#### **Suggested Learning Resources:**

##### **Textbooks**

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 2nd Edition, 2009, Pearson.
2. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014, Universities Press.

##### **Reference Books**

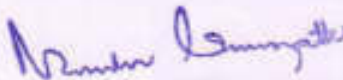
1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
2. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)

##### **Weblinks and Video Lectures (e-Resources):**

1. <http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS43.html>
2. <https://nptel.ac.in/courses/106/101/106101060/>
3. <http://elearning.vtu.ac.in/econtent/courses/video/FEP/ADA.html>
4. <http://cse01-iiith.vlabs.ac.in/>
5. <http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms>

##### **Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

1. Real world problem solving and puzzles using group discussion. E.g., Fake coin identification, Peasant, wolf, goat, cabbage puzzle, Konigsberg bridge puzzle etc.,
2. Demonstration of solution to a problem through programming.

  
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#### IV Semester

<b>MICROCONTROLLER AND EMBEDDED SYSTEMS</b>			
Course Code	21CS43	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 T + 20 P	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Learning Objectives:</b>			
CLO 1: Understand the fundamentals of ARM-based systems, including programming modules with registers and the CPSR.			
CLO 2: Use the various instructions to program the ARM controller.			
CLO 3: Program various embedded components using the embedded C program.			
CLO 4: Identify various components, their purpose, and their application to the embedded system's applicability.			
CLO 5: Understand the embedded system's real-time operating system and its application in IoT.			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. The lecturer method (L) does not mean only the traditional lecture method, but different types of teaching methods may be adopted to develop the outcomes.</li> <li>2. Show video/animation films to explain the functioning of various concepts.</li> <li>3. Encourage collaborative (group learning) learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Topics will be introduced in multiple representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world, and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
Microprocessors versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software.			
<b>ARM Processor Fundamentals:</b> Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extensions			
<b>Textbook 1: Chapter 1 - 1.1 to 1.4, Chapter 2 - 2.1 to 2.5</b>			
<b>Laboratory Component:</b>			
1. Using Keil software, observe the various registers, dump, CPSR, with a simple ALP programme.			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Demonstration of registers, memory access, and CPSR in a programme module.</li> <li>2. For concepts, numerical, and discussion, use chalk and a whiteboard, as well as a PowerPoint presentation.</li> </ol>		
<b>Module-2</b>			
<b>Introduction to the ARM Instruction Set:</b> Data Processing Instructions , Branch Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants			

  
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**C Compilers and Optimization** :Basic C Data Types, C Looping Structures, Register Allocation, Function Calls, Pointer Aliasing,

**Textbook 1: Chapter 3: Sections 3.1 to 3.6 (Excluding 3.5.2), Chapter 5**

**Laboratory Component:**

2. Write a program to find the sum of the first 10 integer numbers.
3. Write a program to find the factorial of a number.
4. Write a program to add an array of 16 bit numbers and store the 32 bit result in internal RAM.
5. Write a program to find the square of a number (1 to 10) using a look-up table.
6. Write a program to find the largest or smallest number in an array of 32 numbers.

**Teaching-Learning Process**

1. Demonstration of sample code using Keil software.
2. Laboratory Demonstration

**Module-3**

**C Compilers and Optimization** :Structure Arrangement, Bit-fields, Unaligned Data and Endianness, Division, Floating Point, Inline Functions and Inline Assembly, Portability Issues.

**ARM programming using Assembly language:** Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation, Conditional Execution, Looping Constructs

**Textbook 1: Chapter-5,6**

**Laboratory Component:**

1. Write a program to arrange a series of 32 bit numbers in ascending/descending order.
2. Write a program to count the number of ones and zeros in two consecutive memory locations.
3. Display "Hello World" message using Internal UART.

**Teaching-Learning Process**

1. Demonstration of sample code using Keil software.
2. Chalk and Board for numerical

**Module-4**

**Embedded System Components:** Embedded Vs General computing system, History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems.

Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components.

**Textbook 2: Chapter 1 (Sections 1.2 to 1.6), Chapter 2 (Sections 2.1 to 2.6)**

**Laboratory Component:**

1. Interface and Control a DC Motor.
2. Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.
3. Determine Digital output for a given Analog input using Internal ADC of ARM controller.
4. Interface a DAC and generate Triangular and Square waveforms.
5. Interface a 4x4 keyboard and display the key code on an LCD.
6. Demonstrate the use of an external interrupt to toggle an LED On/Off.
7. Display the Hex digits 0 to F on a 7-segment LED interface, with an appropriate delay in between.

**Teaching-Learning Process**

1. Demonstration of sample code for various embedded components using keil.
2. Chalk and Board for numerical and discussion

**Module-5**

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**RTOS and IDE for Embedded System Design:** Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program), Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan.

**Textbook 2: Chapter-10 (Sections 10.1, 10.2, 10.3, 10.4 , 10.7, 10.8.1.1, 10.8.1.2, 10.8.2.2, 10.10 only), Chapter 12, Chapter-13 ( block diagram before 13.1, 13.3, 13.4, 13.5, 13.6 only)**

**Laboratory Component:**

1. Demonstration of IoT applications by using Arduino and Raspberry Pi

**Teaching-Learning Process**

1. Chalk and Board for numerical and discussion
2. Significance of real time operating system[RTOS] using raspberry pi

**Course outcome (Course Skill Set)**

At the end of the course, the student will be able to:

- CO 1. Explain C-Compilers and optimization
- CO 2. Describe the ARM microcontroller's architectural features and program module.
- CO 3. Apply the knowledge gained from programming on ARM to different applications.
- CO 4. Program the basic hardware components and their application selection method.
- CO 5. Demonstrate the need for a real-time operating system for embedded system applications.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Practical Sessions need to be assessed by appropriate rubrics and viva-voce method. This will contribute to **20 marks**.

- Rubrics for each Experiment taken average for all Lab components – 15 Marks,
- Viva-Voce– 5 Marks (more emphasized on demonstration topics)

The sum of three tests, two assignments, and practical sessions will be out of 100 marks and will be **scaled down to 50 marks**

(to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

  
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CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

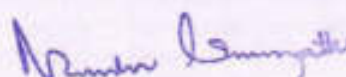
1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2<sup>nd</sup> Edition.

**Reference Books**

1. Raghunandan. G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication, 2019
2. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd., 1st edition, 2005.
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

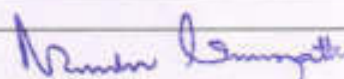
**Weblinks and Video Lectures (e-Resources):**

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

  
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#### IV Semester

OPERATING SYSTEMS			
Course Code:	21CS44	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	2:020:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Objectives:</b>			
<p>CLO 1. Demonstrate the need for OS and different types of OS</p> <p>CLO 2. Apply suitable techniques for management of different resources</p> <p>CLO 3. Use processor, memory, storage and file system commands</p> <p>CLO 4. Realize the different concepts of OS in platform of usage through case studies</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer methods (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Introduction to operating systems, System structures:</b> What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments.</p> <p><b>Operating System Services:</b> User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot.</p> <p><b>Process Management:</b> Process concept; Process scheduling; Operations on processes; Inter process communication</p>			
<b>Textbook 1: Chapter - 1,2,3</b>			
<b>Teaching-Learning Process</b>	<p>Active learning and problem solving</p> <ol style="list-style-type: none"> <li>1. <a href="https://www.youtube.com/watch?v=vBURt97EkA&amp;list=PLBlnK6fEYqRiVhbXDGLXdk_OQAeuVcp2Q">https://www.youtube.com/watch?v=vBURt97EkA&amp;list=PLBlnK6fEYqRiVhbXDGLXdk_OQAeuVcp2Q</a></li> <li>2. <a href="https://www.youtube.com/watch?v=a2B69vCtjOU&amp;list=PL3-wYxht4yCjpcfUDz-TgD_ainZ2K3MUZ&amp;index=2">https://www.youtube.com/watch?v=a2B69vCtjOU&amp;list=PL3-wYxht4yCjpcfUDz-TgD_ainZ2K3MUZ&amp;index=2</a></li> </ol>		
<b>Module-2</b>			

  
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**Multi-threaded Programming:** Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling.

**Process Synchronization:** Synchronization: The critical section problem; Peterson's solution, Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.

**Textbook 1: Chapter - 4,5**

<b>Teaching-Learning Process</b>	Active Learning and problem solving 1. <a href="https://www.youtube.com/watch?v=HW2Wcx-ktsc">https://www.youtube.com/watch?v=HW2Wcx-ktsc</a> 2. <a href="https://www.youtube.com/watch?v=9YRxhlvt9Zo">https://www.youtube.com/watch?v=9YRxhlvt9Zo</a>
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**Module-3**

**Deadlocks:** Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

**Memory Management:** Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.

**Textbook 1: Chapter - 7,8**

<b>Teaching-Learning Process</b>	Active Learning, Problem solving based on deadlock with animation 1. <a href="https://www.youtube.com/watch?v=MYgmmJlfdBg">https://www.youtube.com/watch?v=MYgmmJlfdBg</a> 2. <a href="https://www.youtube.com/watch?v=Y14b7_T3AEw&amp;list=PLEJxKK7AcSEGPOCFtQTjhOEIU44J_Aun&amp;index=30">https://www.youtube.com/watch?v=Y14b7_T3AEw&amp;list=PLEJxKK7AcSEGPOCFtQTjhOEIU44J_Aun&amp;index=30</a>
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**Module-4**

**Virtual Memory Management:** Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.

**File System, Implementation of File System:** File system: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.

**Textbook 1: Chapter - 9,10,11**

<b>Teaching-Learning Process</b>	Active learning about memory management and File system 1. <a href="https://www.youtube.com/watch?v=pl6qrCB8pDw&amp;list=PLIY8eNdw5tW-BxRY0yK3fYTYVqytw8qhp">https://www.youtube.com/watch?v=pl6qrCB8pDw&amp;list=PLIY8eNdw5tW-BxRY0yK3fYTYVqytw8qhp</a> 2. <a href="https://www.youtube.com/watch?v=-orffhVNBzY">https://www.youtube.com/watch?v=-orffhVNBzY</a>
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**Module-5**

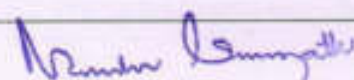
**Secondary Storage Structures, Protection:** Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability- Based systems.

**Case Study: The Linux Operating System:** Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.

**Textbook 1: Chapter - 2,21**

<b>Teaching-Learning Process</b>	Active learning about case studies 1. <a href="https://www.youtube.com/watch?v=TTBkc5eiju4">https://www.youtube.com/watch?v=TTBkc5eiju4</a> 2. <a href="https://www.youtube.com/watch?v=8hkvMRGTzCM&amp;list=PLEAYkSg4uSQ2PAch478muxnoeTNz_QeUJ&amp;index=36">https://www.youtube.com/watch?v=8hkvMRGTzCM&amp;list=PLEAYkSg4uSQ2PAch478muxnoeTNz_QeUJ&amp;index=36</a> 3. <a href="https://www.youtube.com/watch?v=mX1FEur4VCw">https://www.youtube.com/watch?v=mX1FEur4VCw</a>
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**Course Outcomes (Course Skill Set)**



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At the end of the course the student will be able to:

- CO 1. Identify the structure of an operating system and its scheduling mechanism.
- CO 2. Demonstrate the allocation of resources for a process using scheduling algorithm.
- CO 3. Identify root causes of deadlock and provide the solution for deadlock elimination
- CO 4. Explore about the storage structures and learn about the Linux Operating system.
- CO 5. Analyze Storage Structures and Implement Customized Case study

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

#### Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

#### Suggested Learning Resources:


##### Textbooks

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7th edition, Wiley-India, 2006

##### Reference Books

1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition
2. D.M Dhamdhare, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI(EEE), 2014.
4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

#### Weblinks and Video Lectures (e-Resources):

  
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1. [https://www.youtube.com/watch?v=vBURTr97EkA&list=PLBlnK6fEqRiVhbXDGLXDk\\_OQAe\\_uYcp20](https://www.youtube.com/watch?v=vBURTr97EkA&list=PLBlnK6fEqRiVhbXDGLXDk_OQAe_uYcp20)
2. [https://www.youtube.com/watch?v=783KAB-tuE4&list=PLIemF3uozcAKTgsC1j82voMK3TMR0YE\\_f](https://www.youtube.com/watch?v=783KAB-tuE4&list=PLIemF3uozcAKTgsC1j82voMK3TMR0YE_f)
3. <https://www.youtube.com/watch?v=3-ITLMMeeXY&list=PL3pGy4Htqwd0n7bQ0HjPnsWzkeR-n6mk0>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

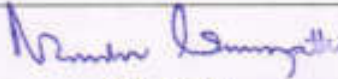
- Real world problem solving using group discussion.
- Role play for process scheduling.
- Present animation for Deadlock.
- Real world examples of memory management concepts

*Nandhu Sanyal*

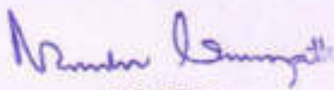
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IV Semester

PYTHON PROGRAMMING LABORATORY			
Course Code	21CSL46	CIE Marks	50
Teaching Hours/Weeks (L: T: P: S)	0: 0: 2: 0	SEE Marks	50
Total Hours of Pedagogy	24	Total Marks	100
Credits	01	Exam Hours	03
<b>Course Objectives:</b>			
CLO 1. Demonstrate the use of IDLE or PyCharm IDE to create Python Applications			
CLO 2. Using Python programming language to develop programs for solving real-world problems			
CLO 3. Implement the Object-Oriented Programming concepts in Python.			
CLO 4. Appraise the need for working with various documents like Excel, PDF, Word and Others			
CLO 5. Demonstrate regular expression using python programming			
<b>Note: two hours tutorial is suggested for each laboratory sessions.</b>			
<b>Prerequisite</b>			
<ul style="list-style-type: none"> <li>Students should be familiarized about Python installation and setting Python environment</li> <li>Usage of IDLE or IDE like PyCharm should be introduced</li> </ul> Python Installation: <a href="https://www.youtube.com/watch?v=Kn1HF3oD19c">https://www.youtube.com/watch?v=Kn1HF3oD19c</a> PyCharm Installation: <a href="https://www.youtube.com/watch?v=SZUNUB6nz3g">https://www.youtube.com/watch?v=SZUNUB6nz3g</a>			
<b>Sl. No.</b>	<b>PART A – List of problems for which student should develop program and execute in the Laboratory</b>		
1	<b>Aim:</b> Introduce the Python fundamentals, data types, operators, flow control and exception handling in Python  a) Write a python program to find the best of two test average marks out of three test's marks accepted from the user. b) Develop a Python program to check whether a given number is palindrome or not and also count the number of occurrences of each digit in the input number.  Datatypes: <a href="https://www.youtube.com/watch?v=gCCVsvgR2KU">https://www.youtube.com/watch?v=gCCVsvgR2KU</a> Operators: <a href="https://www.youtube.com/watch?v=v5MR5JnKcZl">https://www.youtube.com/watch?v=v5MR5JnKcZl</a> Flow Control: <a href="https://www.youtube.com/watch?v=PqFKRqpHrjw">https://www.youtube.com/watch?v=PqFKRqpHrjw</a> For loop: <a href="https://www.youtube.com/watch?v=0ZvaDa8eT5s">https://www.youtube.com/watch?v=0ZvaDa8eT5s</a> While loop: <a href="https://www.youtube.com/watch?v=HZARImviDxg">https://www.youtube.com/watch?v=HZARImviDxg</a> Exceptions: <a href="https://www.youtube.com/watch?v=6SPDvPK38tw">https://www.youtube.com/watch?v=6SPDvPK38tw</a>		
2	<b>Aim:</b> Demonstrating creation of functions, passing parameters and return values  a) Defined as a function $F$ as $F_n = F_{n-1} + F_{n-2}$ . Write a Python program which accepts a value for $N$ (where $N > 0$ ) as input and pass this value to the function. Display suitable error message if the condition for input value is not followed. b) Develop a python program to convert binary to decimal, octal to hexadecimal using functions.  Functions: <a href="https://www.youtube.com/watch?v=BVfCWuca9nw">https://www.youtube.com/watch?v=BVfCWuca9nw</a> Arguments: <a href="https://www.youtube.com/watch?v=ijXMGpoMkhQ">https://www.youtube.com/watch?v=ijXMGpoMkhQ</a> Return value: <a href="https://www.youtube.com/watch?v=nuNXiEDnM44">https://www.youtube.com/watch?v=nuNXiEDnM44</a>		
3	<b>Aim:</b> Demonstration of manipulation of strings using string methods  a) Write a Python program that accepts a sentence and find the number of words, digits, uppercase letters and lowercase letters.		

  
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	<p>b) Write a Python program to find the string similarity between two given strings</p> <table border="0"> <tr> <td><b>Sample Output:</b></td> <td><b>Sample Output:</b></td> </tr> <tr> <td>Original string:</td> <td>Original string:</td> </tr> <tr> <td>Python Exercises</td> <td>Python Exercises</td> </tr> <tr> <td>Python Exercises</td> <td>Python Exercise</td> </tr> <tr> <td>Similarity between two said strings:</td> <td>Similarity between two said strings:</td> </tr> <tr> <td>1.0</td> <td>0.967741935483871</td> </tr> </table> <p>Strings: <a href="https://www.youtube.com/watch?v=ISltwinF0eU">https://www.youtube.com/watch?v=ISltwinF0eU</a> String functions: <a href="https://www.youtube.com/watch?v=9a3CxjYtQ00">https://www.youtube.com/watch?v=9a3CxjYtQ00</a></p>	<b>Sample Output:</b>	<b>Sample Output:</b>	Original string:	Original string:	Python Exercises	Python Exercises	Python Exercises	Python Exercise	Similarity between two said strings:	Similarity between two said strings:	1.0	0.967741935483871
<b>Sample Output:</b>	<b>Sample Output:</b>												
Original string:	Original string:												
Python Exercises	Python Exercises												
Python Exercises	Python Exercise												
Similarity between two said strings:	Similarity between two said strings:												
1.0	0.967741935483871												
4	<p><b>Aim:</b> Discuss different collections like list, tuple and dictionary</p> <p>a) Write a python program to implement insertion sort and merge sort using lists b) Write a program to convert roman numbers in to integer values using dictionaries.</p> <p>Lists: <a href="https://www.youtube.com/watch?v=Eaz5e6M8tL4">https://www.youtube.com/watch?v=Eaz5e6M8tL4</a> List methods: <a href="https://www.youtube.com/watch?v=8-RDVWGktul">https://www.youtube.com/watch?v=8-RDVWGktul</a> Tuples: <a href="https://www.youtube.com/watch?v=bdS4dHIJGBc">https://www.youtube.com/watch?v=bdS4dHIJGBc</a> Tuple operations: <a href="https://www.youtube.com/watch?v=TltKabcTTQ4">https://www.youtube.com/watch?v=TltKabcTTQ4</a> Dictionary: <a href="https://www.youtube.com/watch?v=4Q0pW8XB0kc">https://www.youtube.com/watch?v=4Q0pW8XB0kc</a> Dictionary methods: <a href="https://www.youtube.com/watch?v=oLeNHuORpNY">https://www.youtube.com/watch?v=oLeNHuORpNY</a></p>												
5	<p><b>Aim:</b> Demonstration of pattern recognition with and without using regular expressions</p> <p>a) Write a function called isphonenumbers () to recognize a pattern 415-555-4242 without using regular expression and also write the code to recognize the same pattern using regular expression. b) Develop a python program that could search the text in a file for phone numbers (+919900889977) and email addresses (sample@gmail.com)</p> <p>Regular expressions: <a href="https://www.youtube.com/watch?v=LnzFnZfHLS4">https://www.youtube.com/watch?v=LnzFnZfHLS4</a></p>												
6	<p><b>Aim:</b> Demonstration of reading, writing and organizing files.</p> <p>a) Write a python program to accept a file name from the user and perform the following operations</p> <ol style="list-style-type: none"> <li>1. Display the first N line of the file</li> <li>2. Find the frequency of occurrence of the word accepted from the user in the file</li> </ol> <p>b) Write a python program to create a ZIP file of a particular folder which contains several files inside it.</p> <p>Files: <a href="https://www.youtube.com/watch?v=vuyb7CxZgbU">https://www.youtube.com/watch?v=vuyb7CxZgbU</a> <a href="https://www.youtube.com/watch?v=FqcjKewjTQ0">https://www.youtube.com/watch?v=FqcjKewjTQ0</a></p> <p>File organization: <a href="https://www.youtube.com/watch?v=MRuq3SRXses">https://www.youtube.com/watch?v=MRuq3SRXses</a></p>												
7	<p><b>Aim:</b> Demonstration of the concepts of classes, methods, objects and inheritance</p>												

  
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	<p>a) By using the concept of inheritance write a python program to find the area of triangle, circle and rectangle.</p> <p>b) Write a python program by creating a class called Employee to store the details of Name, Employee_ID, Department and Salary, and implement a method to update salary of employees belonging to a given department.</p> <p>OOP's concepts: <a href="https://www.youtube.com/watch?v=qiSCMNBIP2g">https://www.youtube.com/watch?v=qiSCMNBIP2g</a>  Inheritance: <a href="https://www.youtube.com/watch?v=Cn7AkDb4pIU">https://www.youtube.com/watch?v=Cn7AkDb4pIU</a></p>
8	<p><b>Aim:</b> Demonstration of classes and methods with polymorphism and overriding</p> <p>a) Write a python program to find the whether the given input is palindrome or not (for both string and integer) using the concept of polymorphism and inheritance.</p> <p>Overriding: <a href="https://www.youtube.com/watch?v=CcTzTulsoFk">https://www.youtube.com/watch?v=CcTzTulsoFk</a></p>
9	<p><b>Aim:</b> Demonstration of working with excel spreadsheets and web scraping</p> <p>a) Write a python program to download the all XKCD comics</p> <p>b) Demonstrate python program to read the data from the spreadsheet and write the data in to the spreadsheet</p> <p>Web scraping: <a href="https://www.youtube.com/watch?v=ng2o98k983k">https://www.youtube.com/watch?v=ng2o98k983k</a></p> <p>Excel: <a href="https://www.youtube.com/watch?v=nsKNPHJ9iPc">https://www.youtube.com/watch?v=nsKNPHJ9iPc</a></p>
10	<p><b>Aim:</b> Demonstration of working with PDF, word and JSON files</p> <p>a) Write a python program to combine select pages from many PDFs</p> <p>b) Write a python program to fetch current weather data from the JSON file</p> <p>PDFs: <a href="https://www.youtube.com/watch?v=q70xzDG6nls">https://www.youtube.com/watch?v=q70xzDG6nls</a>  <a href="https://www.youtube.com/watch?v=jhQVD7Y1bsA">https://www.youtube.com/watch?v=jhQVD7Y1bsA</a>  <a href="https://www.youtube.com/watch?v=FcrW-ESdY-A">https://www.youtube.com/watch?v=FcrW-ESdY-A</a></p> <p>Word files: <a href="https://www.youtube.com/watch?v=ZU3cSI51jWE">https://www.youtube.com/watch?v=ZU3cSI51jWE</a></p> <p>JSON files: <a href="https://www.youtube.com/watch?v=9N6a-VLba2I">https://www.youtube.com/watch?v=9N6a-VLba2I</a></p>
<b>Python (Full Course):</b> <a href="https://www.youtube.com/watch?v=_uQrj0TkZlc">https://www.youtube.com/watch?v=_uQrj0TkZlc</a>	
<b>Pedagogy</b>	For the above experiments the following pedagogy can be considered. Problem based learning, Active learning, MOOC, Chalk &Talk
<b>PART B - Practical Based Learning</b>	
A problem statement for each batch is to be generated in consultation with the co-examiner and student should develop an algorithm, program and execute the program for the given problem with appropriate outputs.	
<b>Course Outcomes:</b>	
CO 1. Demonstrate proficiency in handling of loops and creation of functions. CO 2. Identify the methods to create and manipulate lists, tuples and dictionaries. CO 3. Discover the commonly used operations involving regular expressions and file system. CO 4. Interpret the concepts of Object-Oriented Programming as used in Python. CO 5. Determine the need for scraping websites and working with PDF, JSON and other file formats.	

  
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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE). The student has to secure 40% of sum of the maximum marks of CIE and SEE to qualify in the course.

### Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

### Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- *Students can pick one experiment from the questions lot of PART A with equal choice to all the students in a batch. For PART B examiners should frame a question for each batch, student should*

  
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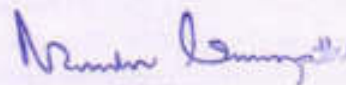
*develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem.*

- *Weightage of marks for PART A is 80% and for PART B is 20%. General rubrics suggested to be followed for part A and part B.*
- *Change of experiment is allowed only once and Marks allotted to the procedure part to be made zero (Not allowed for Part B).*
- *The duration of SEE is 03 hours*

Rubrics suggested in Annexure-II of Regulation book

**Textbooks:**

1. Al Sweigart, "**Automate the Boring Stuff with Python**", 1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)
2. Reema Thareja "**Python Programming Using Problem Solving Approach**" Oxford University Press.
3. Allen B. Downey, "**Think Python: How to Think Like a Computer Scientist**", 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)



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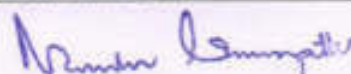
**IV Semester**

<b>WEB PROGRAMMING (Practical based)</b>			
Course Code	21CSL481	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	12T + 12P	Total Marks	100
Credits	01	Exam Hours	02
<b>Course Objectives:</b>			
CLO 1. Learn Web tool box and history of web browsers.			
CLO 2. Learn HTML, XHTML tags with utilizations.			
CLO 3. Know CSS with dynamic document utilizations.			
CLO 4. Learn JavaScript with Element access in JavaScript.			
CLO 5. Logically plan and develop web pages..			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to WEB Programming:</b> Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox.			
<b>Textbook 1: Chapter 1(1.1 to 1.9)</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-2</b>			
<b>HTML and XHTML:</b> Origins of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links, Lists, Tables, Forms, Frames in HTML and XHTML, Syntactic differences between HTML and XHTML.			
<b>Textbook 1: Chapter 2(2.1 to 2.10)</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration, presentation, problem solving		
<b>Module-3</b>			
<b>CSS:</b> Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, Background images, tags.			
<b>Textbook 1: Chapter 3(3.1 to 3.12)</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Demonstration, problem solving		
<b>Module-4</b>			

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<b>Java Script - I:</b> Object orientation and JavaScript; General syntactic characteristics; Primitives, Operations, and expressions; Screen output and keyboard input.	
Textbook 1: Chapter 4(4.1 to 4.5)	
Teaching-Learning Process	Chalk and board, Practical based learning, practical's
<b>Module-5</b>	
<b>Java Script - II:</b> Control statements, Object creation and Modification; Arrays; Functions; Constructor; Pattern matching using expressions; Errors, Element access in JavaScript.	
Textbook 1: Chapter 4(4.6 to 4.14)	
Teaching-Learning Process	Chalk and board, MOOC
<b>Course Outcomes (Course Skill Set):</b> At the end of the course the student will be able to: CO 1. Describe the fundamentals of web and concept of HTML. CO 2. Use the concepts of HTML, XHTML to construct the web pages. CO 3. Interpret CSS for dynamic documents. CO 4. Evaluate different concepts of JavaScript & Construct dynamic documents. CO 5. Design a small project with JavaScript and XHTML.	
<b>Assessment Details (both CIE and SEE)</b> The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE). <b>Continuous Internal Evaluation (CIE):</b> <b>NOTE: List of experiments to be prepared by the faculty based on the syllabus mentioned above</b> CIE marks for the practical course is <b>50 Marks</b> . The split-up of CIE marks for record/ journal and test are in the ratio <b>60:40</b> . <ul style="list-style-type: none"> <li>Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.</li> <li>Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.</li> <li>Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).</li> <li>Weightage to be given for neatness and submission of record/write-up on time.</li> <li>Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.</li> <li>In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.</li> <li>The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book</li> <li>The average of 02 tests is scaled down to <b>20 marks</b> (40% of the maximum marks).</li> </ul> The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.	
<b>Semester End Evaluation (SEE):</b> <ul style="list-style-type: none"> <li>SEE marks for the practical course is 50 Marks.</li> <li>SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University</li> <li>All laboratory experiments are to be included for practical examination.</li> </ul>	

  
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- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. OR based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- The duration of SEE is 02 hours

Rubrics suggested in Annexure-II of Regulation book

#### Textbooks

1. Robert W Sebesta, "Programming the World Wide Web", 6th Edition, Pearson Education, 2008.

#### Reference Books

1. M.Deitel, P.J.Deitel, A.B.Goldberg, "Internet & World Wide Web How to program", 3rd Edition, Pearson Education / PHI, 2004.
2. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.
3. Xue Bai et al, "The Web Warrior Guide to Web Programming", Thomson, 2003.
4. Sklar, "The Web Warrior Guide to Web Design Technologies", 1st Edition, Cengage Learning India

#### Weblinks and Video Lectures (e-Resources):

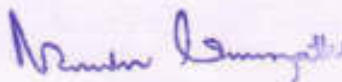
1. Fundamentals of WEB Programming: <https://www.youtube.com/watch?v=DR9dr6gxhDM>
2. HTML and XHTML: <https://www.youtube.com/watch?v=A1XIIIDDxgwg>
3. CSS: <https://www.youtube.com/watch?v=J35jug1uHzE>
4. Java Script and HTML Documents: <https://www.youtube.com/watch?v=Gd0RBdFRvF0>
5. Dynamic Documents with JavaScript: <https://www.youtube.com/watch?v=HTFSIJALNKc>

#### Tutorial Link:

1. <http://www.tutorialspoint.com>
2. <http://www.w3schools.com>

#### Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Demonstration of simple projects



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#### IV Semester

UNIX SHELL PROGRAMMING			
Course Code	21CS482	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	12	Total Marks	100
Credits	01	Exam Hours	01
<b>Course Objectives:</b>			
CLO 1. To help the students to understand effective use of Unix concepts, commands and terminology.			
CLO 2. Identify, access, and evaluate UNIX file system.			
CLO 3. Understand UNIX command syntax and semantics.			
CLO 4. Ability to read and understand specifications, scripts and programs.			
CLO 5. Analyze Facility with UNIX Process.			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction of UNIX</b> - Introduction, History, Architecture, Experience the Unix environment, Basic commands ls, cat, cal, date, calendar, who, printf, tty, sty, uname, passwd, echo, tput, and bc.			
<b>Textbook 1: Chapter 1(1.1 to 1.4) , Chapter 2- 2.1</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-2</b>			
<b>UNIX File System</b> - The file, what's in a filename? The parent-child relationship, pwd, the Home directory, absolute pathnames, using absolute pathnames for a command, cd, mkdir, rmdir, Relative pathnames, The UNIX file system.			
<b>Textbook 1: Chapter 4</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration, presentation, problem solving		
<b>Module-3</b>			
<b>Basic File Attributes - ls -l</b> , the -d option, File Permissions, chmod, Security and File Permission, users and groups, security level, changing permission, user masks, changing ownership and group, File Attributes, More file attributes: hard link, symbolic link, umask, find.			
<b>Textbook 1: Chapter 6</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Demonstration, problem solving		
<b>Module-4</b>			

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**Introduction to the Shell Scripting** - Introduction to Shell Scripting, Shell Scripts, read, Command Line Arguments, Exit Status of a Command, The Logical Operators && and ||, exit, if, and case conditions, expr, sleep and wait, while, until, for, \$, @, redirection. The here document, set, trap, Sample Validation and Data Entry Scripts.

**Textbook 1: Chapter 11,12,14**

**Teaching-Learning Process** | Chalk and board, Practical based learning, practical's

#### Module-5

**Introduction to UNIX System process:** Mechanism of process creation. Parent and child process. The ps command with its options. Executing a command at a specified point of time: at command. Executing a command periodically: cron command and the crontab file. Signals.

**Textbook 1: Chapter 9,19**

**Teaching-Learning Process** | Chalk and board, MOOC

#### Course Outcomes (Course Skill Set):

At the end of the course the student will be able to:

- CO 1. Know the basics of Unix concepts and commands.
- CO 2. Evaluate the UNIX file system.
- CO 3. Apply Changes in file system.
- CO 4. Understand scripts and programs.
- CO 5. Analyze Facility with UNIX system process

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### Semester End Examination:

**Theory SEE** will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 01 hours**)

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 01 hours

#### Textbooks

  
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1. Unix Concepts & Applications 4th Edition, Sumitabha Das, Tata McGraw Hill  
References:

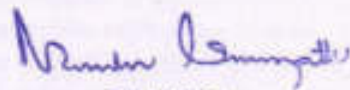
2. Unix Shell Programming, Yashwant Kanetkar
3. Introduction to UNIX by M G Venkatesh Murthy.

**Weblinks and Video Lectures (e-Resources):**

1. <https://www.youtube.com/watch?v=ffYUfAqEamY>
2. <https://www.youtube.com/watch?v=Q05NZiYFcD0>
3. <https://www.youtube.com/watch?v=8GdT53KDlyY>
4. <https://www.youtube.com/watch?app=desktop&v=3Pga3y7rCgo>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Real world problem solving using group discussion.
- Real world examples of Linux operating system Utilizations.



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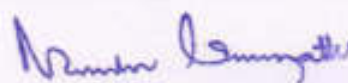
#### IV Semester

<b>R PROGRAMMING (Practical based)</b>			
Course Code	21CSL483	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	12T + 12P	Total Marks	100
Credits	01	Exam Hours	02
<b>Course Objectives:</b>			
CLO 1. Explore and understand how R and R Studio interactive environment.			
CLO 2. To learn and practice programming techniques using R programming.			
CLO 3. Read Structured Data into R from various sources.			
CLO 4. Understand the different data Structures, data types in R.			
CLO 5. To develop small applications using R Programming			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Numeric, Arithmetic, Assignment, and Vectors:</b> R for Basic Math, Arithmetic, Variables, Functions, Vectors, Expressions and assignments Logical expressions.			
<b>Textbook 1: Chapter 2(2.1 to 2.7)</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-2</b>			
<b>Matrices and Arrays:</b> Defining a Matrix, Sub-setting, Matrix Operations, <b>Conditions and Looping:</b> if statements, looping with for, looping with while, vector based programming.			
<b>Textbook 1: Chapter 2- 2.8, chapter 3- 3.2 to 3.5</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration, presentation, problem solving		
<b>Module-3</b>			
<b>Lists and Data Frames:</b> Data Frames, Lists, Special values, The apply family.			
<b>Textbook 1: Chapter 6- 6.2 to 6.4</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Demonstration, problem solving		
<b>Module-4</b>			
<b>Functions:</b> Calling functions, scoping, Arguments matching, writing functions: The function command, Arguments, specialized function.			
<b>Textbook 1: Chapter 5- 5.1 to 5.6</b>			

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<b>Teaching-Learning Process</b>	Chalk and board, Practical based learning, practical's
<b>Module-5</b>	
Pointers: packages, frames, de bugging, manipulation of code, compilation of the code.	
Textbook 1: Chapter 8- 8.1 to 8.8	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC
<b>Course Outcomes (Course Skill Set):</b>	
At the end of the course the student will be able to:	
CO 1. To understand the fundamental syntax of R through readings, practice exercises,	
CO 2. To demonstrations, and writing R code.	
CO 3. To apply critical programming language concepts such as data types, iteration,	
CO 4. To understand control structures, functions, and Boolean operators by writing R programs and through examples	
CO 5. To import a variety of data formats into R using R-Studio	
CO 6. To prepare or tidy data for in preparation for analyze.	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).	
<b>Continuous Internal Evaluation (CIE):</b>	
<b>NOTE: List of experiments to be prepared by the faculty based on the syllabus mentioned above</b>	
CIE marks for the practical course is <b>50 Marks</b> .	
The split-up of CIE marks for record/ journal and test are in the ratio <b>60:40</b> .	
<ul style="list-style-type: none"> <li>• Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.</li> <li>• Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.</li> <li>• Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).</li> <li>• Weightage to be given for neatness and submission of record/write-up on time.</li> <li>• Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.</li> <li>• In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.</li> <li>• The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book</li> <li>• The average of 02 tests is scaled down to <b>20 marks</b> (40% of the maximum marks).</li> </ul>	
The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.	
<b>Semester End Evaluation (SEE):</b>	
<ul style="list-style-type: none"> <li>• SEE marks for the practical course is 50 Marks.</li> <li>• SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University</li> <li>• All laboratory experiments are to be included for practical examination.</li> <li>• (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. <b>OR</b> based on the course requirement evaluation rubrics shall be decided jointly by examiners.</li> </ul>	



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- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- The duration of SEE is 02 hours

Rubrics suggested in Annexure-II of Regulation book

**Textbooks**

1. Jones, O., Maillardet, R. and Robinson, A. (2014). Introduction to Scientific Programming and Simulation Using R. Chapman & Hall/CRC, The R Series.

**References:**

1. Michael J. Crawley, "Statistics: An Introduction using R", Second edition, Wiley, 2015

**Weblinks and Video Lectures (e-Resources):**

1. Wickham, H. & Grolemund, G. (2018). for Data Science. O'Reilly: New York. Available for free at <http://r4ds.had.co.nz>

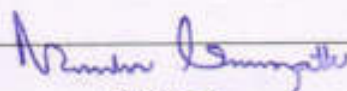
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Demonstration of simple projects

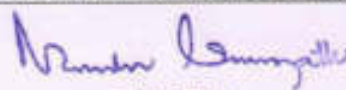
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V Semester

AUTOMATA THEORY AND COMPILER DESIGN			
Course Code	21CS51	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Introduce the fundamental concepts of Automata Theory, Formal Languages and compiler design</p> <p>CLO 2. Principles Demonstrate Application of Automata Theory and Formal Languages in the field of compiler design</p> <p>CLO 3. Develop understanding of computation through Push Down Automata and Turing Machines</p> <p>CLO 4. Introduce activities carried out in different phases of Phases compiler</p> <p>CLO 5. Identify the undecidability problems.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) needs not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different approaches and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Introduction to Automata Theory:</b> Central Concepts of Automata theory, Deterministic Finite Automata(DFA), Non- Deterministic Finite Automata(NFA) ,Epsilon- NFA, NFA to DFA Conversion, Minimization of DFA.</p> <p><b>Introduction to Compiler Design:</b> Language Processors, Phases of Compilers</p> <p><b>Textbook 1:</b> Chapter1 - 1.5, Chapter2 - 2.2,2.3,2.5 Chapter4 -4.4</p> <p><b>Textbook 2:</b> Chapter1 - 1.1 and 1.2</p>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<p><b>Regular Expressions and Languages:</b> Regular Expressions, Finite Automata and Regular Expressions, Proving Languages Not to Be Regular</p> <p><b>Lexical Analysis Phase of compiler Design:</b> Role of Lexical Analyzer, Input Buffering , Specification of Token, Recognition of Token.</p>			

  
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<b>Textbook 1: Chapter3 - 3.1, 3.2, Chapter4- 4.1</b>	
<b>Textbook 2: Chapter3- 3.1 to 3.4</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
<b>Module-3</b>	
<b>Context Free Grammars:</b> Definition and designing CFGs, Derivations Using a Grammar, Parse Trees, Ambiguity and Elimination of Ambiguity, Elimination of Left Recursion, Left Factoring.	
<b>Syntax Analysis Phase of Compilers: part-1:</b> Role of Parser , Top-Down Parsing	
<b>Textbook 1: Chapter 5 - 5.1.1 to 5.1.6, 5.2 (5.2.1, 5.2.2), 5.4</b>	
<b>Textbook 2: Chapter 4 - 4.1, 4.2, 4.3 (4.3.2 to 4.3.4) ,4.4</b>	
<b>Teaching-Learning Process</b>	<b>Chalk and board, Problem based learning, Demonstration</b>
<b>Module-4</b>	
<b>Push Down Automata:</b> Definition of the Pushdown Automata, The Languages of a PDA.	
<b>Syntax Analysis Phase of Compilers: Part-2:</b> Bottom-up Parsing, Introduction to LR Parsing: SLR, More Powerful LR parsers	
<b>Textbook1: Chapter 6 - 6.1, 6.2</b>	
<b>Textbook2: Chapter 4 - 4.5, 4.6, 4.7 (Up to 4.7.4)</b>	
<b>Teaching-Learning Process</b>	Chalk & board, Problem based learning
<b>Module-5</b>	
<b>Introduction to Turing Machine:</b> Problems that Computers Cannot Solve, The Turing machine, problems, Programming Techniques for Turing Machine, Extensions to the Basic Turing Machine	
<b>Undecidability :</b> A language That Is Not Recursively Enumerable, An Undecidable Problem That Is RE.	
<b>Other Phases of Compilers: Syntax Directed Translation-</b> Syntax-Directed Definitions, Evaluation Orders for SDD's. <b>Intermediate-Code Generation-</b> Variants of Syntax Trees, Three-Address Code.	
<b>Code Generation-</b> Issues in the Design of a Code Generator	
<b>Textbook1: Chapter 8 - 8.1, 8.2,8.3,8.4 Chapter 9 - 9.1,9.2</b>	
<b>Textbook2: Chapter 5 - 5.1, 5.2, Chapter 6- 6.1,6.2 Chapter 8- 8.1</b>	
<b>Teaching-Learning Process</b>	<b>Chalk and board, MOOC</b>
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation	
CO 2. Design and develop lexical analyzers, parsers and code generators	
CO 3. Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers.	
CO 4. Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers	
CO 5. Design computations models for problems in Automata theory and adaptation of such model in the field of compilers	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/	

  
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course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

1. First assignment at the end of 4<sup>th</sup> week of the semester
2. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

1. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks and Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. John E Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, " Introduction to Automata Theory, Languages and Computation", Third Edition, Pearson.
2. Alfred V.Aho, Monica S.Lam,Ravi Sethi, Jeffrey D. Ullman, " Compilers Principles, Techniques and Tools", Second Edition,Perason.

**Reference:**

1. Elain Rich, "Automata,Computability and complexity", 1st Edition, Pearson Education,2018.
2. K.L.P Mishra, N Chandrashekar , 3rd Edition , "Theory of Computer Science",PHI,2012.
3. Peter Linz, "An introduction to Formal Languages and Automata ", 3rd Edition, Narosa Publishers,1998.
4. K Muneeswaran, "Compiler Design", Oxford University Press 2013.

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/106/106106049/#>
2. <https://nptel.ac.in/courses/106/104/106104123/>
3. <https://www.jflap.org/>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

  
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Group Activities, quizzes, Puzzles and presentations

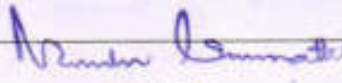
## V Semester

COMPUTER NETWORKS			
Course Code:	21CSS2	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40T + 20P	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Objectives:</b>			
CLO 1. Fundamentals of data communication networks. CLO 2. Software and hardware interfaces CLO 3. Application of various physical components and protocols CLO 4. Communication challenges and remedies in the networks.			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"><li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li><li>2. Use of Video/Animation to explain functioning of various concepts.</li><li>3. Encourage collaborative (Group Learning) Learning in the class.</li><li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li><li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li><li>6. Introduce Topics in manifold representations.</li><li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li><li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li></ol>			
<b>Module-1</b>			
<b>Introduction to networks:</b> Network hardware, Network software, Reference models,			
<b>Physical Layer:</b> Guided transmission media, Wireless transmission			
<b>Textbook 1: Ch.1.2 to 1.4, Ch.2.2 to 2.3</b>			
<b>Laboratory Component:</b>			
<ol style="list-style-type: none"><li>1. Implement Three nodes point - to - point network with duplex links between them for different topologies. 1Set the queue size, vary the bandwidth, and find the number of packets dropped for various iterations.</li></ol>			
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration		
<b>Module-2</b>			
<b>The Data link layer:</b> Design issues of DLL, Error detection and correction, Elementary data link protocols, Sliding window protocols.			
<b>The medium access control sublayer:</b> The channel allocation problem, Multiple access protocols.			
<b>Textbook 1: Ch.3.1 to 3.4, Ch.4.1 and 4.2</b>			
<b>Laboratory Component:</b>			
<ol style="list-style-type: none"><li>1. Implement simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the throughput with respect to transmission of packets</li></ol>			

  
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2. Write a program for error detecting code using CRC-CCITT (16- bits).	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-3</b>	
<b>The Network Layer:</b> Network Layer Design Issues, Routing Algorithms, Congestion Control Algorithms, QoS.	
<b>Textbook 1: Ch 5.1 to 5.4</b>	
<b>Laboratory Component:</b>	
<ol style="list-style-type: none"> <li>1. Implement transmission of ping messages/trace route over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion in the network.</li> <li>2. Write a program to find the shortest path between vertices using bellman-ford algorithm.</li> </ol>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-4</b>	
<b>The Transport Layer:</b> The Transport Service, Elements of transport protocols, Congestion control, The internet transport protocols.	
<b>Textbook 1: Ch 6.1 to 6.4 and 6.5.1 to 6.5.7</b>	
<b>Laboratory Component:</b>	
<ol style="list-style-type: none"> <li>1. Implement an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.</li> <li>2. Write a program for congestion control using leaky bucket algorithm.</li> </ol>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-5</b>	
<b>Application Layer:</b> Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS—The Internet's Directory Service.	
<b>Textbook 2: Ch 2.1 to 2.4</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Course Outcomes (Course Skill Set)</b>	
At the end of the course the student will be able to:	
CO 1. Learn the basic needs of communication system.	
CO 2. Interpret the communication challenges and its solution.	
CO 3. Identify and organize the communication system network components	
CO 4. Design communication networks for user requirements.	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
<ol style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol>	
Two assignments each of <b>10 Marks</b>	
<ol style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol>	
Practical Sessions need to be assessed by appropriate rubrics and viva-voce method. This will contribute to <b>20 marks</b> .	

  
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- Rubrics for each Experiment taken average for all Lab components - 15 Marks.
- Viva-Voce- 5 Marks (more emphasized on demonstration topics)

The sum of three tests, two assignments, and practical sessions will be out of 100 marks and will be **scaled down to 50 marks**

(to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

#### Suggested Learning Resources:

##### Textbooks:

1. Computer-Networks- Andrew S. Tanenbaum and David J. Wetherall, Pearson Education, 5th-Edition. ([www.pearsonhighered.com/tanenbaum](http://www.pearsonhighered.com/tanenbaum))
2. Computer Networking A Top-Down Approach -James F. Kurose and Keith W. RossPearson Education 7<sup>th</sup> Edition.

##### Reference Books:

1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition
2. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER

##### Weblinks and Video Lectures (e-Resources):

1. <https://www.digimat.in/nptel/courses/video/106105183/L01.html>
2. <http://www.digimat.in/nptel/courses/video/106105081/L25.html>
3. <https://nptel.ac.in/courses/106105081>
4. VTU e-Shikshana Program

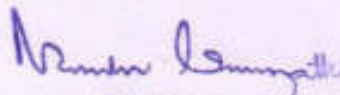
##### Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Simulation of Personal area network, Home area network, achieve QoS etc.

**Note:** For the Simulation experiments modify the topology and parameters set for the experiment and take multiple rounds of reading and analyze the results available in log files. Plot necessary graphs and conclude using NS2. Installation procedure of the required software must be demonstrated, carried out in groups, and documented in the report. Non simulation programs can be implemented using Java

#### V Semester

DATABASE MANAGEMENT SYSTEMS			
Course Code	21CS53	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			

  
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- CLO 1. Provide a strong foundation in database concepts, technology, and practice.
- CLO 2. Practice SQL programming through a variety of database problems.
- CLO 3. Demonstrate the use of concurrency and transactions in database
- CLO 4. Design and build database applications for real world problems.

**Teaching-Learning Process (General Instructions)**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

**Module-1**

**Introduction to Databases:** Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications.

**Overview of Database Languages and Architectures:** Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment.

**Conceptual Data Modelling using Entities and Relationships:** Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, Examples

**Textbook 1: Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.7**

<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning
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**Module-2**

**Relational Model:** Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations.

**Relational Algebra:** Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra.

**Mapping Conceptual Design into a Logical Design:** Relational Database Design using ER-to-Relational mapping.

**Textbook 1; Ch 5.1 to 5.3, 8.1 to 8.5, 9.1;**

<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
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**Module-3**

**SQL:** SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.

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 11/04/2023

**Advances Queries:** More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL.  
Database

**Application Development:** Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop.

**Textbook 1: Ch 6.1 to 6.5, 7.1 to 7.4; Textbook 2: 6.1 to 6.6;**

<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
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**Module-4**

**Normalization: Database Design Theory** - Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Examples on normal forms.

**Normalization Algorithms:** Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms

**Textbook 1: Ch 14.1 to -14.7, 15.1 to 15.6**

<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning
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**Module-5**

**Transaction Processing:** Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL.

**Concurrency Control in Databases:** Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking.

**Textbook 1: Ch 20.1 to 20.6, 21.1 to 21.7;**

<b>Teaching-Learning Process</b>	Chalk and board, MOOC
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**Course Outcomes**

At the end of the course the student will be able to:

- CO 1. Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS
- CO 2. Use Structured Query Language (SQL) for database manipulation and also demonstrate the basic of query evaluation.
- CO 3. Design and build simple database systems and *relate* the concept of transaction, concurrency control and recovery in database
- CO 4. Develop application to interact with databases, relational algebra expression.
- CO 5. Develop applications using tuple and domain relation expression from queries.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

  
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**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:****Textbooks**

1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

**Reference Books:**

1. Abraham Silberschatz, Henry F. Korth and S. Sudarshan's Database System Concepts 6th Edition Tata Mcgraw Hill Education Private Limited

**Weblinks and Video Lectures (e-Resources):**

1. <https://www.youtube.com/watch?v=3EJlovevfcA>
2. <https://www.youtube.com/watch?v=9TwMRs3qTclI>
3. <https://www.youtube.com/watch?v=ZWl0Xow304I>
4. <https://www.youtube.com/watch?v=4YilEjkNPrQ>
5. <https://www.youtube.com/watch?v=CZTkgMoqVss>
6. <https://www.youtube.com/watch?v=Hl4NZB1XR9c>
7. [https://www.youtube.com/watch?v=EGEwkad\\_lIA](https://www.youtube.com/watch?v=EGEwkad_lIA)
8. <https://www.youtube.com/watch?v=t5hsV9lC1rU>

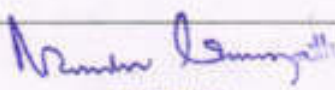
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

**Demonstration of real time Database projects - E-commerce Platform, Inventory Management, Railway System, College Data Management, Library Data Management, Solution for Saving Student Records, Hospital Data Management, Blood Donation Management.**


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V Semester

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING			
Course Code	21CS54	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
CLO 1. Gain a historical perspective of AI and its foundations			
CLO 2. Become familiar with basic principles of AI toward problem solving			
CLO 3. Familiarize with the basics of Machine Learning & Machine Learning process, basics of Decision Tree, and probability learning			
CLO 4. Understand the working of Artificial Neural Networks and basic concepts of clustering algorithms			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction:</b> What is AI? Foundations and History of AI			
<b>Problem-solving:</b> Problem-solving agents, Example problems, Searching for Solutions, Uninformed Search Strategies: Breadth First search, Depth First Search,			
<b>Textbook 1: Chapter 1- 1.1, 1.2, 1.3</b>			
<b>Textbook 1: Chapter 3- 3.1, 3.2, 3.3, 3.4.1, 3.4.3</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<b>Informed Search Strategies:</b> Greedy best-first search, A*search, Heuristic functions.			
Introduction to Machine Learning , Understanding Data			
<b>Textbook 1: Chapter 3 - 3.5, 3.5.1, 3.5.2, 3.6</b>			
<b>Textbook 2: Chapter 1 and 2</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
Basics of Learning theory			
Similarity Based Learning			
Regression Analysis			

  
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<b>Textbook 2: Chapter 3 - 3.1 to 3.4, Chapter 4, chapter 5.1 to 5.4</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-4</b>	
Decision Tree learning Bayesian Learning	
<b>Textbook 2: Chapter 6 and 8</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-5</b>	
Artificial neural Network Clustering Algorithms	
<b>Textbook 2: Chapter 10 and 13</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning.
<b>Course Outcomes Course Skill Set)</b>	
At the end of the course the student will be able to:	
CO 1. Apply the knowledge of searching and reasoning techniques for different applications.	
CO 2. Have a good understanding of machine leaning in relation to other fields and fundamental issues and challenges of machine learning.	
CO 3. Apply the knowledge of classification algorithms on various dataset and compare results	
CO 4. Model the neuron and Neural Network, and to analyze ANN learning and its applications.	
CO 5. Identifying the suitable clustering algorithm for different pattern	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours) OR</b> Suitable Programming experiments based on the syllabus contents can be given to the students to submit the same as laboratory work( for example; Implementation of concept learning, implementation of decision tree learning algorithm for suitable data set, etc...)	
6. At the end of the 13 <sup>th</sup> week of the semester	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	

  
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(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

#### **Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

#### **Suggested Learning Resources:**

##### **Textbooks**

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence, 3<sup>rd</sup> Edition, Pearson,2015
2. S. Sridhar, M Vijayalakshmi "Machine Learning". Oxford ,2021

##### **Reference:**

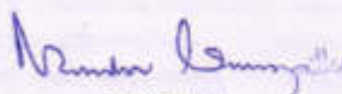
1. Elaine Rich, Kevin Knight, Artificial Intelligence, 3<sup>rd</sup>edition, Tata McGraw Hill,2013
2. George F Luger, Artificial Intelligence Structure and strategies for complex, Pearson Education, 5th Edition, 2011
3. Tom Michel, Machine Learning. McGrawHill Publication.

##### **Weblinks and Video Lectures (e-Resources):**

1. <https://www.kdnuggets.com/2019/11/10-free-must-read-books-ai.html>
2. <https://www.udacity.com/course/knowledge-based-ai-cognitive-systems--ud409>
3. <https://nptel.ac.in/courses/106/105/106105077/>
4. <https://www.javatpoint.com/history-of-artificial-intelligence>
5. <https://www.tutorialandexample.com/problem-solving-in-artificial-intelligence>
6. <https://techvidvan.com/tutorials/ai-heuristic-search/>
7. <https://www.analyticsvidhya.com/machine-learning/>
8. <https://www.javatpoint.com/decision-tree-induction>
9. <https://www.hackerearth.com/practice/machine-learning/machine-learning-algorithms/ml-decision-tree/tutorial/>
10. <https://www.javatpoint.com/unsupervised-artificial-neural-networks>

##### **Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Role play for strategies- DFS & BFS, Outlier detection in Banking and insurance transaction for identifying fraudulent behaviour etc. Uncertainty and reasoning Problem- reliability of sensor used to detect pedestrians using Bayes Rule



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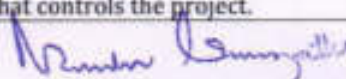
V Semester

DATABASE MANAGEMENT SYSTEM LABORATORY WITH MINI PROJECT			
Course Code	21CSL55	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	24	Total Marks	100
Credits	01	Exam Hours	03
<b>Course Learning Objectives:</b>			
CLO 1. Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.			
CLO 2. Strong practice in SQL programming through a variety of database problems.			
CLO 3. Develop database applications using front-end tools and back-end DBMS.			
<b>Sl. No.</b>	<b>PART-A: SQL Programming (Max. Exam Marks. 50)</b>		
	Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment. Create Schema and insert at least 5 records for each table. Add appropriate database constraints.		
1	<p>Aim: Demonstrating creation of tables, applying the view concepts on the tables.</p> <p>Program: Consider the following schema for a Library Database:  <b>BOOK(Book_id, Title, Publisher_Name, Pub_Year)</b>  <b>BOOK_AUTHORS(Book_id, Author_Name)</b>  <b>PUBLISHER(Name, Address, Phone)</b>  <b>BOOK_COPIES(Book_id, Programme_id, No-of_Copies)</b>  <b>BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date)</b>  <b>LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address)</b></p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.</li> <li>2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.</li> <li>3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.</li> <li>4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.</li> <li>5. Create a view of all books and its number of copies that are currently available in the Library.</li> </ol> <p>Reference:  <a href="https://www.youtube.com/watch?v=AaSU-AOguIs">https://www.youtube.com/watch?v=AaSU-AOguIs</a>  <a href="https://www.youtube.com/watch?v=-EwEvjxS-Fw">https://www.youtube.com/watch?v=-EwEvjxS-Fw</a></p>		
2	<p>Aim: Discuss the various concepts on constraints and update operations.</p> <p>Program: Consider the following schema for Order Database:  <b>SALESMAN(Salesman_id, Name, City, Commission)</b>  <b>CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id)</b>  <b>ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)</b></p> <p>Write SQL queries to</p> <p>Count the customers with grades above Bangalore's average.</p> <ol style="list-style-type: none"> <li>2. Find the name and numbers of all salesman who had more than one customer.</li> <li>3. List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation.)</li> <li>4. Create a view that finds the salesman who has the customer with the highest order of a day.</li> <li>5. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.</li> </ol> <p>Reference:  <a href="https://www.youtube.com/watch?v=AA-KL1jbMeY">https://www.youtube.com/watch?v=AA-KL1jbMeY</a></p>		

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3	<p><a href="https://www.youtube.com/watch?v=7S_tz1z_5bA">https://www.youtube.com/watch?v=7S_tz1z_5bA</a></p> <p>Aim: Demonstrate the concepts of JOIN operations.</p> <p>Program: Consider the schema for Movie Database:  <b>ACTOR(Act_id, Act_Name, Act_Gender)</b>  <b>DIRECTOR(Dir_id, Dir_Name, Dir_Phone)</b>  <b>MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)</b>  <b>MOVIE_CAST(Act_id, Mov_id, Role)</b>  <b>RATING(Mov_id, Rev_Stars)</b></p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. List the titles of all movies directed by 'Hitchcock'.</li> <li>2. Find the movie names where one or more actors acted in two or more movies.</li> <li>3. List all actors who acted in a movie before 2000 and also in a movie after 2015(use JOIN operation).</li> <li>4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.</li> <li>5. Update rating of all movies directed by 'Steven Spielberg' to 5.</li> </ol> <p>Reference:  <a href="https://www.youtube.com/watch?v=hSiCUNVKIAo">https://www.youtube.com/watch?v=hSiCUNVKIAo</a>  <a href="https://www.youtube.com/watch?v=Eod3aQkFzB4">https://www.youtube.com/watch?v=Eod3aQkFzB4</a></p>
4	<p>Aim: Introduce concepts of PLSQL and usage on the table.</p> <p>Program: Consider the schema for College Database:  <b>STUDENT(USN, SName, Address, Phone, Gender)</b>  <b>SEMSEC(SSID, Sem, Sec)</b>  <b>CLASS(USN, SSID)</b>  <b>COURSE(Subcode, Title, Sem, Credits)</b>  <b>IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)</b></p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> <li>1. List all the student details studying in fourth semester 'C' section.</li> <li>2. Compute the total number of male and female students in each semester and in each section.</li> <li>3. Create a view of Test1 marks of student USN '1B115CS101' in all Courses.</li> <li>4. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.</li> <li>5. Categorize students based on the following criterion:        If FinalIA = 17 to 20 then CAT = 'Outstanding'        If FinalIA = 12 to 16 then CAT = 'Average'        If FinalIA &lt; 12 then CAT = 'Weak'</li> </ol> <p>Give these details only for 8th semester A, B, and C section students.</p> <p>Reference:  <a href="https://www.youtube.com/watch?v=hor1JRQewW9c">https://www.youtube.com/watch?v=hor1JRQewW9c</a>  <a href="https://www.youtube.com/watch?v=P7-wKbKrAhk">https://www.youtube.com/watch?v=P7-wKbKrAhk</a></p>
5	<p>Aim: Demonstrate the core concepts on table like nested and correlated nesting queries and also EXISTS and NOT EXISTS keywords.</p> <p>Program: Consider the schema for Company Database:  <b>EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo)</b>  <b>DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate)</b>  <b>DLOCATION(DNo, DLoc)</b>  <b>PROJECT(PNo, PName, PLocation, DNo)</b>  <b>WORKS_ON(SSN, PNo, Hours)</b></p> <p>Write SQL queries to</p> <p>Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.</p>



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	<p>Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.</p> <p>Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department</p> <p>Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).</p> <p>For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs.6,00,000.</p> <p><b>Reference:</b>  <a href="https://www.youtube.com/watch?v=Dk8f3ejqKts">https://www.youtube.com/watch?v=Dk8f3ejqKts</a></p>
<b>Pedagogy</b>	For the above experiments the following pedagogy can be considered. Problem based learning, Active learning, MOOC, Chalk & Talk
<b>PART B</b>	
	<b>Mini project:</b> For any problem selected, make sure that the application should have five or more tables. Indicative areas include: Organization, health care, Ecommerce etc.
<b>Course Outcomes:</b>	
At the end of the course the student will be able to:	
CO 1. Create, Update and query on the database.	
CO 2. Demonstrate the working of different concepts of DBMS	
CO 3. Implement, analyze and evaluate the project developed for an application.	
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE). The student has to secure a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p>	
<b>Continuous Internal Evaluation (CIE):</b>	
CIE marks for the practical course is <b>50 Marks</b> .	
The split-up of CIE marks for record/ journal and test are in the ratio <b>60:40</b> .	
Each experiment to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.	
Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.	
Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).	
Weightage to be given for neatness and submission of record/write-up on time.	
Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.	
In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.	
The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book	
The average of 02 tests is scaled down to 20 marks (40% of the maximum marks).	

  
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The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- *Students can pick one experiment from the questions lot of PART A with an equal choice to all the students in a batch. For PART B, the project group (Maximum of 4 students per batch) should demonstrate the mini-project.*
- *Weightage of marks for PART A is 60% and for PART B is 40%. General rubrics suggested to be followed for part A and part B.*
- Change of experiment is allowed only once and Marks allotted to the procedure part to be made zero (Not allowed for Part B).
- The duration of SEE is 03 hours


Rubrics suggested in Annexure-II of Regulation book

**Textbooks:**

1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

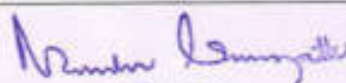
**Suggested Weblinks/ E Resource**

<https://www.tutorialspoint.com/sql/index.htm>

  
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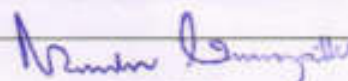
V Semester

ANGULAR JS AND NODE JS (Practical based)			
Course Code:	21CSL581	CIE Marks	50
Teaching Hours/Week	1:0:0:0	SEE Marks	50
Total No. of Hours	12T + 12P	Total Marks	100
Credits	01	Exam Hours	02
<p><b>Course Objectives:</b> The student should be made to:</p> <p>CLO 1. To learn the basics of Angular JS.</p> <p>CLO 2. To understand the Angular JS Modules.</p> <p>CLO 3. To implement Forms, inputs and Services</p> <p>CLO 4. To implement Directives and Databases</p> <p>CLO 5. To understand basics of Node JS.</p>			
<p><b>Teaching-Learning Process (General Instructions)</b></p> <p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction To Angular JS:</b> Introduction - Features - Angular JSModel-View-Controller - Expression -Directives and Controllers.			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-2</b>			
<b>Angular JS Modules:</b> Arrays -Working with ng-model - Working with Forms - Form Validation - Error Handling with Forms - Nested Forms with ng-form - Other Form Controls.			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-3</b>			
<b>Directives&amp; Building Databases:</b>			
<b>Part I-</b> Filters - Using Filters in Controllers and Services - Angular JS Services - Internal Angular JS Services - Custom Angular JS Services			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-4</b>			
<b>Directives&amp; Building Databases:</b>			
<b>Part-II-</b> Directives - Alternatives to Custom Directives - Understanding the Basic options - Interacting with Server -HTTP Services - Building Database, Front End and BackEnd			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning		
<b>Module-5</b>			
<b>Introduction to NODE .JS:</b> Introduction -Using the Terminals - Editors -Building a Webserver with Node - The HTTPModule - Views and Layouts.			



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<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, practical based learning
<b>Course Outcomes (Course Skill Set)</b>	
At the end of the course the student will be able to:	
CO 1. Describe the features of Angular JS.	
CO 2. Recognize the form validations and controls.	
CO 3. Implement Directives and Controllers.	
CO 4. Evaluate and create database for simple application.	
CO 5. Plan and build webservers with node using Node .JS.	
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE). The student has to secure a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p>	
<b>Continuous Internal Evaluation (CIE):</b>	
<b>NOTE: List of experiments to be prepared by the faculty based on the syllabus mentioned above</b>	
CIE marks for the practical course is <b>50 Marks</b> .	
The split-up of CIE marks for record/ journal and test are in the ratio <b>60:40</b> .	
<ul style="list-style-type: none"> <li>• Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.</li> <li>• Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.</li> <li>• Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).</li> <li>• Weightage to be given for neatness and submission of record/write-up on time.</li> <li>• Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.</li> <li>• In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.</li> <li>• The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book</li> <li>• The average of 02 tests is scaled down to <b>20 marks</b> (40% of the maximum marks).</li> </ul>	
The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.	
<b>Semester End Evaluation (SEE):</b>	
<ul style="list-style-type: none"> <li>• SEE marks for the practical course is 50 Marks.</li> <li>• SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University</li> <li>• All laboratory experiments are to be included for practical examination.</li> <li>• (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. <b>OR</b> based on the course requirement evaluation rubrics shall be decided jointly by examiners.</li> <li>• Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.</li> </ul>	



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- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- The duration of SEE is 02 hours

Rubrics suggested in Annexure-II of Regulation book

**Suggested Learning Resources:**

**Textbooks**

1. Adam Freeman - ProAngular JS, Apress, First Edition, 2014.
2. ShyamSeshadri, Brad Green - "AngularJS: Up and Running: Enhanced Productivity with Structured Web Apps", Apress, O'Reilly Media, Inc.
3. AgusKurniawan-"AngularJS Programming by Example", First Edition, PE Press, 2014.

**Reference Books**

1. Brad Dayley, "Learning Angular JS", Addison-Wesley Professional, First Edition, 2014.
2. Steve Hoberman, "Data Modeling for MongoDB", Technics Publication, First Edition, 2014..

**Weblinks and Video Lectures (e-Resources):**

1. Introduction to Angular JS : <https://www.youtube.com/watch?v=HEbphzK-0xE>
2. Angular JS Modules : <https://www.youtube.com/watch?v=gWmOKmgnQkU>
3. Directives& Building Databases: [https://www.youtube.com/watch?v=R\\_okHflzgm0](https://www.youtube.com/watch?v=R_okHflzgm0)
4. Introduction to NODE .JS: <https://www.youtube.com/watch?v=8u1o-0mOeGQ>
5. <https://www.youtube.com/watch?v=7F1nLajs4Eo>
6. <https://www.youtube.com/watch?v=t7x7c-x90FU>

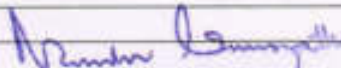
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Demonstration of simple projects

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V Semester

C# AND .NET FRAMEWORK			
Course Code:	21CS582	CIE Marks	50
Teaching Hours/Week	1:0:0:0	SEE Marks	50
Total No. of Hours	12	Total Marks	100
Credits	01	Exam Hours	01
<b>Course Objectives:</b>			
<p>CLO 1. Understand the basics of C# and .NET</p> <p>CLO 2. Learn the variables and constants of C#</p> <p>CLO 3. Know the object-oriented aspects and applications.</p> <p>CLO 4. Learn the basic structure of .NET framework.</p> <p>CLO 5. Learn to create a simple project of .NET Core</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to C#</b>			
<b>Part-I:</b> Understanding C#, .NET, overview of C#, Variables, Data Types, Operators, Expressions, Branching, Looping, Methods, implicit and explicit casting.			
<b>Teaching-Learning Process</b>	Active learning		
<b>Module-2</b>			
<b>Part-II:</b> Constants, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.			
<b>Teaching-Learning Process</b>	Active learning		
<b>Module-3</b>			
<b>Object Oriented Concepts-I:</b>			
Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism.			
<b>Teaching-Learning Process</b>	Active learning		
<b>Module-4</b>			
<b>Object Oriented Concepts-II:</b>			

  
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Sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.

**Teaching-Learning Process** | Active learning

**Module-5**

**Introduction to .NET FRAMEWORK:**

Assemblies, Versioning, Attributes, reflection, viewing meta data, remoting, security in .NET, Environment Setup of .NET Core and create a small project.

**Teaching-Learning Process** | Active learning

**Course Outcomes (Course Skill Set)**

At the end of the course the student will be able to:

- CO 1. Able to explain how C# fits into the .NET platform.
- CO 2. Describe the utilization of variables and constants of C#
- CO 3. Use the implementation of object-oriented aspects in applications.
- CO 4. Analyze and Set up Environment of .NET Core.
- CO 5. Evaluate and create a simple project application.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

- 1. First test at the end of 5<sup>th</sup> week of the semester
- 2. Second test at the end of the 10<sup>th</sup> week of the semester
- 3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

- 4. First assignment at the end of 4<sup>th</sup> week of the semester
- 5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz. any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

- 6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

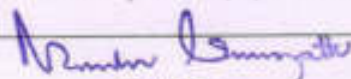
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

**Theory SEE** will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 01 hours**)

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 01 hours



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**Suggested Learning Resources:****Textbooks**

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

**Reference Books**

1. Andrew Troelsen, "Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010.
2. Ian Griffiths, Matthew Adams, Jesse Liberty, "Programming C# 4.0", Sixth Edition, O'Reilly, 2010.

**Weblinks and Video Lectures (e-Resources):**

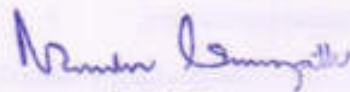
1. Introduction to C# : <https://www.youtube.com/watch?v=ltolFCT9P90>
2. Object Oriented Concepts : <https://www.youtube.com/watch?v=LP3llcExPK0>
3. .NET FRAMEWORK : <https://www.youtube.com/watch?v=h7huHkvPoEE>

**Tutorial Link:**

1. <https://www.tutorialsteacher.com/csharp>
2. <https://www.w3schools.com/cs/index.php>
3. <https://www.javatpoint.com/net-framework>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Real world problem solving using group discussion.



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**VI Semester**

<b>SOFTWARE ENGINEERING &amp; PROJECT MANAGEMENT</b>			
Course Code	21CS61	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

**Course Learning Objectives**

- CLO 1. Outline software engineering principles and activities involved in building large software programs. Identify ethical and professional issues and explain why they are of concern to Software Engineers.
- CLO 2. Describe the process of requirement gathering, requirement classification, requirement specification and requirements validation.
- CLO 3. Infer the fundamentals of object oriented concepts, differentiate system models, use UML diagrams and apply design patterns.5
- CLO 4. Explain the role of DevOps in Agile Implementation.
- CLO 5. Discuss various types of software testing practices and software evolution processes.
- CLO 6. Recognize the importance Project Management with its methods and methodologies.
- CLO 7. Identify software quality parameters and quantify software using measurements and metrics. List software quality standards and outline the practices involved

**Teaching-Learning Process (General Instructions)**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

**Module-1**

**Introduction:** The evolving role of software, Software, The changing nature of software, Software engineering, A Process Framework, Process Patterns, Process Assessment, Personal and Team Process Models, Process Technology, Product and Process.

**Textbook 1: Chapter 1: 1.1 to 1.3**

**Process Models:** Prescriptive models, Waterfall model, Incremental process models, Evolutionary process models, Specialized process models.

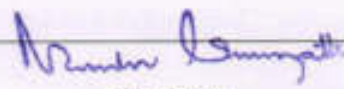
**Textbook 1: Chapter 2: 2.1, 2.2, 2.4 to 2.7**

**Requirements Engineering:** Requirements Engineering Task, Initiating the Requirements Engineering process, Eliciting Requirements, Developing use cases, Building the analysis model, Negotiating Requirements, Validating Requirements, Software Requirement Document **(Sec 4.2)**

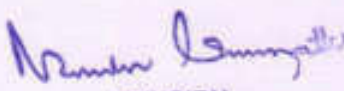
**Textbook 1: Chapter 3: 3.1 to 3.6, Textbook 5: Chapter 4: 4.2**

  
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<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning
<b>Module-2</b>	
<p><b>Introduction, Modelling Concepts and Class Modelling:</b> What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling, abstraction, The Three models, Class Modelling: Object and Class Concept, Link and associations concepts, Generalization and Inheritance, A sample class model, Navigation of class models, Introduction to RUP(<b>Textbook: 5 Sec 2.4</b>) and UML diagrams</p> <p><b>Textbook 2: Chapter 1,2,3</b></p> <p><b>Building the Analysis Models:</b> Requirement Analysis, Analysis Model Approaches, Data modeling Concepts, Object Oriented Analysis, Scenario-Based Modeling, Flow-Oriented Modeling, class Based Modeling, Creating a Behavioral Model.</p> <p><b>Textbook 1: Chapter 8: 8.1 to 8.8</b></p>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
<b>Module-3</b>	
<p><b>Software Testing:</b> A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object -Oriented Software, Validation Testing, System Testing, The Art of Debugging.</p> <p><b>Textbook 1: Chapter 13: 13.1 to 13.7</b></p> <p><b>Agile Methodology &amp; DevOps:</b> Before Agile - Waterfall, Agile Development,</p> <p><b>Self-Learning Section:</b> What is DevOps?, DevOps Importance and Benefits, DevOps Principles and Practices, 7 C's of DevOps Lifecycle for Business Agility, DevOps and Continuous Testing, How to Choose Right DevOps Tools?, Challenges with DevOps Implementation.</p> <p><b>Textbook 4: Chapter 2: 2.1 to 2.9</b></p>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
<b>Module-4</b>	
<p><b>Introduction to Project Management:</b> Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some ways of categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices.</p> <p><b>Textbook 3: Chapter 1: 1.1 to 1.17</b></p>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
<b>Module-5</b>	
<p><b>Activity Planning:</b> Objectives of Activity Planning, When to Plan, Project Schedules, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass- Backward Pass, Identifying critical path, Activity Float, Shortening Project Duration, Activity on Arrow Networks.</p> <p><b>Textbook 3: Chapter 6: 6.1 to 6.16</b></p> <p><b>Software Quality:</b> Introduction, The place of software quality in project planning, Importance of software quality, software quality models, ISO 9126, quality management systems, process capability models, techniques to enhance software quality, quality plans.</p> <p><b>Textbook 3: Chapter 13: (13.1 to 13.6 , 13.9, 13.11, 13.14),</b></p>	

  
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<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
<p><b>Course Outcomes</b></p> <p>At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>CO 1. Understand the activities involved in software engineering and analyze the role of various process models</li> <li>CO 2. Explain the basics of object-oriented concepts and build a suitable class model using modelling techniques</li> <li>CO 3. Describe various software testing methods and to understand the importance of agile methodology and DevOps</li> <li>CO 4. Illustrate the role of project planning and quality management in software development</li> <li>CO 5. Understand the importance of activity planning and different planning models</li> </ul>	
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together</p> <p><b>Continuous Internal Evaluation:</b></p> <p>Three Unit Tests each of <b>20 Marks (duration 01 hour)</b></p> <ul style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ul> <p>Two assignments each of <b>10 Marks</b></p> <ul style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ul> <p>Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b></p> <ul style="list-style-type: none"> <li>6. At the end of the 13<sup>th</sup> week of the semester</li> </ul> <p>The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b></p> <p>(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).</p> <p><b>CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <p>Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (<b>duration 03 hours</b>)</p> <ul style="list-style-type: none"> <li>1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks</li> <li>2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), <b>should have a mix of topics</b> under that module.</li> </ul> <p>The students have to answer 5 full questions, selecting one full question from each module</p>	
<p><b>Suggested Learning Resources:</b></p> <p><b>Textbooks</b></p> <ul style="list-style-type: none"> <li>1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.</li> <li>2. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML, 2nd Edition, Pearson Education, 2005.</li> </ul>	

  
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3. Bob Hughes, Mike Cotterell, Rajib Mall: Software Project Management, 6<sup>th</sup> Edition, McGraw Hill Education, 2018.
4. Deepak Gaikwad, Viral Thakkar, DevOps Tools From Practitioner's Viewpoint, Wiley.
5. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012.

**Reference:**

1. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India.

**Weblinks and Video Lectures (e-Resources):**

1. [https://onlinecourses.nptel.ac.in/noc20\\_cs68/preview](https://onlinecourses.nptel.ac.in/noc20_cs68/preview)
2. [https://www.youtube.com/watch?v=WxkP5KR\\_Emk&list=PLrjKTq13jnm9b5nr-ggx7Pt1G4UAHeFII](https://www.youtube.com/watch?v=WxkP5KR_Emk&list=PLrjKTq13jnm9b5nr-ggx7Pt1G4UAHeFII)
3. <http://elearning.vtu.ac.in/econtent/CSE.php>
4. <http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html>
5. <https://nptel.ac.in/courses/128/106/128106012/> (DevOps)

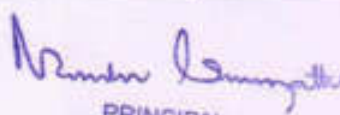
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Case study, Field visit

  
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**VI Semester**

<b>FULLSTACK DEVELOPMENT</b>			
Course Code	21CS62	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 T + 20 P	Total Marks	100
Credits	04	Exam Hours	03
<p><b>Course Learning Objectives:</b></p> <p>CLO 1.Explain the use of learning full stack web development.</p> <p>CLO 2.Make use of rapid application development in the design of responsive web pages.</p> <p>CLO 3.Illustrate Models, Views and Templates with their connectivity in Django for full stack web development.</p> <p>CLO 4.Demonstrate the use of state management and admin interfaces automation in Django.</p> <p>CLO 5.Design and implement Django apps containing dynamic pages with SQL databases.</p>			
<p><b>Teaching-Learning Process (General Instructions)</b></p> <p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.</li> <li>2. Show Video/animation films to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Topics will be introduced in a multiple representation.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1: MVC based Web Designing</b>			
Web framework, MVC Design Pattern, Django Evolution, Views, Mapping URL to Views, Working of Django URL Confs and Loose Coupling, Errors in Django, Wild Card patterns in URLs.			
<b>Textbook 1: Chapter 1 and Chapter 3</b>			
<p><b>Laboratory Component:</b></p> <ol style="list-style-type: none"> <li>1. Installation of Python, Django and Visual Studio code editors can be demonstrated.</li> <li>2. Creation of virtual environment, Django project and App should be demonstrated</li> <li>3. Develop a Django app that displays current date and time in server</li> <li>4. Develop a Django app that displays date and time four hours ahead and four hours before as an offset of current date and time in server.</li> </ol>			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Demonstration using Visual Studio Code</li> <li>2. PPT/Prezi Presentation for Architecture and Design Patterns</li> <li>3. Live coding of all concepts with simple examples</li> </ol>		
<b>Module-2: Django Templates and Models</b>			
Template System Basics, Using Django Template System, Basic Template Tags and Filters, MVT Development Pattern, Template Loading, Template Inheritance, MVT Development Pattern.			

  
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Configuring Databases, Defining and Implementing Models, Basic Data Access, Adding Model String Representations, Inserting/Updating data, Selecting and deleting objects, Schema Evolution  
**Textbook 1: Chapter 4 and Chapter 5**

**Laboratory Component:**

1. Develop a simple Django app that displays an unordered list of fruits and ordered list of selected students for an event
2. Develop a layout.html with a suitable header (containing navigation menu) and footer with copyright and developer information. Inherit this layout.html and create 3 additional pages: contact us, About Us and Home page of any website.
3. Develop a Django app that performs student registration to a course. It should also display list of students registered for any selected course. Create students and course as models with enrolment as ManyToMany field.

**Teaching-Learning Process**

1. Demonstration using Visual Studio Code
2. PPT/Prezi Presentation for Architecture and Design Patterns
3. Live coding of all concepts with simple examples
4. Case Study: Apply concepts learnt for an Online Ticket Booking System

**Module-3: Django Admin Interfaces and Model Forms**

Activating Admin Interfaces, Using Admin Interfaces, Customizing Admin Interfaces, Reasons to use Admin Interfaces.

Form Processing, Creating Feedback forms, Form submissions, custom validation, creating Model Forms, URLConf Ticks, Including Other URLConfs.

**Textbook 1: Chapters 6, 7 and 8**

**Laboratory Component:**

1. For student and course models created in Lab experiment for Module2, register admin interfaces, perform migrations and illustrate data entry through admin forms.
2. Develop a Model form for student that contains his topic chosen for project, languages used and duration with a model called project.

**Teaching-Learning Process**

1. Demonstration using Visual Studio Code
2. PPT/Prezi Presentation for Architecture and Design Patterns
3. Live coding of all concepts with simple examples

**Module-4: Generic Views and Django State Persistence**

Using Generic Views, Generic Views of Objects, Extending Generic Views of objects, Extending Generic Views.

MIME Types, Generating Non-HTML contents like CSV and PDF, Syndication Feed Framework, Sitemap framework, Cookies, Sessions, Users and Authentication.

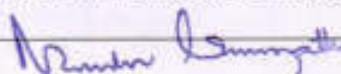
**Textbook 1: Chapters 9, 11 and 12**

**Laboratory Component:**

1. For students enrolment developed in Module 2, create a generic class view which displays list of students and detailview that displays student details for any selected student in the list.
2. Develop example Django app that performs CSV and PDF generation for any models created in previous laboratory component.

**Teaching-Learning Process**

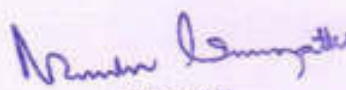
1. Demonstration using Visual Studio Code
2. PPT/Prezi Presentation for Architecture and Design Patterns



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	<ol style="list-style-type: none"> <li>3. Live coding of all concepts with simple examples</li> <li>4. Project Work: Implement all concepts learnt for Student Admission Management.</li> </ol>
<b>Module-5: jQuery and AJAX Integration in Django</b>	
Ajax Solution, Java Script, XMLHttpRequest and Response, HTML, CSS, JSON, iFrames, Settings of Java Script in Django, jQuery and Basic AJAX, jQuery AJAX Facilities, Using jQuery UI Autocomplete in Django	
<b>Textbook 2: Chapters 1, 2 and 7.</b>	
<b>Laboratory Component:</b>	
<ol style="list-style-type: none"> <li>1. Develop a registration page for student enrolment as done in Module 2 but without page refresh using AJAX.</li> <li>2. Develop a search application in Django using AJAX that displays courses enrolled by a student being searched.</li> </ol>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Demonstration using Visual Studio Code</li> <li>2. PPT/Prezi Presentation for Architecture and Design Patterns</li> <li>3. Live coding of all concepts with simple examples</li> <li>4. Case Study: Apply the use of AJAX and jQuery for development of EMI calculator.</li> </ol>
<b>Course outcome (Course Skill Set)</b>	
At the end of the course the student will be able to:	
<ol style="list-style-type: none"> <li>CO 1. Understand the working of MVT based full stack web development with Django.</li> <li>CO 2. Designing of Models and Forms for rapid development of web pages.</li> <li>CO 3. Analyze the role of Template Inheritance and Generic views for developing full stack web applications.</li> <li>CO 4. Apply the Django framework libraries to render nonHTML contents like CSV and PDF.</li> <li>CO 5. Perform jQuery based AJAX integration to Django Apps to build responsive full stack web applications,</li> </ol>	
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together</p>	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
<ol style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol>	
Two assignments each of <b>10 Marks</b>	
<ol style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol>	

  
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Practical Sessions need to be assessed by appropriate rubrics and viva-voce method. This will contribute to **20 marks**.

- Rubrics for each Experiment taken average for all Lab components - 15 Marks.
- Viva-Voce- 5 Marks (more emphasized on demonstration topics)

The sum of three tests, two assignments, and practical sessions will be out of 100 marks and will be **scaled down to 50 marks**

(to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### **Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

#### **Suggested Learning Resources:**

##### **Textbooks**

1. Adrian Holovaty, Jacob Kaplan Moss, The Definitive Guide to Django: Web Development Done Right, Second Edition, Springer-Verlag Berlin and Heidelberg GmbH & Co. KG Publishers, 2009
2. Jonathan Hayward, Django Java Script Integration: AJAX and jQuery, First Edition, Pack Publishing, 2011

##### **Reference Books**

1. Aidas Bendroraitis, Jake Kronika, Django 3 Web Development Cookbook, Fourth Edition, Pack Publishing, 2020
2. William Vincent, Django for Beginners: Build websites with Python and Django, First Edition, Amazon Digital Services, 2018
3. Antonio Mele, Django3 by Example, 3<sup>rd</sup> Edition, Pack Publishers, 2020
4. Arun Ravindran, Django Design Patterns and Best Practices, 2<sup>nd</sup> Edition, Pack Publishers, 2020.
5. Julia Elman, Mark Lavin, Light weight Django, David A. Bell, 1<sup>st</sup> Edition, Oreily Publications, 2014

##### **Weblinks and Video Lectures (e-Resources):**

1. MVT architecture with Django: <https://freevideolectures.com/course/3700/django-tutorials>
2. Using Python in Django: <https://www.youtube.com/watch?v=2BqoLiMT3Ao>
3. Model Forms with Django: <https://www.youtube.com/watch?v=gMM1rtTwKxE>
4. Real time Interactions in Django: <https://www.youtube.com/watch?v=3gHmf0eZ45k>
5. AJAX with Django for beginners: <https://www.youtube.com/watch?v=3VaKNyjlxAU>

##### **Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

1. Real world problem solving - applying the Django framework concepts and its integration with AJAX to develop any shopping website with admin and user dashboards.

  
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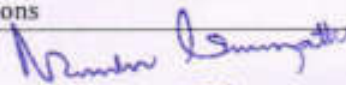
**Short Preamble on Full Stack Web Development:**

Website development is a way to make people aware of the services and/or products they are offering, understand why the products are relevant and even necessary for them to buy or use, and highlight the striking qualities that set it apart from competitors. Other than commercial reasons, a website is also needed for quick and dynamic information delivery for any domain. Development of a well-designed, informative, responsive and dynamic website is need of the hour from any computer science and related engineering graduates. Hence, they need to be augmented with skills to use technology and framework which can help them to develop elegant websites. Full Stack developers are in need by many companies, who knows and can develop all pieces of web application (Front End, Back End and business logic). MVT based development with Django is the cutting-edge framework for Full Stack Web Development. Python has become an easier language to use for many applications. Django based framework in Python helps a web developer to utilize framework and develop rapidly responsive and secure web applications.

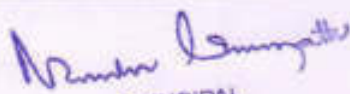
  
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## VI Semester

COMPUTER GRAPHICS AND FUNDAMENTALS OF IMAGE PROCESSING			
Course Code	21CS63	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<p><b>Course Objectives:</b></p> <p>CLO 1. Overview of Computer Graphics along with its applications.</p> <p>CLO 2. Exploring 2D and 3D graphics mathematics along with OpenGL API's.</p> <p>CLO 3. Use of Computer graphics principles for animation and design of GUI's .</p> <p>CLO 4. Introduction to Image processing and Open CV.</p> <p>CLO 5. Image segmentation using Open CV.</p>			
<p><b>Teaching-Learning Process (General Instructions)</b></p> <p>These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyse information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Overview:</b> Computer Graphics hardware and software and OpenGL: Computer Graphics: Video Display Devices, Raster-Scan Systems Basics of computer graphics, Application of Computer Graphics. OpenGL: Introduction to OpenGL, coordinate reference frames, specifying two-dimensional world coordinate reference frames in OpenGL, OpenGL point functions, OpenGL line functions, point attributes, line attributes, curve attributes, OpenGL point attribute functions, OpenGL line attribute functions, Line drawing algorithms(DDA, Bresenham's).</p> <p><b>Textbook 1: Chapter -1,2,3, 5(1 and 2 only)</b></p> <p><b>Self-study topics :</b> Input devices, hard copy devices, coordinate representation, graphics functions, fill area primitives, polygon fill areas, pixel arrays, Parallel Line algorithms</p>			
<b>Teaching-Learning Process</b>	Chalk & board, Active Learning Virtual Lab		
<b>Module-2</b>			
<p><b>2D and 3D graphics with OpenGL:</b> 2D Geometric Transformations: Basic 2D Geometric Transformations, matrix representations and homogeneous coordinates, 2D Composite transformations, other 2D transformations, raster methods for geometric transformations, OpenGL raster transformations, OpenGL geometric transformations function,</p> <p><b>3D Geometric Transformations:</b> Translation, rotation, scaling, composite 3D transformations, other 3D transformations, OpenGL geometric transformations functions</p>			

  
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<b>Textbook 1: Chapter -6, 8</b>	
<b>Self-study topics:</b> Transformation between 2D coordinate system, OpenGL geometric-transformation, Transformation between 3D coordinate system.	
<b>Teaching-Learning Process</b>	Chalk & board, Active Learning, Problem based learning Virtual Lab:
<b>Module-3</b>	
<b>Interactive Input Methods and Graphical User Interfaces:</b> Graphical Input Data ,Logical Classification of Input Devices, Input Functions for Graphical Data , Interactive Picture-Construction Techniques, Virtual-Reality Environments, OpenGL Interactive Input-Device Functions, OpenGL Menu Functions , Designing a Graphical User Interface.	
<b>Computer Animation :</b> Design of Animation Sequences, Traditional Animation Techniques, General Computer-Animation Functions, Computer-Animation Languages, Character Animation, Periodic Motions, OpenGL Animation Procedures.	
<b>Textbook 1: Chapter -11, 18</b>	
<b>Self-study topics:</b> Raster methods for computer animation, Key frame systems, Motion specification.	
<b>Teaching-Learning Process</b>	Chalk & board, MOOC, Active Learning
<b>Module-4</b>	
<b>Introduction to Image processing:</b> overview, Nature of IP, IP and its related fields, Digital Image representation, types of images.	
<b>Digital Image Processing Operations:</b> Basic relationships and distance metrics, Classification of Image processing Operations.	
<b>Text book 2: Chapter 3</b>	
<i>( Below topics is for experiential learning only , No questions in SEE)</i>	
<i>Computer vision and OpenCV: What is computer vision, Evolution of computer vision, Application of Computer vision, Feature of OpenCV, OpenCV library modules, OpenCV environment, Reading, writing and storing images using OpenCV. OpenCV drawing Functions. OpenCV Geometric Transformations.</i>	
<b><u>(Note : Computer vision and OpenCV for experimental learning or Activity Based Learning using web sources, Preferred for assignments. No questions in SEE )</u></b>	
<b>Web Source:</b> <a href="https://www.tutorialspoint.com/opencv/">https://www.tutorialspoint.com/opencv/</a>	
<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning Lab practice for OpenCV for basic geometric objects and basic image operation
<b>Module-5</b>	
<b>Image Segmentation:</b> Introduction, classification, detection of discontinuities, Edge detection (up to canny edge detection(included)).	
<b>Text Book 2: Chapter 9: 9.1 to 9.4.4</b>	
<i>( Below topics is for experiential learning only , No questions in SEE)</i>	
<i>Image processing with Open CV: Resizing , Rotation/ Flipping, Blending, Creating region of Interest (ROI), Image Thresholding, Image Blurring and smoothing, Edge Detection, Image contours and Face Detection on images using OpenCV.</i>	

  
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**(Note :Image Processing withOpenCV for experimental learning or Activity Based Learning using web sources, Preferred for assignments, No questions in SEE)**

Web source: <https://medium.com/analytics-vidhya/introduction-to-computer-vision-opencv-in-python-fb722e805e8b>

<b>Teaching-Learning Process</b>	Chalk & board, MOOC Lab practice on image processing. Virtual Lab:
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**Course Outcomes:**

At the end of the course the student will be able to:

- CO 1. Construct geometric objects using Computer Graphics principles and OpenGL APIs.
- CO 2. Use OpenGL APIs and related mathematics for 2D and 3D geometric Operations on the objects.
- CO 3. Design GUI with necessary techniques required to animate the created objects
- CO 4. Apply OpenCV for developing Image processing applications.
- CO 5. Apply Image segmentation techniques along with programming, using OpenCV, for developing simple applications.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(To have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

3. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
4. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

**Suggested Learning Resources:**

  
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**Textbooks**

1. Donald D Hearn, M Pauline Baker and Warren Carithers: Computer Graphics with OpenGL 4th Edition, Pearson, 2014
2. S. Sridhar, Digital Image Processing, second edition, Oxford University press 2016.

**Reference Books**

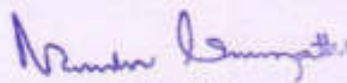
1. Edward Angel: Interactive Computer Graphics- A Top Down approach with OpenGL, 5th edition. Pearson Education, 2008
2. James D Foley, Andries Van Dam, Steven K Feiner, John F Huges Computer graphics with OpenGL: Pearson education

**Web links and Video Lectures (e-Resources):****Web links and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/106/106106090/>
2. <https://nptel.ac.in/courses/106/102/106102063/>
3. <https://nptel.ac.in/courses/106/103/106103224/>
4. <https://nptel.ac.in/courses/106/102/106102065/>
5. <https://www.tutorialspoint.com/opencv/> (Tutorial, Types of Images, Drawing Functions )

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

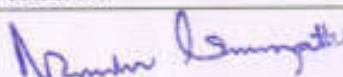
2. Mini project on computer graphics using Open GL/Python/Open CV.



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## VI Semester

<b>AGILE TECHNOLOGIES</b>			
Course Code	21CS641	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b>			
<p>CLO 1. To understand basics of agile technologies</p> <p>CLO 2. To explain XP Lifecycle, XP Concepts and Adopting XP</p> <p>CLO 3. To Evaluate on Pair Programming, Root-Cause Analysis, Retrospectives, Planning, Incremental Requirements and Customer Tests</p> <p>CLO 4. To become Mastering in Agility</p> <p>CLO 5. To provide well Deliver Value</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.</li> <li>2. Show Video/animation films to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Topics will be introduced in a multiple representation.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Why Agile?</b> : Understanding Success, Beyond Deadlines, The Importance of Organizational Success, Enter Agility, How to Be Agile?: Agile Methods, Don't Make Your Own Method, The Road to Mastery, Find a Mentor.</p> <p>The Genesis of Agile, Introduction and background, Agile Manifesto, and Principles, Simple Design, User Stories, Agile Testing, Agile Tools</p> <p><b>Textbook 1: Part I – Ch 1, Ch 2.</b></p> <p><b>Textbook 2: Ch 1</b></p>			
<b>Teaching-Learning Process</b>	<p>Chalk and board, Active Learning</p> <p><a href="https://www.nptelvideos.com/video.php?id=904">https://www.nptelvideos.com/video.php?id=904</a>  <a href="https://www.youtube.com/watch?v=x90kIAFGYKE">https://www.youtube.com/watch?v=x90kIAFGYKE</a>  <a href="http://www.digimat.in/nptel/courses/video/110104073/L02.html">http://www.digimat.in/nptel/courses/video/110104073/L02.html</a>  <a href="https://onlinecourses.nptel.ac.in/noc19_mg30/preview">https://onlinecourses.nptel.ac.in/noc19_mg30/preview</a></p>		
<b>Module-2</b>			

  
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Understanding XP: The XP Lifecycle, The XP Team, XP Concepts, Adopting XP: Is XP Right for Us?, Go!, Assess Your Agility

Overview of Extreme Programming, The Practices of Extreme Programming, Conclusion, Bibliography, Planning Initial Exploration, Release Planning, Iteration Planning, Defining "Done", Task Planning Iterating, Tracking.

**Textbook 1: Part I: Ch 3, Ch 4.**

**Textbook 3: Section 1: Ch 1**

**Teaching-Learning Process**

Chalk and board, Active Learning

<https://www.nptelvideos.com/video.php?id=904>

<https://www.youtube.com/watch?v=x90klAFGYKE>

<http://www.digimat.in/nptel/courses/video/110104073/L02.html>

[https://onlinecourses.nptel.ac.in/noc19\\_mg30/preview](https://onlinecourses.nptel.ac.in/noc19_mg30/preview)

### Module-3

**Practicing XP:** Thinking: Pair Programming, Energized Work, Informative Workspace, Root Cause Analysis, Retrospectives,

**Collaborating:** Trust, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting,

**Releasing:** "Done Done", No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation. **Planning:** Vision, Release Planning, The Planning Game, Risk Management, Iteration Planning, Slack, Stories, Estimating. **Developing:** Incremental requirements, Customer Tests, Test-Driven Development, Refactoring, Simple Design, Incremental Design and Architecture, Spike Solutions, Performance Optimization, Exploratory Testing

**Textbook 1: Part II: Ch 5, Ch 6, Ch 7, Ch 8, Ch 9.**

**Teaching-Learning Process**

Chalk and board, Demonstration

<https://www.nptelvideos.com/video.php?id=904>

<https://www.youtube.com/watch?v=x90klAFGYKE>

<http://www.digimat.in/nptel/courses/video/110104073/L02.html>

[https://onlinecourses.nptel.ac.in/noc19\\_mg30/preview](https://onlinecourses.nptel.ac.in/noc19_mg30/preview)

### Module-4

**Mastering Agility :** Values and Principles: Commonalities, About Values, Principles, and Practices, Further Reading, Improve the Process: Understand Your Project, Tune and Adapt, Break the Rules, Rely on People :Build Effective Relationships, Let the Right People Do the Right Things, Build the Process for the People, Eliminate Waste :Work in Small, Reversible Steps, Fail Fast, Maximize Work Not Done, Pursue Throughput

**Textbook 1: Part III- Ch 10, Ch 11, Ch 12, Ch 13.**

**Teaching-Learning Process**

Chalk and board

<https://www.nptelvideos.com/video.php?id=904>

<https://www.youtube.com/watch?v=x90klAFGYKE>

<http://www.digimat.in/nptel/courses/video/110104073/L02.html>

[https://onlinecourses.nptel.ac.in/noc19\\_mg30/preview](https://onlinecourses.nptel.ac.in/noc19_mg30/preview)

### Module-5

**Deliver Value:** Exploit Your Agility, Only Releasable Code Has Value, Deliver Business Results, Deliver Frequently, Seek Technical Excellence: Software Doesn't Exist, Design Is for Understanding, Design

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Trade-offs, Quality with a Name, Great Design, Universal Design Principles, Principles in Practice, Pursue Mastery

Textbook 1: Part IV- Ch 14, Ch 15.

**Teaching-Learning Process**

Chalk and board  
<https://www.nptelvideos.com/video.php?id=904>  
<https://www.youtube.com/watch?v=x90klAFGYKE>  
<http://www.digimat.in/nptel/courses/video/110104073/L02.html>  
[https://onlinecourses.nptel.ac.in/noc19\\_mg30/preview](https://onlinecourses.nptel.ac.in/noc19_mg30/preview)

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

- CO 1. Understand the fundamentals of agile technologies
- CO 2. Explain XP Lifecycle, XP Concepts and Adopting XP
- CO 3. Apply different techniques on Practicing XP, Collaborating and Releasing
- CO 4. Analyze the Values and Principles of Mastering Agility
- CO 5. Demonstrate the agility to deliver good values

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

- 1. First test at the end of 5<sup>th</sup> week of the semester
- 2. Second test at the end of the 10<sup>th</sup> week of the semester
- 3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

- 4. First assignment at the end of 4<sup>th</sup> week of the semester
- 5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

- 6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

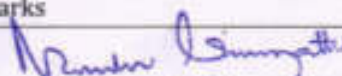
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- 1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks



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2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. James shore, Chromatic, O'Reilly, The Art of Agile Development, 2007

**Reference Books**

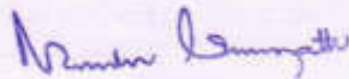
1. Ken Schawber, Mike Beedle, "Agile Software Development with Scrum", Pearson, 2008
2. Agile-Principles-Patterns-and-Practices-in-C by Robert C Martin & Mic Martin.

**Web links and Video Lectures (e-Resources):**

Model wise mentioned

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

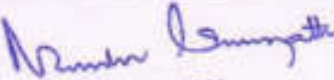
- Demonstration of the project based on Agile technologies.



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VI Semester

ADVANCED JAVA PROGRAMMING			
Course Code	21CS642	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Understanding the fundamental concepts of Enumerations and Annotations</p> <p>CLO 2. Apply the concepts of Generic classes in Java programs</p> <p>CLO 3. Demonstrate the fundamental concepts of String operations</p> <p>CLO 4. Design and develop web applications using Java servlets and JSP</p> <p>CLO 5. Apply database interaction through Java database Connectivity</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same program</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Enumerations, Autoboxing and Annotations:</b>			
<p>Enumerations, Enumeration fundamentals, the values() and valueOf() methods, Java enumerations are class types, enumerations inherits Enum, example, type wrappers, Autoboxing, Autoboxing methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of warning</p> <p>Annotations, Annotation basics, specifying retention policy, obtaining annotations at run time by use of reflection, Annotated element interface, Using default values, Marker Annotations, Single member annotations, Built in annotations</p>			
<b>Textbook 1: Chapter12</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Online demonstration, Problem based learning		
<b>Module-2</b>			
<b>Generics:</b> What are Generics, A Simple Generics Example, A Generic Class with Two Type Parameters, The General Form of a Generic Class, Bounded Types, Using Wildcard Arguments, Bounded Wildcards, Creating a Generic Method, Generic Interfaces, Raw types and Legacy code, Generic Class Hierarchies, Erasure, Ambiguity errors, Some Generic Restrictions			
<b>Textbook 1: Chapter 14</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Online Demonstration		
<b>Module-3</b>			

  
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**String Handling:** The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf(), Changing the case of characters within a String, String Buffer, String Builder

Textbook 1: Chapter 15

Teaching-Learning Process Chalk and board, Online Demonstration

**Module-4**

Background; The life cycle of a servlet; A simple servlet; the servlet API; The javax.servlet package Reading servlet parameter; the javax.servlet.http package; Handling HTTP Requests and Responses; using Cookies; Session Tracking, Java Server Pages (JSP); JSP tags, Variables and Objects, Methods, Control statements, Loops, Request String, Parsing other information, User sessions, Cookies, Session Objects

Textbook 1: Chapter 31

Textbook 2: Chapter 11

Teaching-Learning Process Chalk and board, Online Demonstration

**Module-5**

The concept of JDBC; JDBC Driver Types; JDBC packages; A brief overview of the JDBC Process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data Types; Exceptions.

Textbook 2: Chapter 6

Teaching-Learning Process Chalk and board, Online Demonstration

**Course Outcomes**

At the end of the course the student will be able to:

- CO 1. Understanding the fundamental concepts of Enumerations and Annotations
- CO 2. Apply the concepts of Generic classes in Java programs
- CO 3. Demonstrate the concepts of String operations in Java
- CO 4. Develop web based applications using Java servlets and JSP
- CO 5. Illustrate database interaction and transaction processing in Java

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

- 1. First test at the end of 5<sup>th</sup> week of the semester
- 2. Second test at the end of the 10<sup>th</sup> week of the semester
- 3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

- 4. First assignment at the end of 4<sup>th</sup> week of the semester
- 5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

- 6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

*Nandini Sanyal*  
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**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:****Textbooks**

1. Herbert Schildt: JAVA the Complete Reference. 9<sup>th</sup> Edition, Tata McGraw-Hill
2. Jim Keogh, The Complete Reference J2EE, Tata McGraw-Hill

**Reference Books:**

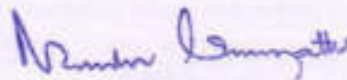
1. Y. Daniel Liang: Introduction to JAVA Programming, 7<sup>th</sup> Edition, Pearson Education, 2007.

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. <https://nptel.ac.in/courses/106/105/106105225/>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

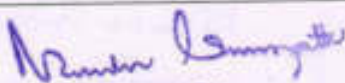
- Programming exercises



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VI Semester

ADVANCED COMPUTER ARCHITECTURE			
Course Code	21CS643	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Describe computer architecture.</p> <p>CLO 2. Measure the performance of architectures in terms of right parameters.</p> <p>CLO 3. Summarize parallel architecture and the software used for them</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same program</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p>Theory of Parallelism: Parallel Computer Models, The State of Computing, Multiprocessors and Multicomputer, Multivector and SIMD Computers, PRAM and VLSI Models, Program and Network Properties, Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms, System Interconnect Architectures, Principles of Scalable Performance, Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws. For all Algorithm or mechanism any one example is sufficient.</p> <p><b>Chapter 1 (1.1to 1.4), Chapter 2( 2.1 to 2.4) Chapter 3 (3.1 to 3.3)</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Online demonstration, Problem based learning		
<b>Module-2</b>			
<p>Hardware Technologies 1: Processors and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology. For all Algorithms or mechanisms any one example is sufficient.</p> <p><b>Chapter 4 ( 4.1 to 4.4)</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Online Demonstration		
<b>Module-3</b>			
<p>Hardware Technologies 2: Bus Systems, Cache Memory Organizations, Shared Memory Organizations, Sequential and Weak Consistency Models, Pipelining and Superscalar Techniques, Linear Pipeline Processors, Nonlinear Pipeline Processors. For all Algorithms or mechanisms any one example is sufficient.</p>			

  
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<b>Chapter 5 (5.1 to 5.4) Chapter 6 (6.1 to 6.2)</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Online Demonstration
<b>Module-4</b>	
Parallel and Scalable Architectures: Multiprocessors and Multicomputers, Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message-Passing Mechanisms, Multivector and SIMD Computers, Vector Processing Principles, Multivector Multiprocessors, Compound Vector Processing, Scalable, Multithreaded, and Dataflow Architectures, Latency-Hiding Techniques, Principles of Multithreading, Fine- Grain Multicomputers. For all Algorithms or mechanisms any one example is sufficient.	
<b>Chapter 7 (7.1,7.2 and 7.4) Chapter 8( 8.1 to 8.3) Chapter 9(9.1 to 9.3)</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Online Demonstration
<b>Module-5</b>	
Software for parallel programming: Parallel Models, Languages, and Compilers ,Parallel Programming Models, Parallel Languages and Compilers, Dependence Analysis of Data Arrays. Instruction and System Level Parallelism, Instruction Level Parallelism, Computer Architecture, Contents, Basic Design Issues, Problem Definition, Model of a Typical Processor, Compiler-detected Instruction Level Parallelism ,Operand Forwarding ,Reorder Buffer, Register Renaming ,Tomasulo's Algorithm. For all Algorithms or mechanisms any one example is sufficient.	
<b>Chapter 10(10.1 to 10.3) Chapter 12( 12.1 to 12.9)</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Online Demonstration
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
<ul style="list-style-type: none"> <li>CO 1. Explain the concepts of parallel computing</li> <li>CO 2. Explain and identify the hardware technologies</li> <li>CO 3. Compare and contrast the parallel architectures</li> <li>CO 4. Illustrate parallel programming concepts</li> </ul>	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
<ul style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ul>	
Two assignments each of <b>10 Marks</b>	
<ul style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ul>	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
<ul style="list-style-type: none"> <li>6. At the end of the 13<sup>th</sup> week of the semester</li> </ul>	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	

  
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CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks marks scored will be proportionately reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Kai Hwang and Naresh Jotwani, Advanced Computer Architecture (SIE): Parallelism, Scalability, Programmability, McGraw Hill Education 3/e. 2015

**Reference Books:**

1. John L. Hennessy and David A. Patterson, Computer Architecture: A quantitative approach, 5th edition, Morgan Kaufmann Elseveir, 2013

**Weblinks and Video Lectures (e-Resources):**

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

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VI Semester

DATA SCIENCE AND VISUALIZATION			
Course Code	21CS644	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. To introduce data collection and pre-processing techniques for data science</p> <p>CLO 2. Explore analytical methods for solving real life problems through data exploration techniques</p> <p>CLO 3. Illustrate different types of data and its visualization</p> <p>CLO 4. Find different data visualization techniques and tools</p> <p>CLO 5. Design and map element of visualization well to perceive information</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to Data Science</b>			
<p><b>Introduction:</b> What is Data Science? Big Data and Data Science hype – and getting past the hype, Why now? – Datafication, Current landscape of perspectives, Skill sets, Needed Statistical Inference: Populations and samples, Statistical modelling, probability distributions, fitting a model.</p>			
<b>Textbook 1: Chapter 1</b>			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>PPT – Recognizing different types of data, Data science process</li> <li>Demonstration of different steps, learning definition and relation with data science</li> </ol>		
<b>Module-2</b>			
<b>Exploratory Data Analysis and the Data Science Process</b>			
<p>Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process, Case Study: Real Direct (online realestate firm). Three Basic Machine Learning Algorithms: Linear Regression, k-Nearest Neighbours (k- NN), k-means.</p>			
<b>Textbook 1: Chapter 2, Chapter 3</b>			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>PPT –Plots, Graphs, Summary Statistics</li> <li>Demonstration of Machine Learning Algorithms</li> </ol>		

  
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### Module-3

#### Feature Generation and Feature Selection

Extracting Meaning from Data: Motivating application: user (customer) retention. Feature Generation (brainstorming, role of domain expertise, and place for imagination), Feature Selection algorithms. Filters; Wrappers; Decision Trees; Random Forests. Recommendation Systems: Building a User-Facing Data Product, Algorithmic ingredients of a Recommendation Engine, Dimensionality Reduction, Singular Value Decomposition, Principal Component Analysis, Exercise: build your own recommendation system.

#### Textbook 1: Chapter 6

#### Teaching-Learning Process

1. PPT - Feature generation, selection
2. Demonstration recommendation engine

### Module-4

#### Data Visualization and Data Exploration

**Introduction:** Data Visualization, Importance of Data Visualization, Data Wrangling, Tools and Libraries for Visualization

**Comparison Plots:** Line Chart, Bar Chart and Radar Chart; **Relation Plots:** Scatter Plot, Bubble Plot, Correlogram and Heatmap; **Composition Plots:** Pie Chart, Stacked Bar Chart, Stacked Area Chart, Venn Diagram; **Distribution Plots:** Histogram, Density Plot, Box Plot, Violin Plot; **Geo Plots:** Dot Map, Choropleth Map, Connection Map; What Makes a Good Visualization?

#### Textbook 2: Chapter 1, Chapter 2

#### Teaching-Learning Process

1. Demonstration of different data visualization tools.

### Module-5

#### A Deep Dive into Matplotlib

Introduction, Overview of Plots in Matplotlib, **Pyplot Basics:** Creating Figures, Closing Figures, Format Strings, Plotting, Plotting Using pandas DataFrames, Displaying Figures, Saving Figures; **Basic Text and Legend Functions:** Labels, Titles, Text, Annotations, Legends; **Basic Plots:** Bar Chart, Pie Chart, Stacked Bar Chart, Stacked Area Chart, Histogram, Box Plot, Scatter Plot, Bubble Plot; **Layouts:** Subplots, Tight Layout, Radar Charts, GridSpec; **Images:** Basic Image Operations, Writing Mathematical Expressions

#### Textbook 2: Chapter 3

#### Teaching-Learning Process

1. PPT - Comparison of plots
2. Demonstration charts

#### Course Outcomes

At the end of the course the student will be able to:

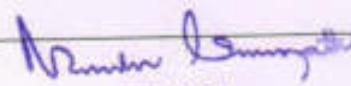
- CO 1. Understand the data in different forms
- CO 2. Apply different techniques to Explore Data Analysis and the Data Science Process
- CO 3. Analyze feature selection algorithms & design a recommender system.
- CO 4. Evaluate data visualization tools and libraries and plot graphs.
- CO 5. Develop different charts and include mathematical expressions.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

#### Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour)

  
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1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of 10 Marks

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Doing Data Science, Cathy O'Neil and Rachel Schutt, O'Reilly Media, Inc O'Reilly Media, Inc, 2013
2. Data Visualization workshop, Tim Grobmann and Mario Dobler, Packt Publishing, ISBN 9781800568112

**Reference:**

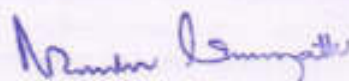
1. Mining of Massive Datasets, Anand Rajaraman and Jeffrey D. Ullman, Cambridge University Press, 2010
2. Data Science from Scratch, Joel Grus, Shroff Publisher /O'Reilly Publisher Media
3. A handbook for data driven design by Andy krik

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/105/106105077/>
2. <https://www.oreilly.com/library/view/doing-data-science/9781449363871/toc01.html>
3. <http://book.visualisingdata.com/>
4. <https://matplotlib.org/>
5. <https://docs.python.org/3/tutorial/>
6. <https://www.tableau.com/>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

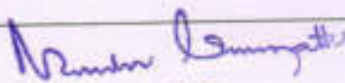
Demonstration using projects



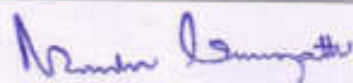
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VI Semester

INTRODUCTION TO DATA STRUCTURES			
Course Code	21CS651	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Introduce elementary data structures.</p> <p>CLO 2. Analyze Linear Data Structures: Stack, Queues, Lists</p> <p>CLO 3. Analyze Non Linear Data Structures: Trees</p> <p>CLO 4. Assess appropriate data structure during program development/Problem Solving.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> </ol> <p>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</p>			
<b>Module-1</b>			
<b>Introduction:</b>			
Introduction to arrays: one-dimensional arrays, two dimensional arrays, initializing two dimensional arrays, Multidimensional arrays.			
Introduction to Pointers: Pointer concepts, accessing variables through pointers, Dynamic memory allocation, pointers applications.			
Introduction to structures and unions: Declaring structures, Giving values to members, structure initialization, arrays of structures, nested structure, unions, size of structures.			
<b>Textbook 1: Ch 8.3 to 8.15, Ch 12.3 to 12.19</b>			
<b>Textbook 2: Ch 2.1 to 2.13, 2.51, 2.80 to 2.98</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning		
<b>Module-2</b>			
<b>Linear Data Structures-Stacks and queues:</b>			
Introduction, Stack representation in Memory, Stack Operations, Stack Implementation, Applications of Stack. Introduction, Queues-Basic concept, Logical representation of Queues, Queue Operations and its types, Queue Implementation, Applications of Queue.			
<b>Textbook 2: Ch 6.1 to 6.14, Ch 8.1, 8.2</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem Based Learning		
<b>Module-3</b>			
<b>Linear Data Structures-Linked List:</b>			
Introduction, Linked list Basic concept, Logical representation of Linked list, Self-Referential structure, Singly-linked List Operations and Implementation, Circular Linked List, applications of Linked list.			

  
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<b>Textbook 1: Ch 15.1,15.3,15.4,15.8</b>	
<b>Textbook 2: Ch 9.2,9.5</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning
<b>Module-4</b>	
<b>Non Linear Data Structures - Trees</b>	
Introduction, Basic concept, Binary Tree and its types, Binary Tree Representation, Binary Tree Traversal, Binary Search tree, Expression Trees.	
<b>Textbook1: Ch 16.1,16.2</b>	
<b>Textbook2:Ch 10.1,10.2,10.4,10.6.3</b>	
<b>Teaching-Learning Process</b>	Chalk& board, Active Learning, Problem based learning
<b>Module-5</b>	
<b>Sorting and Searching</b>	
Sorting: Introduction, Bubble sort, Selection sort, Insertion sort	
Searching: Introduction, Linear search, Binary search.	
<b>Textbook1: Ch 17.1,17.2.2, 17.2.4, 17.3.1,17.3.2</b>	
<b>Textbook2: Ch 11.1.,11.2,11.3,11.7,11.10.1,11.10.2</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Express the fundamentals of static and dynamic data structure.	
CO 2. Summarize the various types of data structure with their operations.	
CO 3. Interpret various searching and sorting techniques.	
CO 4. Choose appropriate data structure in problem solving.	
CO 5. Develop all data structures in a high level language for problem solving.	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
6. At the end of the 13 <sup>th</sup> week of the semester	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	
<b>CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b>	
<b>Semester End Examination:</b>	

  
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Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. C Programming and data structures, E Balaguruswamy 4<sup>th</sup> Edition, 2007, McGraw Hill
2. Systematic approach to Data structures using C, A M Padma Reddy, 7<sup>th</sup> Edition 2007, Sri Nandi Publications.

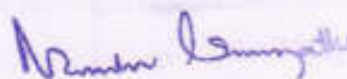
**References**

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2<sup>nd</sup> Ed, Universities Press, 2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1<sup>st</sup> Ed, McGraw Hill, 2014.

**Weblinks and Video Lectures (e-Resources):**

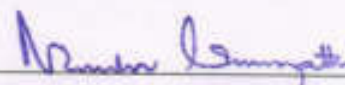
1. [https://www.youtube.com/watch?v=DFpWCl\\_49j0](https://www.youtube.com/watch?v=DFpWCl_49j0)
2. <https://www.youtube.com/watch?v=x7t-Ul0AZM>
3. <https://www.youtube.com/watch?v=137kGX-nZEI>
4. <https://www.youtube.com/watch?v=XuCbpw6Bj1U>
5. <https://www.youtube.com/watch?v=R9PTBwQzceo>
6. <https://www.youtube.com/watch?v=qH6yxkw0u78>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**  
Demonstration of projects developed using Linear/Non-linear data structures

  
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## VI Semester

INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS			
Course Code	21CS652	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
CLO 1. Understand the basic concepts and the applications of database systems.			
CLO 2. Understand the relational database design principles.			
CLO 3. Master the basics of SQL and construct queries using SQL.			
CLO 4. Familiar with the basic issues of transaction processing and concurrency control.			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. Lecturer method (L) need not be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain the functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to Databases:</b> Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications.			
<b>Overview of Database Languages and Architectures:</b> Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment.			
<b>Conceptual Data Modelling using Entities and Relationships:</b> Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, Examples			
<b>Textbook 1: Ch 1.1 to 1.8, 2.1 to 2.6, 3.1 to 3.7</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<b>Relational Model:</b> Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations.			
<b>Relational Algebra:</b> Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Examples of Queries in relational algebra.			
<b>Mapping Conceptual Design into a Logical Design:</b> Relational Database Design using ER-to-Relational mapping.			
<b>Textbook 1: ch5.1 to 5.3, 8.1 to 8.5, 9.1;</b>			



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<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration
<b>Module-3</b>	
SQL: SQL data definition and data types, specifying constraints in SQL, retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.	
<b>Advances Queries:</b> More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL Database	
<b>Textbook 1: Ch 6.1 to 6.5, 7.1 to 7.4; Textbook 2: 6.1 to 6.6;</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-4</b>	
<b>Normalization: Database Design Theory</b> - Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Examples on normal forms.	
<b>Textbook 1: Ch 14.1 to -14.7, 15.1 to 15.6</b>	
<b>Teaching-Learning Process</b>	Chalk & board, Problem based learning
<b>Module-5</b>	
<b>Transaction management and Concurrency</b> - Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.	
<b>Textbook 1: Ch 20.1 to 20.6, 21.1 to 21.7;</b>	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Identify, analyze and define database objects, enforce integrity constraints on a database using RDBMS	
CO 2. Use Structured Query Language (SQL) for database manipulation.	
CO 3. Design and build simple database systems	
CO 4. Develop application to interact with databases.	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
6. At the end of the 13 <sup>th</sup> week of the semester	

  
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The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Fundamentals of Database Systems, RamezElmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson.
2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill

**Weblinks and Video Lectures (e-Resources):**

1. <https://www.youtube.com/watch?v=3EjlovevfcA>
2. <https://www.youtube.com/watch?v=9TwMRs3qTclI>
3. <https://www.youtube.com/watch?v=ZWl0Xow304I>
4. <https://www.youtube.com/watch?v=4YilEjkNPrQ>
5. <https://www.youtube.com/watch?v=CZTkgMoqVss>
6. <https://www.youtube.com/watch?v=Hl4NZB1XR9c>
7. [https://www.youtube.com/watch?v=EGEwkad\\_lIA](https://www.youtube.com/watch?v=EGEwkad_lIA)
8. <https://www.youtube.com/watch?v=t5hsV9lC1rU>

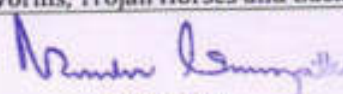
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Real world problem solving: Developing and demonstration of models / projects based on DBMS application

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VI Semester

INTRODUCTION TO CYBER SECURITY			
Course Code	21CS653	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b> CLO 1. To familiarize cybercrime terminologies and ACTs CLO 2. Understanding cybercrime in mobiles and wireless devices along with the tools for Cybercrime and prevention CLO 3. Understand the motive and causes for cybercrime, cybercriminals, and investigators CLO 4. Understanding criminal case and evidence, detection standing criminal case and evidence.			
<b>Teaching-Learning Process (General Instructions)</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to Cybercrime:</b> <b>Cybercrime:</b> Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, <b>Cybercrime:</b> The Legal Perspectives, <b>Cybercrimes:</b> An Indian Perspective, Cybercrime and the Indian ITA 2000. <b>Textbook1:Ch1 (1.1 to 1.8).</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning		
<b>Module-2</b>			
<b>Cyber offenses:</b> <b>How Criminals Plan Them:</b> Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cybercafe and Cybercrimes, <b>Botnets:</b> The Fuel for Cybercrime, Attack Vector <b>Textbook1: Ch2 (2.1 to 2.7).</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning		
<b>Module-3</b>			
<b>Tools and Methods Used in Cybercrime:</b> Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors,			

  
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Steganography, DoS and DDoS Attacks, Attacks on Wireless Networks.

**Textbook1: Ch4 (4.1 to 4.9, 4.12).**

**Teaching-Learning Process** Chalk and board, Case studies

**Module-4**

**Understanding the people on the scene:** Introduction, understanding cyber criminals, understanding cyber victims, understanding cyber investigators.

**The Computer Investigation process:** investigating computer crime.

**Understanding Cybercrime Prevention:** Understanding Network Security Concepts, Understanding Basic Cryptography Concepts, Making the Most of Hardware and Software Security

**Textbook 2:Ch3,Ch 4, Ch 7.**

**Teaching-Learning Process** Chalk& board, Case studies

**Module-5**

**Cybercrime Detection Techniques:** Security Auditing and Log Firewall Logs, Reports, Alarms, and Alerts, Commercial Intrusion Detection Systems, Understanding E-Mail Headers Tracing a Domain Name or IP Address.

**Collecting and preserving digital Evidence:** Introduction, understanding the role of evidence in a criminal case, collecting digital evidence, preserving digital evidence, recovering digital evidence, documenting evidence.

**TextBook 2:Ch 9, Ch 10.**

**Teaching-Learning Process** Chalk and board, Case studies

**Course Outcomes**

At the end of the course the student will be able to:

- CO 1. Describe the cyber crime terminologies
- CO 2. Analyze cybercrime in mobiles and wireless devices along with the tools for Cybercrime and prevention
- CO 3. Analyze the motive and causes for cybercrime, cybercriminals, and investigators
- CO 4. Apply the methods for understanding criminal case and evidence, detection standing criminal case and evidence.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

- 1. First test at the end of 5<sup>th</sup> week of the semester
- 2. Second test at the end of the 10<sup>th</sup> week of the semester
- 3. Third test at the end of the 15<sup>th</sup> week of the semester

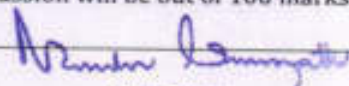
Two assignments each of **10 Marks**

- 4. First assignment at the end of 4<sup>th</sup> week of the semester
- 5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

- 6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

  
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(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).  
**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. SunitBelapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2013
2. Debra Little John Shinder and Michael Cross, "Scene of the cybercrime", 2nd edition, Syngress publishing Inc, Elsevier Inc, 2008

**Reference Books:**

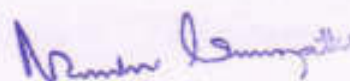
1. Robert M Slade, "Software Forensics", Tata McGraw Hill, New Delhi, 2005.
2. Bernadette H Schell, Clemens Martin, "Cybercrime", ABC - CLIO Inc, California, 2004.
3. Nelson Phillips and EinfingerSteuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi, 2009.
4. Kevin Mandia, Chris Prorise, Matt Pepe, "Incident Response and Computer Forensics", Tata McGraw -Hill, New Delhi, 2006.

**Weblinks and Video Lectures (e-Resources):**

1. <https://www.youtube.com/watch?v=czDzUP1HclQ>
2. <https://www.youtube.com/watch?v=qS4Viqnjkc8>
3. [https://www.trendmicro.com/en\\_nz/ciso/21/h/cybercrime-today-and-the-future.html](https://www.trendmicro.com/en_nz/ciso/21/h/cybercrime-today-and-the-future.html)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Real world problem solving: Demonstration of projects related to Cyber security.



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## VI Semester

PROGRAMMING IN JAVA			
Course Code	21CS654	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b> CLO 1. Learn fundamental features of object oriented language and JAVA. CLO 2. To create, debug and run simple Java programs. CLO 3. Learn object oriented concepts using programming examples. CLO 4. Study the concepts of importing of packages and exception handling mechanism. CLO 5. Discuss the String Handling examples with Object Oriented concepts.			
<b>Teaching-Learning Process (General Instructions)</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>An Overview of Java:</b> Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries.			
<b>Data Types, Variables, and Arrays:</b> Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings			
<b>Textbook 1:Ch 2,Ch 3.</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning.		
<b>Module-2</b>			
<b>Operators:</b> Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses,			
<b>Control Statements:</b> Java's Selection Statements, Iteration Statements, Jump Statements.			
<b>Textbook 1:Ch 4,Ch 5.</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<b>Introducing Classes:</b> Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class.			

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**A Closer Look at Methods and Classes:** Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited. **Inheritance:** Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding.

**Textbook 1: Ch 6, Ch 7.1-7.9, Ch 8.1-8.5**

<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
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**Module-4**

**Packages and Interfaces:** Packages, Access Protection, Importing Packages, Interfaces.

**Exception Handling:** Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions

**Textbook 1: Ch 9, Ch 10.**

<b>Teaching-Learning Process</b>	Chalk & board, Problem based learning, Demonstration
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**Module-5**

**Enumerations :** Enumerations, Type Wrappers.

**String Handling:** The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer, StringBuilder.

**Textbook 1: Ch 12.1, 12.2, Ch 15.**

<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
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**Course Outcomes**

At the end of the course the student will be able to:

- CO 1. Develop JAVA programs using OOP principles and proper program structuring.
- CO 2. Develop JAVA program using packages, inheritance and interface.
- CO 3. Develop JAVA programs to implement error handling techniques using exception handling
- CO 4. Demonstrate string handling concepts using JAVA.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

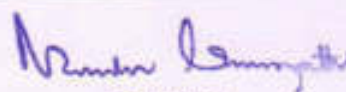
4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).



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**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 2, 3, 4, 5, 6,7, 8, 9,10, 12,15)

**Reference Books:**

1. Mahesh Bhawe and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806.
2. Rajkumar Buyya,SThamarasisevi, xingchen chu, Object oriented Programming with java, Tata McGraw Hill education private limited.
3. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies.
4. Anita Seth and B L Juneja, JAVA One step Ahead, Oxford University Press, 2017.

**Weblinks and Video Lectures (e-Resources):**

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Real world problem solving: Demonstration of projects developed using JAVA

  
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VI Semester

COMPUTER GRAPHICS AND IMAGE PROCESSING LABORATORY			
Course Code	21CSL66	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	24	Total Marks	100
Credits	1	Exam Hours	03
<b>Course Objectives:</b>			
CLO 1: Demonstrate the use of Open GL.			
CLO 2: Demonstrate the different geometric object drawing using OpenGL.			
CLO 3: Demonstration of 2D/3D transformation on simple objects.			
CLO 4: Demonstration of lighting effects on the created objects.			
CLO 5: Demonstration of Image processing operations on image/s.			
<b>Practise Programs</b>			
Sl. No.	<ul style="list-style-type: none"> <li>• Installation of OpenGL /OpenCV/ Python and required headers</li> <li>• Simple programs using OpenGL (Drawing simple geometric object like line, circle, rectangle, square)</li> <li>• Simple programs using OpenCV (operation on an image/s)</li> </ul>		
<b>PART A</b>			
<i>List of problems for which student should develop program and execute in the Laboratory using OpenGL/openCV/ Python</i>			
1.	Develop a program to draw a line using Bresenham's line drawing technique		
2.	Develop a program to demonstrate basic geometric operations on the 2D object		
3.	Develop a program to demonstrate basic geometric operations on the 3D object		
4.	Develop a program to demonstrate 2D transformation on basic objects		
5.	Develop a program to demonstrate 3D transformation on 3D objects		
6.	Develop a program to demonstrate Animation effects on simple objects.		
7.	Write a Program to read a digital image. Split and display image into 4 quadrants, up, down, right and left.		
8.	Write a program to show rotation, scaling, and translation on an image.		
9.	Read an image and extract and display low-level features such as edges, textures using filtering techniques.		
10.	Write a program to blur and smoothing an image.		
11.	Write a program to contour an image.		
12.	Write a program to detect a face/s in an image.		
<b>PART B</b>			
<b>Practical Based Learning</b>			
Student should develop a mini project and it should be demonstrate in the laboratory examination, Some of the projects are listed and it is not limited to:			
<ul style="list-style-type: none"> <li>➤ Recognition of License Plate through Image Processing</li> <li>➤ Recognition of Face Emotion in Real-Time</li> <li>➤ Detection of Drowsy Driver in Real-Time</li> <li>➤ Recognition of Handwriting by Image Processing</li> <li>➤ Detection of Kidney Stone</li> <li>➤ Verification of Signature</li> <li>➤ Compression of Color Image</li> <li>➤ Classification of Image Category</li> <li>➤ Detection of Skin Cancer</li> <li>➤ Marking System of Attendance using Image Processing</li> <li>➤ Detection of Liver Tumor</li> <li>➤ IRIS Segmentation</li> <li>➤ Detection of Skin Disease and / or Plant Disease</li> <li>➤ Biometric Sensing System .</li> <li>➤ Projects which helps to formers to understand the present developments in agriculture.</li> </ul>			

*Principals Signature*

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- Projects which helps high school/college students to understand the scientific problems.
- Simulation projects which helps to understand innovations in science and technology

#### Course Outcome (Course Skill Set)

At the end of the course the student will be able to:

- CO 1: Use OpenGL /OpenCV for the development of mini Projects.
- CO 2: Analyze the necessity mathematics and design required to demonstrate basic geometric transformation techniques.
- CO 3: Demonstrate the ability to design and develop input interactive techniques.
- CO 4: Apply the concepts to Develop user friendly applications using Graphics and IP concepts.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).

#### Continuous Internal Evaluation (CIE):

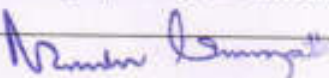
CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).  
The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

#### Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

  
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2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.  
The students have to answer 5 full questions, selecting one full question from each module

**Textbooks**

1. Introducing Data Science, Davy Cielen, Arno D. B. Meysman and Mohamed Ali, Manning Publications, 2016.

**Reference Books**

1. Doing Data Science, Straight Talk from the Frontline, Cathy O'Neil, Rachel Schutt, O' Reilly, 1st edition, 2013.
2. Mining of Massive Datasets, Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman, Cambridge University Press, 2nd edition, 2014
3. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013
4. Think Like a Data Scientist, Brian Godsey, Manning Publications, 2017.

**Weblinks and Video Lectures (e-Resources):**

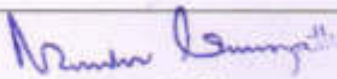
1. <https://www.simplilearn.com/tutorials/data-science-tutorial/what-is-data-science>
2. <https://www.youtube.com/watch?v=N6BghzuFLlg>
3. <https://www.coursera.org/lecture/what-is-datascience/fundamentals-of-data-science-tPgFU>
4. <https://www.youtube.com/watch?v=ua-CiDNNj30>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Real world problem solving using Data science techniques and demonstration of data visualization methods with the help of suitable project.

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20/11/2024

<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, PPT Based presentation, Video
<b>Module-4</b>	
<b>VISUALIZATION</b> -Introduction to data visualization – Data visualization options – Filters – MapReduce – Dashboard development tools.	
<b>Textbook 1: Ch 9</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, PPT Based presentation, MOOC
<b>Module-5</b>	
<b>CASE STUDIES</b> Distributing data storage and processing with frameworks - Case study: e.g. Assessing risk when lending money.	
<b>Textbook 1: Ch 5.1, 5.2</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, PPT Based presentation, Video
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Describe the data science terminologies	
CO 2. Apply the Data Science process on real time scenario.	
CO 3. Analyze data visualization tools	
CO 4. Apply Data storage and processing with frameworks	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
6. At the end of the 13 <sup>th</sup> week of the semester	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	
<b>CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b>	
<b>Semester End Examination:</b>	
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject ( <b>duration 03 hours</b> )	
1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks	

  
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## VII Semester

<b>INTRODUCTION TO DATA SCIENCE</b>			
Course Code	21CS754	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. To provide a foundation in data Science terminologies</p> <p>CLO 2. To familiarize data science process and steps</p> <p>CLO 3. To Demonstrate the data visualization tools</p> <p>CLO 4. To analyze the data science applicability in real time applications.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>PREPARING AND GATHERING DATA AND KNOWLEDGE</b>			
<p>Philosophies of data science - Data science in a big data world - Benefits and uses of data science and big data - facts of data: Structured data, Unstructured data, Natural Language, Machine generated data, Audio, Image and video streaming data - The Big data Eco system: Distributed file system, Distributed Programming framework, Data Integration frame work, Machine learning Framework, NoSQL Databases, Scheduling tools, Benchmarking Tools, System Deployment, Service programming and Security.</p>			
<b>Textbook 1: Ch 1.1 to 1.4</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, PPT Based presentation		
<b>Module-2</b>			
<b>THE DATA SCIENCE PROCESS</b> -Overview of the data science process- defining research goals and creating project charter, retrieving data, cleansing, integrating and transforming data, exploratory data analysis, Build the models, presenting findings and building application on top of them.			
<b>Textbook 1;Ch 2</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, PPT Based presentation		
<b>Module-3</b>			
<b>MACHINE LEARNING:</b> Application for machine learning in data science- Tools used in machine learning- Modeling Process - Training model - Validating model - Predicting new observations -Types of machine learning Algorithm : Supervised learning algorithms, Unsupervised learning algorithms.			
<b>Textbook 1: Ch 3.1 to 3.3</b>			

  
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2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Textbooks**

1. Douglas Eadline, "Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem", 1<sup>st</sup> Edition, Pearson Education, 2016.
2. Anil Maheshwari, "Data Analytics", 1<sup>st</sup> Edition, McGraw Hill Education, 2017

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/104/106104189/>
2. <https://www.youtube.com/watch?v=mNP44rZYIAU>
3. [https://www.youtube.com/watch?v=qr\\_awo5yz0g](https://www.youtube.com/watch?v=qr_awo5yz0g)
4. <https://www.youtube.com/watch?v=rr17cbPGWGA>
5. <https://www.youtube.com/watch?v=G4NYQox4n2g>
6. <https://www.youtube.com/watch?v=ow17zxGqNY0>
7. <https://www.youtube.com/watch?v=FujVLSZYkuE>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Real world problem solving: Demonstration of Big Data related projects

Exploring the applications which involves big data.

  
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**Decision Trees:** Introduction, Decision Tree Problem, Decision Tree Constructions, Lessons from Construction Trees. Decision Tree Algorithm

**Regressions:** Introduction, Correlations and Relationships, Non-Linear Regression, Logistic Regression, Advantages and disadvantages.

**Textbook 2: Chapter 6,7**

<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning
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**Module-5**

**Text Mining:** Introduction, Text Mining Applications, Text Mining Process, Term Document Matrix, Mining the TDM, Comparison, Best Practices

**Web Mining:** Introduction, Web Content Mining, Web Structured Mining, Web Usage Mining, Web Mining Algorithms.

**Textbook 2: Chapter 11,14**

<b>Teaching-Learning Process</b>	Chalk and board, MOOC
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**Suggested Course Outcomes**

At the end of the course the students will be able to:

- CO 1. Master the concepts of HDFS and MapReduce framework.
- CO 2. Investigate Hadoop related tools for Big Data Analytics and perform basic
- CO 3. Infer the importance of core data mining techniques for data analytics
- CO 4. Use Machine Learning algorithms for real world big data.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

- 1. First test at the end of 5<sup>th</sup> week of the semester
- 2. Second test at the end of the 10<sup>th</sup> week of the semester
- 3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

- 4. First assignment at the end of 4<sup>th</sup> week of the semester
- 5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

- 6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

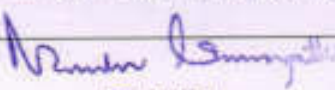
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- 1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks

  
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## VII Semester

<b>INTRODUCTION TO BIG DATA</b>			
Course Code	21CS753	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Understand Hadoop Distributed File system and examine MapReduce Programming</p> <p>CLO 2. Explore Hadoop tools and manage Hadoop with Sqoop</p> <p>CLO 3. Appraise the role of data mining and its applications across industries</p> <p>CLO 4. Identify various Text Mining techniques</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Hadoop Distributed file system:</b> HDFS Design, Features, HDFS Components, HDFS user commands  <b>Hadoop MapReduce Framework:</b> The MapReduce Model, Map-reduce Parallel Data Flow, Map Reduce Programming</p>			
<b>Textbook 1: Chapter 3,5,6,8hr</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<p><b>Essential Hadoop Tools:</b> Using apache Pig, Using Apache Hive, Using Apache Sqoop, Using Apache Apache Flume, Apache H Base</p>			
<b>Textbook 1: Chapter 7,8hr</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<p><b>Data Warehousing:</b> Introduction, Design Consideration, DW Development Approaches, DW Architectures</p> <p><b>Data Mining:</b> Introduction, Gathering, and Selection, data cleaning and preparation, outputs of Data Mining, Data Mining Techniques</p>			
<b>Textbook 2: Chapter 4,5</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration		
<b>Module-4</b>			

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Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Textbooks**

1. Stuart Russel, Peter Norvig: "Artificial Intelligence A Modern Approach", 3<sup>rd</sup> Edition, Pearson Education, 2015.
2. S. Sridhar, M Vijayalakshmi "Machine Learning". Oxford ,2021

**REFERENCE BOOKS:**

1. Elaine Rich, Kevin Knight: "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009, ISBN-10: 0070087709
2. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, 1980, ISBN: 978-3-540-11340-9.

**Weblinks and Video Lectures (e-Resources):**

<http://stpk.cs.rtu.lv/sites/all/files/stpk/materiali/MI/Artificial%20Intelligence%20A%20Modern%20Approach.pdf>

1. [http://www.getfreebooks.com/16-sites-with-free-artificial-intelligence-e-books/https://www.tutorialspoint.com/artificial\\_intelligence/artificial\\_intelligence\\_overview.htm](http://www.getfreebooks.com/16-sites-with-free-artificial-intelligence-e-books/https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_overview.htm)
2. Problem solving agent: <https://www.youtube.com/watch?v=KTPmo-KsOis>.
3. [https://www.youtube.com/watch?v=X\\_Qt0U66aH0&list=PLwdnzlV3ogoXaceHrrFVZCjKbm\\_laSHcl](https://www.youtube.com/watch?v=X_Qt0U66aH0&list=PLwdnzlV3ogoXaceHrrFVZCjKbm_laSHcl)
4. <https://www.javatpoint.com/history-of-artificial-intelligence>
5. <https://www.tutorialandexample.com/problem-solving-in-artificial-intelligence>
6. <https://techvidvan.com/tutorials/ai-heuristic-search/>
7. <https://www.analyticsvidhya.com/machine-learning/>
8. <https://www.hackerearth.com/practice/machine-learning/machine-learning-algorithms/ml-decision-tree/tutorial/>
9. <https://www.javatpoint.com/unsupervised-artificial-neural-networks>

**Activity Based Learning (Suggested Activities In Class)/ Practical Based learning**

Real world problem solving: Demonstration of projects related to AI and ML.

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**Understanding Data**

Bivariate and Multivariate data, Multivariate statistics, Essential mathematics for Multivariate data, Overview hypothesis, Feature engineering and dimensionality reduction techniques.

**Basics of Learning Theory:** Introduction to learning and its types, Introduction computation learning theory, Design of learning system, Introduction concept learning.

**Similarity-based learning:** Introduction to Similarity or instance based learning, Nearest-neighbour learning, weighted k- Nearest - Neighbour algorithm.

**Textbook 2: Chapter: 2.6 to 2.10, 3.1 to 3.4, 4.1 to 4.3**

<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning
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**Module-5**

**Artificial Neural Network:** Introduction, Biological neurons, Artificial neurons, Perceptron and learning theory, types of Artificial neural Network, learning in multilayer Perceptron, Radial basis function neural network, self-organizing feature map,

**Textbook 2: Chapter: 10**

<b>Teaching-Learning Process</b>	Chalk and board, MOOC
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**Course Outcomes**

At the end of the course the student will be able to:

- CO 1. Design intelligent agents for solving simple gaming problems.
- CO 2. Have a good understanding of machine learning in relation to other fields and fundamental issues and Challenges of machine learning
- CO 3. Understand data and applying machine learning algorithms to predict the outputs.
- CO 4. Model the neuron and Neural Network, and to analyze ANN learning and its applications.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

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## VII Semester

<b>INTRODUCTION TO AI AND ML</b>			
Course Code	21CS752	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
CLO1. Understands the basics of AI, history of AI and its foundations, basic principles of AI for problem solving			
CLO2. Explore the basics of Machine Learning & Machine Learning process, understanding data			
CLO3. Understand the Working of Artificial Neural Networks			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction:</b> What is AI, The foundation of Artificial Intelligence, The history of Artificial Intelligence, Intelligent Agents: Agents and Environments, Good Behaviour: The concept of rationality, the nature of Environments, the structure of Agents.			
<b>Textbook 1: Chapter: 1 and 2</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<b>Problem solving by searching:</b> Problem solving agents, Example problems, Searching for solutions, Uniformed search strategies, Informed search strategies, Heuristic functions			
<b>Textbook 1: Chapter: 3</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<b>Introduction to machine learning:</b> Need for Machine Learning, Machine Learning Explained, and Machine Learning in relation to other fields, Types of Machine Learning, Challenges of Machine Learning, Machine Learning process, Machine Learning applications.			
<b>Understanding Data:</b> What is data, types of data, Big data analytics and types of analytics, Big data analytics framework, Descriptive statistics, univariate data analysis and visualization			
<b>Textbook 2: Chapter: 1 and 2.1 to 2.5</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration		
<b>Module-4</b>			

  
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(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).  
**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Textbooks**

1. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, CreateSpace Independent Publishing Platform, 2016.  
[http://do1.dr-chuck.com/pythonlearn/EN\\_us/pythonlearn.pdf](http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf)
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (Chapters 15, 16, 17)  
<http://greenteapress.com/thinkpython2/thinkpython2.pdf>

**REFERENCE BOOKS:**

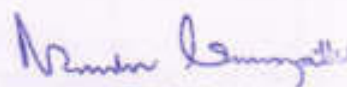
1. R. Nageswara Rao, "Core Python Programming", dreamtech
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
3. Python Programming, Reema theraja, OXFORD publication

**Weblinks and Video Lectures (e-Resources):**

1. <https://www.w3resource.com/python/python-tutorial.php>
2. <https://data-flair.training/blogs/python-tutorials-home/>
3. <https://www.youtube.com/watch?v=c235EsGFcZs>
4. <https://www.youtube.com/watch?v=v4e6oMRS2QA>
5. <https://www.youtube.com/watch?v=Uh2ebFW8OYM>
6. <https://www.youtube.com/watch?v=oSPMmeaiQ68>
7. <https://www.youtube.com/watch?v=uQrj0TkZlc>
8. <https://www.youtube.com/watch?v=K8L6KVGG-7o>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Real world problem solving: Demonstration of projects developed using python language



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Strings: strings, length of string, string slices, immutability, multiline comments, string functions and methods;

Textbook 1: Chapter 6

Textbook 2: Chapter 3

Teaching-Learning Process Chalk and board, Active Learning, Demonstration

#### Module-4

**LISTS, TUPLES, DICTIONARIES:08 Hours**

**Lists:**List operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, listparameters, list comprehension;

**Tuples:** tuple assignment, tuple as return value, tuple comprehension;

**Dictionaries:** operations and methods, comprehension;

Textbook 2: Chapter 10,11,12

Teaching-Learning Process Chalk& board, Active Learning

#### Module-5

**REGULAR EXPRESSIONS,FILES AND EXCEPTION:**

**Regular expressions:**Character matching in regular expressions, extracting data using regular expressions, Escape character

**Files and exception:** Text files, reading and writing files, command line arguments, errors andexceptions, handling exceptions, modules.

Textbook 1: Chapter 11.1,11.2,11.4

Textbook 2: Chapter 14

Teaching-Learning Process Chalk and board, MOOC

**Suggested Course Outcomes**

At the end of the course the student will be able to:

- CO 1. Understand Python syntax and semantics and be fluent in the use of Python flow control and functions.
- CO 2. Demonstrate proficiency in handling Strings and File Systems.
- CO 3. Represent compound data using Python lists, tuples, Strings, dictionaries.
- CO 4. Read and write data from/to files in Python Programs

**Assessment Details (both CIE and SEE)**

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**Continuous Internal Evaluation:**

Three Unit Tests each of 20 Marks (duration 01 hour)

- 1. First test at the end of 5<sup>th</sup> week of the semester
- 2. Second test at the end of the 10<sup>th</sup> week of the semester
- 3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of 10 Marks

- 4. First assignment at the end of 4<sup>th</sup> week of the semester
- 5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

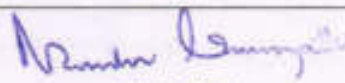
- 6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be scaled down to 50 marks

  
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## VII Semester

PROGRAMMING IN PYTHON			
Course Code	21CS751	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. To understand why Python is a useful scripting language for developers</p> <p>CLO 2. To read and write simple Python programs</p> <p>CLO 3. To learn how to identify Python object types.</p> <p>CLO 4. To learn how to write functions and pass arguments in Python.</p> <p>CLO 5. To use Python data structures -- lists, tuples, dictionaries.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>INTRODUCTION DATA, EXPRESSIONS, STATEMENTS:08 Hours</b>			
Introduction: Creativity and motivation, understanding programming, Terminology: Interpreter and compiler, Running Python, The First Program; Data types: Int, float, Boolean, string, and list, variables, expressions, statements, Operators and operands.			
Textbook 1: Chapter 1.1,1.2,1.3,1.6, Chapter 2.1-2.6			
Textbook 2: Chapter 1			
Teaching-Learning Process	Chalk and board, Active Learning		
<b>Module-2</b>			
<b>CONTROL FLOW, LOOPS:</b>			
Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: while, for, break, continue, pass statement.			
Textbook 1: Chapter 3.1-3.6, chapter 5			
Teaching-Learning Process	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<b>FUNCTIONS AND STRINGS:</b>			
Functions: Function calls, adding new functions, definition and uses, local and global scope, return values.			

  
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Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson Addison Wesley, 2012

**Reference Books**

1. Dan Sullivan, "NoSQL For Mere Mortals", 1st Edition, Pearson Education India, 2015. (ISBN-13: 978-9332557338)
2. Dan McCreary and Ann Kelly, "Making Sense of NoSQL: A guide for Managers and the Rest of us", 1st Edition, Manning Publication/Dreamtech Press, 2013. (ISBN-13: 978-9351192022)
3. Kristina Chodorow, "MongoDB: The Definitive Guide- Powerful and Scalable Data Storage", 2nd Edition, O'Reilly Publications, 2013. (ISBN-13: 978-9351102694)

**Weblinks and Video Lectures (e-Resources):**

1. <https://www.geeksforgeeks.org/introduction-to-nosql/> ( and related links in the page)
2. <https://www.youtube.com/watch?v=0buKQHokLK8> (How do NoSQL databases work? Simply explained)
3. [https://www.techtarget.com/searchdatamanagement/definition/NoSQL-Not-Only-SQL\\_\(What\\_is\\_NoSQL\\_and\\_How\\_do\\_NoSQL\\_databases\\_work\)](https://www.techtarget.com/searchdatamanagement/definition/NoSQL-Not-Only-SQL_(What_is_NoSQL_and_How_do_NoSQL_databases_work))
4. <https://www.mongodb.com/nosql-explained> (What is NoSQL)
5. <https://onlinecourses.nptel.ac.in/noc20-cs92/preview> (preview of Bigdata course contains NoSQL)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Real world problem solving using group discussion.

  
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Consistency, Update Consistency, Read Consistency, Relaxing Consistency, The CAP Theorem, Relaxing Durability, Quorums.

Version Stamps, Business and System Transactions, Version Stamps on Multiple Nodes

**Textbook1: Chapter 4,5,6**

**Teaching-Learning Process** | Active Learning and Demonstrations

**Module-3**

Map-Reduce, Basic Map-Reduce, Partitioning and Combining, Composing Map-Reduce Calculations, A Two Stage Map-Reduce Example, Incremental Map-Reduce

Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preference, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets

**Textbook1: Chapter 7,8**

**Teaching-Learning Process** | Active Learning, Problem solving based

**Module-4**

Document Databases, What Is a Document Database?, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, E- Commerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure

**Textbook1: Chapter 9**

**Teaching-Learning Process** | Active learning

**Module-5**

Graph Databases, What Is a Graph Database?, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use.

**Textbook1: Chapter 11**

**Teaching-Learning Process** | Active learning

**Course Outcomes (Course Skill Set)**

At the end of the course the student will be able to:

CO1. Demonstrate an understanding of the detailed architecture of Column Oriented NoSQL databases, Document databases, Graph databases.

CO2. Use the concepts pertaining to all the types of databases.

CO3. Analyze the structural Models of NoSQL.

CO4. Develop various applications using NoSQL databases.

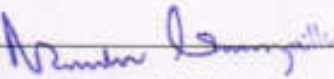
**Assessment Details (both CIE and SEE)**

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**Continuous Internal Evaluation:**

Three Unit Tests each of 20 Marks (duration 01 hour)

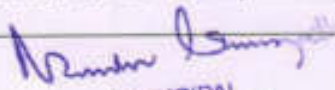
1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

  
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## VII Semester

NOSQL DATABASE			
Course Code:	21CS745	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Objectives:</b>			
<p>CLO 1. Recognize and Describe the four types of NoSQL Databases, the Document-oriented, Key-Value, Column-oriented and Graph databases useful for diverse applications.</p> <p>CLO 2. Pairs, Column-oriented and Graph databases useful for diverse applications.</p> <p>CLO 3. Apply performance tuning on Column-oriented NoSQL databases and Document-oriented NoSQL Databases.</p> <p>CLO 4. Differentiate the detailed architecture of column oriented NoSQL database, Document database and Graph Database and relate usage of processor, memory, storage and file system commands.</p> <p>CLO 5. Evaluate several applications for location based service and recommendation services. Devise an application using the components of NoSQL.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer methods (L) need not to be only traditional lecture methods, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p>Why NoSQL? The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, A (Mostly) Standard Model, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL.</p> <p>Aggregate Data Models; Aggregates, Example of Relations and Aggregates, Consequences of Aggregate Orientation, Key-Value and Document Data Models, Column-Family Stores, Summarizing Aggregate-Oriented Databases.</p> <p>More Details on Data Models; Relationships, Graph Databases, Schemaless Databases, Materialized Views, Modeling for Data Access,</p> <p><b>Textbook1: Chapter 1,2,3</b></p>			
<b>Teaching-Learning Process</b>	Active learning		
<b>Module-2</b>			
<p>Distribution Models; Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.</p>			

  
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The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Tom Taulli , The Robotic Process Automation Handbook : A Guide to Implementing RPA Systems, 2020, ISBN-13 (electronic): 978-1-4842-5729-6, Publisher : Apress
2. Alok Mani Tripathi, Learning Robotic Process Automation, Publisher: Packt Publishing Release Date: March 2018 ISBN: 9781788470940

**Reference:**

1. Frank Casale, Rebecca Dilla, Heidi Jaynes, Lauren Livingston, "Introduction to Robotic Process Automation: a Primer", Institute of Robotic Process Automation.
2. Richard Murdoch, Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become An RPA Consultant
3. Srikanth Merianda, Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA and Intelligent Automation

**Weblinks and Video Lectures (e-Resources):**

- <https://www.uipath.com/rpa/robotic-process-automation>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

  
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**Sequence, Flowchart, and Control Flow**-Sequencing the workflow-Activities-Control flow, various types of loops, and decision making-Step-by-step example using Sequence and Flowchart-Step-by-step example using Sequence and Control flow-Data Manipulation-Variables and Scope-Collections-Arguments - Purpose and use-Data table usage with examples-Clipboard management-File operation with step-by-step example-CSV/Excel to data table and vice versa (with a step-by-step example).

**Textbook 2: Ch 3, Ch 4**

<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
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**Module-4**

**Taking Control of the Controls**- Finding and attaching windows- Finding the control- Techniques for waiting for a control- Act on controls - mouse and keyboard activities- Working with UiExplorer- Handling events- Revisit recorder- Screen Scraping- When to use OCR- Types of OCR available- How to use OCR- Avoiding typical failure points.

**Textbook 2: Ch 5**

<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning
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**Module-5**

Exception Handling, Debugging, and Logging- Exception handling- Common exceptions and ways to handle them- Logging and taking screensHOT- Debugging techniques- Collecting crash dumps- Error reporting- Future of RPA

**Textbook 2: Ch 8**  
**Textbook 1: Ch 13**

<b>Teaching-Learning Process</b>	Chalk and board, MOOC
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**Course Outcomes**

- CO 1. To Understand the basic concepts of RPA
- CO 2. To Describe various components and platforms of RPA
- CO 3. To Describe the different types of variables, control flow and data manipulation techniques
- CO 4. To Understand various control techniques and OCR in RPA
- CO 5. To Describe various types and strategies to handle exceptions

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz - any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

  
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**VII Semester**

<b>ROBOTIC PROCESS AUTOMATION DESIGN AND DEVELOPMENT</b>			
Course Code	21CS744	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
<b>Course Learning Objectives</b>			
<p>CLO 1. To understand basic concepts of RPA            CLO 2. To Describe RPA, where it can be applied and how its implemented            CLO 3. To Describe the different types of variables, Control Flow and data manipulation techniques            CLO 4. To Understand Image, Text and Data Tables Automation            CLO 5. To Describe various types of Exceptions and strategies to handle</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>RPA Foundations-</b> What is RPA - Flavors of RPA- History of RPA- The Benefits of RPA- The downsides of RPA- RPA Compared to BPO, BPM and BPA – Consumer Willingness for Automation- The Workforce of the Future- RPA Skills-On-Premise Vs. the Cloud- Web Technology- Programming Languages and Low Code- OCR-Databases-APIs- AI-Cognitive Automation-Agile, Scrum, Kanban and Waterfall0 DevOps- Flowcharts.</p>			
<b>Textbook 1: Ch 1, Ch 2</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<p><b>RPA Platforms-</b> Components of RPA- RPA Platforms-About Ui Path- About UiPath - The future of automation - Record and Play - Downloading and installing UiPath Studio -Learning Ui Path Studio- - Task recorder - Step-by-step examples using the recorder.</p>			
<b>Textbook 2: Ch 1, Ch 2</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			

  
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 Mrs. Jyotsna Kulkarni

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2016.

**Reference:**

1. Bengio, Yoshua. "Learning deep architectures for AI." Foundations and trends in Machine Learning, 2009.
2. N.D.Lewis, "Deep Learning Made Easy with R: A Gentle Introduction for Data Science", January 2016.
3. Nikhil Buduma, "Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms", O'Reilly publications.

**Weblinks and Video Lectures (e-Resources):**

- <https://faculty.iitmandi.ac.in/~aditya/cs671/index.html>
- <https://nptel.ac.in/courses/106/106/106106184/>
- <https://www.youtube.com/watch?v=7x2YZhEj9Dw>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

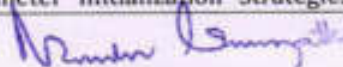
*Nandini Singh*  
ppin10aj  
Syll. 2020-21

Algorithms with Adaptive Learning Rates: The AdaGrad algorithm, The RMSProp algorithm, Choosing the Right Optimization Algorithm.	
<b>Textbook 1: Chapter: 8.1-8.5</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-4</b>	
<b>Convolutional Networks:</b> The Convolution Operation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features- LeNet, AlexNet.	
<b>Textbook 1: Chapter: 9.1-9.9.</b>	
<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning
<b>Module-5</b>	
<b>Recurrent and Recursive Neural Networks:</b> Unfolding Computational Graphs, Recurrent Neural Network, Bidirectional RNNs, Deep Recurrent Networks, Recursive Neural Networks, The Long Short-Term Memory and Other Gated RNNs.	
<b>Applications:</b> Large-Scale Deep Learning, Computer, Speech Recognition, Natural Language Processing and Other Applications.	
<b>Textbook 1: Chapter: 10.1-10.3, 10.5, 10.6, 10.10, 12.</b>	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC
<b>Course Outcomes</b>	
CO1: Understand the fundamental issues and challenges of deep learning data, model selection, model complexity etc.,	
CO2: Describe various knowledge on deep learning and algorithms	
CO3: Apply CNN and RNN model for real time applications	
CO4: Identify various challenges involved in designing and implementing deep learning algorithms.	
CO5: Relate the deep learning algorithms for the given types of learning tasks in varied domain	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
6. At the end of the 13 <sup>th</sup> week of the semester	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	

  
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## VII Semester

DEEP LEARNING			
Course Code	21CS743	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
<b>Course Learning Objectives</b>			
<p>CLO 1. Understand the fundamentals of deep learning.</p> <p>CLO 2. Know the theory behind Convolutional Neural Networks, Autoencoders, RNN.</p> <p>CLO 3. Illustrate the strength and weaknesses of many popular deep learning approaches.</p> <p>CLO 4. Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems.</p> <p>CLO 5. Learn the open issues in deep learning, and have a grasp of the current research directions.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to Deep Learning:</b> Introduction, Deep learning Model, Historical Trends in Deep Learning.			
<b>Machine Learning Basics:</b> Learning Algorithms, Supervised Learning Algorithms, Unsupervised Learning Algorithms.			
<b>Textbook 1: Chapter1 - 1.1, 1.2, 5.1,5.7-5.8.</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<b>Feedforward Networks:</b> Introduction to feedforward neural networks, Gradient-Based Learning, Back-Propagation and Other Differentiation Algorithms. <b>Regularization for Deep Learning.</b>			
<b>Textbook 1: Chapter 6, 7</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<b>Optimization for Training Deep Models:</b> Empirical Risk Minimization, Challenges in Neural Network Optimization, Basic Algorithms: Stochastic Gradient Descent, Parameter Initialization Strategies,			

  
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Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Fundamentals of Multiagent Systems by Jos'e M. Vidal, 2006, available online  
<http://mvidal.cse.sc.edu/papers/mas.pdf>.
2. Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations, By YoavShoham, Kevin Leyton-Brown, Cambridge University Press, 2008, 2<sup>nd</sup>ed  
<http://www.masfoundations.org/mas.pdf>

**Reference:**

1. Multiagent Systems : A Modern Approach to Distributed Artificial Intelligence Gerhard Weiss The MIT Press 2000

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/105/106105077/>
2. <https://www.youtube.com/watch?v=O2su1u2AXG0>.
3. <https://www.coursera.org/lecture/modeling-simulation-natural-processes/multi-agent-systems-kAKyC>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

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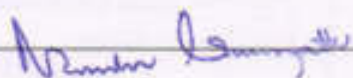


<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. PPT – Cooperative learning, Collective intelligence</li> <li>2. Demonstration of stochastic games</li> </ol>
<b>Module-4: Negotiation</b>	
<p>The Bargaining Problem, Monotonic Concession Protocol, Negotiation as Distributed Search, Ad-hoc Negotiation Strategies, The Task Allocation Problem.</p> <p><b>Protocols for Multiagent Resource Allocation: Auctions:</b> Simple Auctions, Combinatorial Auctions</p> <p><b>Textbook 1: Chapters 6&amp;7,</b> <b>Textbook 2: Chapter 11</b></p>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. PPT – Bargaining problems</li> <li>2. Demonstration of different auctions for resource allocation</li> </ol>
<b>Module-5: Voting and Mechanism Design</b>	
<p>The Voting Problem, Mechanism Design. <b>Nature-Inspired Approaches:</b> Ants and Termites, Immune System</p> <p><b>Textbook 1: Chapters 8&amp;10,</b> <b>Textbook 2: Chapter 10</b></p>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. PPT – Voting Problem</li> <li>2. Demonstration of nature inspired Approaches</li> </ol>
<b>Course Outcomes</b>	
<p>At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>CO 1. Demonstrate the decision process with different constraints</li> <li>CO 2. Analyze games in different forms</li> <li>CO 3. Apply the cooperative learning in developing games</li> <li>CO 4. Analyze different negotiation strategies of Multi-Agent System</li> <li>CO 5. Design and develop solutions for voting problems</li> </ul>	
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together</p> <p><b>Continuous Internal Evaluation:</b></p> <p>Three Unit Tests each of <b>20 Marks (duration 01 hour)</b></p> <ol style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol> <p>Two assignments each of <b>10 Marks</b></p> <ol style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol> <p>Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b></p> <ol style="list-style-type: none"> <li>6. At the end of the 13<sup>th</sup> week of the semester</li> </ol> <p>The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b></p> <p>(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).</p> <p><b>CIE methods /question papers are designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p>	

  
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**VII Semester**

<b>MULTIAGENT SYSTEMS</b>			
Course Code	21CS742	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. To introduce the concept of a multi agent systems and Distributed Constraints            CLO 2. Explore the main issues surrounding the computer and extended form games.            CLO 3. Develop cooperative learning, stochastic games            CLO 4. Exhibit the awareness about protocols about multi agent resource allocation and auctions            CLO 5. Construct voting mechanism design.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1: Multiagent Problem Formulation</b>			
Utility, Markov Decision Processes, Planning <b>Distributed Constraints:</b> Distributed Constraint Satisfaction, Distributed Constraint Optimization  <b>Textbook 1: Chapters 1 &amp;2, Textbook 2: Chapter 1</b>			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>PPT – Decision Processes, Planning</li> <li>Demonstration of constraints and their optimization</li> </ol>		
<b>Module-2: Standard and Extended Form Games</b>			
Games in Normal Form, Games in Extended Form, Self-interested agents, Characteristic Form Games, Coalition Formation  <b>Textbook 1: Chapters 3 &amp; 4, Textbook 2: Chapter 3</b>			
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>PPT – Games in different forms</li> <li>Demonstration of coalition formation</li> </ol>		
<b>Module-3: Learning in Multiagent Systems</b>			
The Machine Learning Problem, Cooperative Learning, Repeated Games, Stochastic Games, General Theories for Learning Agents, Collective Intelligence  <b>Textbook 1: Chapters 5</b>			

  
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**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

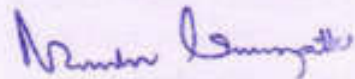
The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:****Textbooks**

1. Brahma Dathan, Sarnath Rammath, Object-oriented analysis, design and implementation, Universities Press, 2013
2. Erich Gamma, Richard Helan, Ralph Johman, John Vlissides, Design Patterns, Pearson Publication, 2013.

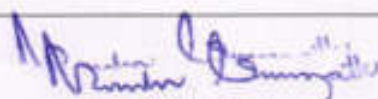
**Reference:**

1. Frank Bachmann, Regine Meunier, Hans Rohnert "Pattern Oriented Software Architecture" -Volume 1, 1996.
2. William J Brown et al., "Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis", John Wiley, 1998.

**Weblinks and Video Lectures (e-Resources):****Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

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<b>Textbook 2: chapter 5</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-4</b>	
<b>Interactive systems and the MVC architecture:</b> Introduction, The MVC architectural pattern, analyzing a simple drawing program, designing the system, designing of the subsystems, getting into implementation, implementing undo operation, drawing incomplete items, adding a new feature, pattern-based solutions.	
<b>Textbook 1: Chapter 11</b>	
<b>Teaching-Learning Process</b>	Chalk & board, Problem based learning
<b>Module-5</b>	
<b>Designing with Distributed Objects:</b> Client server system, java remote method invocation, implementing an object-oriented system on the web (discussions and further reading) a note on input and output, selection statements, loops arrays.	
<b>Textbook 1: Chapter 12</b>	
<b>Teaching-Learning Process</b>	Chalk and board
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Design and implement codes with higher performance and lower complexity	
CO 2. Be aware of code qualities needed to keep code flexible	
CO 3. Experience core design principles and be able to assess the quality of a design with respect to these principles.	
CO 4. Capable of applying these principles in the design of object oriented systems.	
CO 5. Demonstrate an understanding of a range of design patterns. Be capable of comprehending a design presented using this vocabulary.	
CO 6. Be able to select and apply suitable patterns in specific contexts	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
6. At the end of the 13 <sup>th</sup> week of the semester- Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	
<b>CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b>	



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VII Semester

<b>SOFTWARE ARCHITECTURE AND DESIGN PATTERNS</b>			
Course Code	21CS741	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Learn How to add functionality to designs while minimizing complexity.            CLO 2. What code qualities are required to maintain to keep code flexible?            CLO 3. To Understand the common design patterns.            CLO 4. To explore the appropriate patterns for design problems</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Introduction:</b> what is a design pattern? describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern. A Notation for Describing Object-Oriented Systems</p> <p><b>Textbook 1: Chapter 1 and 2.7</b></p> <p><b>Analysis a System:</b> overview of the analysis phase, stage 1: gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain. Design and Implementation, discussions and further reading.</p> <p><b>Textbook 1: Chapter 6</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<p><b>Design Pattern Catalog:</b> Structural patterns, Adapter, bridge, composite, decorator, facade, flyweight, proxy.</p> <p><b>Textbook 2: chapter 4</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<p><b>BehavioralPatterns:</b> Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Template Method</p>			

  
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1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press, 2021.

**Reference:**

1. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
2. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

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<b>Textbook 1: Chapter 6 – 6.1 to 6.5</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-4</b>	
<b>IoT Connectivity Technologies:</b> Introduction, IEEE 802.15.4, Zigbee, Thread, ISA100.11A, WirelessHART, RFID, NFC, DASH7, Z-Wave, Weightless, Sigfox, LoRa, NB-IoT, Wi-Fi, Bluetooth	
<b>Textbook 1: Chapter 7 – 7.1 to 7.16</b>	
<b>Teaching-Learning Process</b>	Chalk & board, Problem based learning
<b>Module-5</b>	
<b>IoT Communication Technologies:</b> Introduction, Infrastructure Protocols, Discovery Protocols, Data Protocols, Identification Protocols, Device Management, Semantic Protocols	
<b>IoT Interoperability:</b> Introduction, Taxonomy of interoperability, Standards, Frameworks	
<b>Textbook 1: Chapter 8 – 8.1, 6.2, 8.3, 8.4, 8.5, 8.6, .7</b>	
<b>Textbook 1: Chapter 9 – 9.1, 9.2, 9.3</b>	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Understand the evolution of IoT, IoT networking components, and addressing strategies in IoT.	
CO 2. Analyze various sensing devices and actuator types.	
CO 3. Demonstrate the processing in IoT.	
CO 4. Apply different connectivity technologies.	
CO 5. Understand the communication technologies , protocols and interoperability in IoT.	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
6. At the end of the 13 <sup>th</sup> week of the semester- Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b>	
(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	
<b>CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b>	
<b>Semester End Examination:</b>	
Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject ( <b>duration 03 hours</b> )	

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**VII Semester**

<b>INTERNET OF THINGS</b>			
Course Code	21CS735	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.</p> <p>CLO 2. Understand the recent application domains of IoT in everyday life.</p> <p>CLO 3. Understand the protocols and standards designed for IoT and the current research on it.</p> <p>CLO 4. Understand the other associated technologies like cloud and fog computing in the domain of IoT.</p> <p>CLO 5. Improve their knowledge about the various cutting-edge technologies in the field IoT and machine learning applications.</p> <p>CLO 6. Gain insights about the current trends of machine learning and AI techniques used in IoT to orient towards the present industrial scenario.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Emergence of IoT:</b> Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components, Addressing Strategies in IoT.			
<b>Textbook 1: Chapter 4 - 4.1 to 4.5</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<b>IoT Sensing and Actuation:</b> Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.			
<b>Textbook 1: Chapter 5 - 5.1 to 5.9</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			
<b>IoT Processing Topologies and Types:</b> Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.			

  
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CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017.
2. Arvind Narayanan, Joseph Bonneau, Edward W. Felten, Andrew Miller, Steven Goldfeder and Jeremy Clark., Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction. Princeton University Press, 2016.

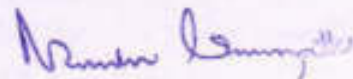
**Reference:**

1. Mastering Bitcoins: Unlocking Digital Cryptocurrencies by Andreas Antonopoulos. O'Reilly Media, Inc, 2013.

**Weblinks and Video Lectures (e-Resources):**

1. [http://bitcoinbook.cs.princeton.edu/?\\_ga=2.8302578.1344744326.1642688462-86383721.1642688462](http://bitcoinbook.cs.princeton.edu/?_ga=2.8302578.1344744326.1642688462-86383721.1642688462)
2. <https://nptel.ac.in/courses/106/105/106105184/>
3. <https://ethereum.org/en/developers/>
4. <https://developer.ibm.com/components/hyperledger-fabric/tutorials/>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**



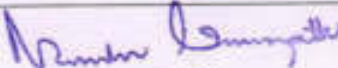
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<b>How to Store and Use Bitcoins:</b> Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets	
Textbook2: Chapter 3,4	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration, MOOC
<b>Module-4</b>	
<b>Bitcoin Mining:</b> The task of Bitcoin miners, Mining Hardware, Energy consumption and ecology, Mining pools, Mining incentives and strategies,	
<b>Bitcoin and Anonymity:</b> Anonymity Basics, How to De-anonymize Bitcoin, Mixing, Decentralized Mixing, Zerocoin and Zerocash,	
Textbook2: Chapter 5,6	
<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning, MOOC
<b>Module-5</b>	
<b>Smart Contracts and Ethereum 101:</b> Smart Contracts: Definition, Ricardian contracts.	
<b>Ethereum 101:</b> Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts.	
Textbook 1: Chapter 10	
<b>Teaching-Learning Process</b>	Chalk and board, MOOC, Practical Demonstration
<b>Course Outcomes</b> At the end of the course the student will be able to:	
CO 1. Describe the concepts of Distributed computing and its role in Blockchain	
CO 2. Describe the concepts of Cryptography and its role in Blockchain	
CO 3. List the benefits, drawbacks and applications of Blockchain	
CO 4. Appreciate the technologies involved in Bitcoin	
CO 5. Appreciate and demonstrate the Ethereum platform to develop blockchain application.	
<b>Assessment Details (both CIE and SEE)</b> The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b> Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	
6. At the end of the 13 <sup>th</sup> week of the semester	
The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be <b>scaled down to 50 marks</b> (to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).	

  
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**VII Semester**

<b>BLOCKCHAIN TECHNOLOGY</b>			
Course Code	21CS734	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Explain the fundamentals of distributed computing and blockchain            CLO 2. Discuss the concepts in bitcoin            CLO 3. Demonstrate Ethereum platform</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Blockchain 101:</b> Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.</p> <p><b>Decentralization and Cryptography:</b> Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations.</p> <p><b>Textbook 1: Chapter 1, 2</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning - Oral presentations.		
<b>Module-2</b>			
<p><b>Introduction to Cryptography &amp; Cryptocurrencies:</b> Cryptographic Hash Functions, Hash Pointers and Data Structures, Digital Signatures, Public Keys as Identities, A Simple Cryptocurrency,</p> <p><b>How Bitcoin Achieves Decentralization:</b> Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work, Putting it all together,</p> <p><b>Textbook 2: Chapter 1, 2</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Demonstration		
<b>Module-3</b>			
<p><b>Mechanics of Bitcoin:</b> Bitcoin transactions, Bitcoin Scripts, Applications of Bitcoin scripts, Bitcoin blocks, The Bitcoin network, Limitations and improvements</p>			

  
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6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Textbooks**

1. William Stallings: Cryptography and Network Security, Pearson 6th edition.

**Reference:**

1. V. K Pachghare: Cryptography and Information Security, PHI 2nd Edition
2. Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw Hill 2007.

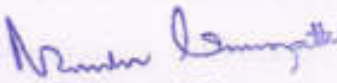
**Weblinks and Video Lectures (e-Resources):**

<https://nptel.ac.in/courses/106105031>  
[https://onlinecourses.nptel.ac.in/noc21\\_cs16](https://onlinecourses.nptel.ac.in/noc21_cs16)  
<https://www.digimat.in/nptel/courses/video/106105031>  
<https://www.youtube.com/watch?v=DEqjC0G5KwU>  
<https://www.youtube.com/watch?v=FqQ7TWvOaus>  
[https://www.youtube.com/watch?v=PHsa\\_DdGx6w](https://www.youtube.com/watch?v=PHsa_DdGx6w)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning:**

Project based learning:

1. Implement classical, symmetric and asymmetric algorithms in any preferred language
2. Evaluate network security protocol using any simulator available
3. Conduct a comprehensive literature survey on the protocols and algorithms
4. Identify the security threats and models of security threats
5. Implement factorization algorithms and evaluate their complexity, identify a technologies to factorize a large prime number.

  
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<b>Key Management and Distribution:</b> Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, A hybrid scheme, distribution of public keys, public announcement of public keys, publicly available directory, public key authority, public keys certificates.	
<b>Textbook 1: Chapter 14.1 - 14.3</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning, Demonstration
<b>Module-4</b>	
X-509 certificates. Certificates, X-509 version 3	
Public key infrastructure.	
<b>User Authentication:</b> Remote user Authentication principles, Mutual Authentication, one-way authentication, remote user Authentication using Symmetric encryption, Mutual Authentication, one-way Authentication,	
<b>Kerberos,</b> Motivation, Kerberos version 4, Kerberos version 5, Remote user Authentication using Asymmetric encryption, Mutual Authentication, one-way Authentication.	
<b>Textbook 1: Chapter 14.4 - 15.4</b>	
<b>Teaching-Learning Process</b>	Chalk& board, Problem based learning
<b>Module-5</b>	
<b>Electronic Mail Security:</b> Pretty good privacy, S/MIME,	
<b>IP Security:</b> IP Security overview, IP Security policy, Encapsulating Security payload, Combining security associations, Internet key exchange.	
<b>Textbook 1: Chapter 19.1, 19.2, 20.1 - 20.5</b>	
<b>Teaching-Learning Process</b>	Chalk and board, Problem based learning
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
<ul style="list-style-type: none"> <li>CO 1. Understand Cryptography, Network Security theories, algorithms and systems</li> <li>CO 2. Apply different Cryptography and Network Security operations on different applications</li> <li>CO 3. Analyze different methods for authentication and access control</li> <li>CO 4. Evaluate Public and Private key, Key management, distribution and certification</li> <li>CO 5. Design necessary techniques to build protection mechanisms to secure computer networks</li> </ul>	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
<ol style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol>	
Two assignments each of <b>10 Marks</b>	
<ol style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol>	
Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	

  
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VII Semester

CRYPTOGRAPHY AND NETWORK SECURITY			
Course Code	21CS733	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b>			
<p>CLO 1. To understand Cryptography, Network Security and its principles</p> <p>CLO 2. To Analyze different Cryptography algorithms</p> <p>CLO 3. To Illustrate Public and Private key cryptography</p> <p>CLO 4. To Explain Key management, distribution and certification</p> <p>CLO 5. To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies; which teacher can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different encryption techniques and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p><b>Classical Encryption Techniques:</b> Symmetric Cipher Model, Cryptography, Cryptanalysis and Brute-Force Attack, Substitution Techniques, Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Cipher, One Time Pad.</p> <p><b>Block Ciphers and the Data Encryption Standard:</b> Traditional block Cipher structure, Stream Ciphers and Block Ciphers, Motivation for the Feistel Cipher structure, the Feistel Cipher, The data encryption standard, DES encryption, DES decryption, A DES example, results, the avalanche effect, the strength of DES, the use of 56-Bit Keys, the nature of the DES algorithm, timing attacks, Block cipher design principles, number of rounds, design of function F, key schedule algorithm</p>			
<b>Textbook 1: Chapter 2, 3</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Problem based learning		
<b>Module-2</b>			
<p><b>Public-Key Cryptography and RSA:</b> Principles of public-key cryptosystems. Public-key cryptosystems. Applications for public-key cryptosystems, requirements for public-key cryptosystems. public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA.</p> <p><b>Other Public-Key Cryptosystems:</b> Diffie-Hellman key exchange, The algorithm, key exchange protocols, man in the middle attack, Elgamal Cryptographic systems.</p>			
<b>Textbook 1: Chapter 9, 10</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning, Demonstration		
<b>Module-3</b>			

  
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Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

#### **Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

#### **Textbooks**

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Third Ed., Prentice Hall, 2008.
2. S. Sridhar, Digital Image Processing, Oxford University Press, 2<sup>nd</sup> Edition, 2016

#### **Reference:**

1. Digital Image Processing- S.Jayaraman, S.Esakkirajan, T.Veerakumar, TataMcGraw Hill 2014.
2. Fundamentals of Digital Image Processing-A. K. Jain, Pearson 2004

#### **Weblinks and Video Lectures (e-Resources):**

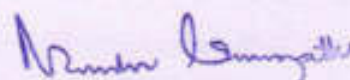
1. <https://nptel.ac.in/courses/106/105/106105032/>
2. <https://github.com/PrajwalPrabhuis/Image-processing-assignments>

#### **Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

Demonstration of finding the histogram from grayscale image, to check the low pass filter properties, filtering the images using Gaussian low pass filter, etc... using Python programming

Practical Based Assignment like following or any topic which is in-line with the course requirement. Students shall present and demonstrate their work at the end of semester.

- Program to show rotation, scaling, and translation of an image.
- Read an image and extract and display low-level features such as edges, textures using filtering techniques
- Demonstrate enhancing and segmenting low contrast 2D images.
- To Read an image, first apply erosion to the image and then subtract the result from the original.



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<b>Restoration:</b> Noise models, Restoration in the Presence of Noise Only using Spatial Filtering and Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering.	
<b>Textbook 1: Chapter 5: Sections 5.2, to 5.9</b>	
<b>Teaching-Learning Process</b>	1. Chalk and board
<b>Module-4</b>	
<b>Color Image Processing:</b> Color Fundamentals, Color Models, Pseudo color Image Processing, Wavelets: Background, Multiresolution Expansions.	
<b>Morphological Image Processing:</b> Preliminaries, Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transforms, Some Basic Morphological Algorithms.	
<b>Text: Chapter 6: Sections 6.1 to 6.3, Chapter 7: Sections 7.1 and 7.2, Chapter 9: Sections 9.1 to 9.5</b>	
<b>Teaching-Learning Process</b>	1. Chalk & board 2. Demonstration of Case study / Application for wavelet transfer method
<b>Module-5</b>	
<b>Segmentation:</b> Introduction, classification of image segmentation algorithms, Detection of Discontinuities, Edge Detection, Hough Transforms and Shape Detection, Corner Detection, Principles of Thresholding.	
<b>Representation and Description:</b> Representation, Boundary descriptors.	
<b>Text 2: Chapter 9: Sections 9.1, to 9.7 and Text 1: Chapter 11: Sections 11.1 and 11.2</b>	
<b>Teaching-Learning Process</b>	1. Chalk and board, MOOC 2. Poster making activity for various image segmentation algorithms
<b>Course Outcomes</b>	
At the end of the course the student will be able to:	
CO 1. Understand the fundamentals of Digital Image Processing.	
CO 2. Apply different Image transformation techniques	
CO 3. Analyze various image restoration techniques	
CO 4. Understand colour image and morphological processing	
CO 5. Design image analysis and segmentation techniques	
<b>Assessment Details (both CIE and SEE)</b>	
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b>	
Three Unit Tests each of <b>20 Marks (duration 01 hour)</b>	
1. First test at the end of 5 <sup>th</sup> week of the semester	
2. Second test at the end of the 10 <sup>th</sup> week of the semester	
3. Third test at the end of the 15 <sup>th</sup> week of the semester	
Two assignments each of <b>10 Marks</b>	
4. First assignment at the end of 4 <sup>th</sup> week of the semester	
5. Second assignment at the end of 9 <sup>th</sup> week of the semester	

  
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Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML, 2<sup>nd</sup> Edition, Pearson Education, 2005
2. Satzinger, Jackson and Burd: Object-Oriented Analysis & Design with the Unified Process, Cengage Learning, 2005.
3. Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides: Design Patterns - Elements of Reusable Object-Oriented Software, Pearson Education, 2007.

**Reference:**

1. Grady Booch et. al.: Object-Oriented Analysis and Design with Applications, 3<sup>rd</sup> Edition, Pearson Education, 2007.
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michel Stal: Pattern - Oriented Software Architecture. A system of patterns, Volume 1, John Wiley and Sons, 2007.
3. Booch, Jacobson, Rumbaugh : Object-Oriented Analysis and Design with Applications, 3<sup>rd</sup> edition, Pearson, Reprint 2013

**Weblinks and Video Lectures (e-Resources):**

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

  
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a problem statement. Domain Analysis: Overview of analysis; Domain Class model: Domain state model; Domain interaction model; Iterating the analysis.

**Textbook-1:Chapter- 10,11,and 12**

**Teaching-Learning Process**

Chalk and board, Demonstration

#### Module-4

Use case Realization :The Design Discipline within up iterations: Object Oriented Design-The Bridge between Requirements and Implementation; Design Classes and Design within Class Diagrams; Interaction Diagrams-Realizing Use Case and defining methods; Designing with Communication Diagrams; Updating the Design Class Diagram; Package Diagrams-Structuring the Major Components; Implementation Issues for Three-Layer Design.

**Textbook-2: Chapter 8: page 292 to 346**

**Teaching-Learning Process**

Chalk and board, Demonstration

#### Module-5

Design Patterns: Introduction; what is a design pattern?, Describing design patterns, the catalogue of design patterns, Organizing the catalogue, How design patterns solve design problems, how to select a design patterns, how to use a design pattern; Creational patterns: prototype and singleton (only); structural patterns adaptor and proxy (only).

**Textbook-3: Ch-1: 1.1, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8,Ch-3,Ch-4.**

**Teaching-Learning Process**

Chalk and board, Demonstration

#### Course Outcomes

At the end of the course the student will be able to:

- CO 1. Describe the concepts of object-oriented and basic class modelling.
- CO 2. Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
- CO 3. Choose and apply a befitting design pattern for the given problem.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

#### Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

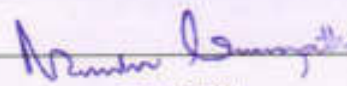
6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

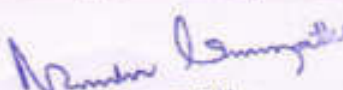
**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

  
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## VII Semester

<b>OBJECT ORIENTED MODELING AND DESIGN</b>			
Course Code	21CS731	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives</b>			
<p>CLO 1. Describe the concepts involved in Object-Oriented modelling and their benefits.</p> <p>CLO 2. Demonstrate concept of use-case model, sequence model and state chart model for a given problem.</p> <p>CLO 3. Explain the facets of the unified process approach to design and build a Software system.</p> <p>CLO 4. Translate the requirements into implementation for Object Oriented design.</p> <p>CLO 5. Choose an appropriate design pattern to facilitate development procedure.</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<p>Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived Data; Packages. State Modeling: Events, States, Transitions and Conditions, State Diagrams, State diagram behaviour.</p> <p><b>Textbook-1: 4, 5</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Demonstration		
<b>Module-2</b>			
<p>UseCase Modelling and Detailed Requirements: Overview; Detailed object-oriented Requirements definitions; System Processes-A use case/Scenario view; Identifying Input and outputs-The System sequence diagram; Identifying Object Behaviour-The state chart Diagram; Integrated Object-oriented Models.</p> <p><b>Textbook-2:Chapter- 6:Page 210 to 250</b></p>			
<b>Teaching-Learning Process</b>	Chalk and board, Demonstration		
<b>Module-3</b>			
<p>Process Overview, System Conception and Domain Analysis: Process Overview: Development stages; Development life Cycle; System Conception: Devising a system concept; elaborating a concept; preparing</p>			

  
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6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 2 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:**

**Textbooks**

1. Rajkumar Buyya, Christian Vecchiola, and Thamrai Selvi Mastering Cloud Computing McGraw Hill Education.
2. Dan C. Marinescu, Cloud Computing Theory and Practice, Morgan Kaufmann, Elsevier 2013

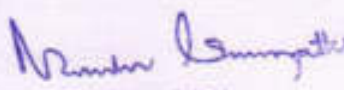
**Reference Books**

1. Toby Veite, Anthony Veite, Cloud Computing: A Practical Approach, McGraw-Hill Osborne Media.
2. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly Publication.
3. John Rhoton, Cloud Computing Explained: Implementation Handbook for Enterprises, Recursive Press.


**Weblinks and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=1N3oqYhzHv4>
- <https://www.youtube.com/watch?v=RWgW-Cgdlk0>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

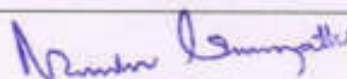
  
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<b>Teaching-Learning Process</b>	Chalk and board, Demonstration
<b>Module-4</b>	
<b>Cloud Security:</b> Risks, Top concern for cloud users, privacy impact assessment, trust, OS security, VM Security, Security Risks posed by shared images and management OS.	
<b>Textbook 2: Chapter 9: 9.1 to 9.6, 9.8, 9.9</b>	
<b>Teaching-Learning Process</b>	Chalk and board
<b>Module-5</b>	
<b>Cloud Platforms in Industry</b> Amazon web services: - Compute services, Storage services, Communication services, Additional services. Google AppEngine: - Architecture and core concepts, Application life cycle, Cost model, Observations.	
<b>Textbook 1: Chapter 9: 9.1 to 9.2</b>	
<b>Cloud Applications:</b> Scientific applications: - HealthCare: ECG analysis in the cloud, Biology: gene expression data analysis for cancer diagnosis, Geoscience: satellite image processing. Business and consumer applications: CRM and ERP, Social networking, media applications.	
<b>Textbook 1: Chapter 10: 10.1 to 10.2</b>	
<b>Teaching-Learning Process</b>	Chalk and board
<b>Course outcome (Course Skill Set)</b> At the end of the course the student will be able to: <ul style="list-style-type: none"> <li>CO 1. Understand and analyze various cloud computing platforms and service provider.</li> <li>CO 2. Illustrate various virtualization concepts.</li> <li>CO 3. Identify the architecture, infrastructure and delivery models of cloud computing.</li> <li>CO 4. Understand the Security aspects of CLOUD.</li> <li>CO 5. Define platforms for development of cloud applications</li> </ul>	
<b>Assessment Details (both CIE and SEE)</b> The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	
<b>Continuous Internal Evaluation:</b> Three Unit Tests each of <b>20 Marks (duration 01 hour)</b> <ol style="list-style-type: none"> <li>1. First test at the end of 5<sup>th</sup> week of the semester</li> <li>2. Second test at the end of the 10<sup>th</sup> week of the semester</li> <li>3. Third test at the end of the 15<sup>th</sup> week of the semester</li> </ol> Two assignments each of <b>10 Marks</b> <ol style="list-style-type: none"> <li>4. First assignment at the end of 4<sup>th</sup> week of the semester</li> <li>5. Second assignment at the end of 9<sup>th</sup> week of the semester</li> </ol> Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for <b>20 Marks (duration 01 hours)</b>	

  
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## VII Semester

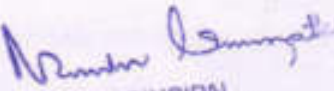
CLOUD COMPUTING			
Course Code	21CS72	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:0:0:0	SEE Marks	50
Total Hours of Pedagogy	24	Total Marks	100
Credits	02	Exam Hours	03
<b>Course Learning Objectives:</b>			
<p>CLO 1. Introduce the rationale behind the cloud computing revolution and the business drivers</p> <p>CLO 2. Introduce various models of cloud computing</p> <p>CLO 3. Introduction on how to design cloud native applications, the necessary tools and the design tradeoffs.</p> <p>CLO 4. Realize the importance of Cloud Virtualization, Abstraction's and Enabling Technologies and cloud security</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.</li> <li>2. Show Video/animation films to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Topics will be introduced in a multiple representation.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction:</b>			
Introduction ,Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjrasoft Aneka			
<b>Textbook 1: Chapter 1: 1.1,1.2 and 1.3</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning		
<b>Module-2</b>			
<b>Virtualization:</b> Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples			
<b>Textbook 1 : Chapter 3: 3.1 to 3.6</b>			
<b>Teaching-Learning Process</b>	Chalk and board, Active Learning		
<b>Module-3</b>			
<b>Cloud Computing Architecture:</b> Introduction, Cloud Reference Model, Types of Clouds, Economics of the Cloud, Open Challenges			
<b>Textbook 1: Chapter 4: 4.1 to 4.5</b>			

  
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4. [https://web2.qatar.cmu.edu/~mhhammou/15440-f19/recitations/Project4\\_Handout.pdf](https://web2.qatar.cmu.edu/~mhhammou/15440-f19/recitations/Project4_Handout.pdf)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

**Mini Project Topics for Practical Based Learning** :Search Engine Optimization, Social Media Reputation Monitoring, Equity Research, Detection of Global Suicide rate, Find the Percentage of Pollution in India, Analyze crime rate in India, Health Status Prediction, Anomaly Detection in cloud server, Tourist Behaviour Analysis, BusBest Not limited to above topics

  
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**Continuous Internal Evaluation:**

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5<sup>th</sup> week of the semester
2. Second test at the end of the 10<sup>th</sup> week of the semester
3. Third test at the end of the 15<sup>th</sup> week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4<sup>th</sup> week of the semester
5. Second assignment at the end of 9<sup>th</sup> week of the semester

Group discussion/Seminar/quiz. any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13<sup>th</sup> week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

**CIE methods /question paper has to be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

**Suggested Learning Resources:****Textbooks**

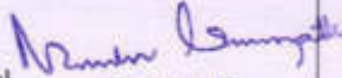
1. Raj Kamal and Preeti Saxena, "Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning", McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966
2. Douglas Eadline, "Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem", 1 stEdition, Pearson Education, 2016. ISBN13: 978-9332570351

**Reference Books**

1. Tom White, "Hadoop: The Definitive Guide", 4 th Edition, O'Reilly Media, 2015.ISBN-13: 978-9352130672
2. Boris Lublinsky, Kevin T Smith, Alexey Yakubovich, "Professional Hadoop Solutions", 1 stEdition, Wrox Press, 2014ISBN-13: 978-8126551071
3. Eric Sammer, "Hadoop Operations: A Guide for Developers and Administrators",1 stEdition, O'Reilly Media, 2012.ISBN-13: 978-9350239261
4. ArshdeepBahga, Vijay Madiseti, "Big Data Analytics: A Hands-On Approach", 1st Edition, VPT Publications, 2018. ISBN-13: 978-0996025577

**Weblinks and Video Lectures (e-Resources):**

1. [https://www.youtube.com/watch?v=n\\_Krer6YWY4](https://www.youtube.com/watch?v=n_Krer6YWY4)
2. [https://onlinecourses.nptel.ac.in/noc20\\_cs92/preview](https://onlinecourses.nptel.ac.in/noc20_cs92/preview)
3. <https://www.digimat.in/nptel/courses/video/106104189/L01.html>

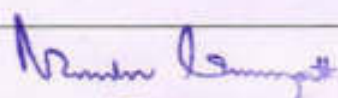
  
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<b>Textbook 2: Chapter 7 (except walk throughs)</b>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Chalk and Board</li> <li>2. Laboratory Demonstration</li> </ol>
<b>Module-3</b>	
<b>NoSQL Big Data Management, MongoDB and Cassandra:</b> Introduction, NoSQL Data Store, NoSQL Data Architecture Patterns, NoSQL to Manage Big Data, Shared-Nothing Architecture for Big Data Tasks, MongoDB, Databases, Cassandra Databases.	
<b>Textbook 1: Chapter 3: 3.1-3.7</b>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Chalk and Board</li> <li>2. Laboratory Demonstration</li> </ol> <a href="https://www.youtube.com/watch?v=pWbMrx5rVBE">https://www.youtube.com/watch?v=pWbMrx5rVBE</a>
<b>Module-4</b>	
Introduction, MapReduce Map Tasks, Reduce Tasks and MapReduce Execution, Composing MapReduce for Calculations and Algorithms, Hive, HiveQL, Pig.	
<b>Textbook 1: Chapter 4: 4.1-4.6</b>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Chalk and Board</li> <li>2. Laboratory Demonstration</li> </ol>
<b>Module-5</b>	
<b>Machine Learning Algorithms for Big Data Analytics:</b> Introduction, Estimating the relationships, Outliers, Variances, Probability Distributions, and Correlations, Regression analysis, Finding Similar Items, Similarity of Sets and Collaborative Filtering, Frequent Itemsets and Association Rule Mining.	
<b>Text, Web Content, Link, and Social Network Analytics:</b> Introduction, Text mining, Web Mining, Web Content and Web Usage Analytics, Page Rank, Structure of Web and analyzing a Web Graph, Social Network as Graphs and Social Network Analytics:	
<b>Textbook 1: Chapter 6: 6.1 to 6.5</b>	
<b>Textbook 1: Chapter 9: 9.1 to 9.5</b>	
<b>Teaching-Learning Process</b>	<ol style="list-style-type: none"> <li>1. Chalk and Board</li> <li>2. Laboratory Demonstration</li> </ol>
<b>Course outcome (Course Skill Set)</b> At the end of the course the student will be able to: <ol style="list-style-type: none"> <li>CO 1. Understand fundamentals and applications of Big Data analytics.</li> <li>CO 2. Investigate Hadoop framework, Hadoop Distributed File system and essential Hadoop tools.</li> <li>CO 3. Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data.</li> <li>CO 4. Demonstrate the MapReduce programming model to process the big data along with Hadoop tools.</li> <li>CO 5. Apply Machine Learning algorithms for real world big data, web contents and Social Networks to provide analytics with relevant visualization tools.</li> </ol>	
<b>Assessment Details (both CIE and SEE)</b> The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together	

  
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## VII Semester

<b>BIG DATA ANALYTICS</b>			
Course Code	21CS71	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b>			
CLO 1. Understand fundamentals and applications of Big Data analytics			
CLO 2. Explore the Hadoop framework and Hadoop Distributed File system and essential Hadoop Tools			
CLO 3. Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data			
CLO 4. Employ MapReduce programming model to process the big data			
CLO 5. Understand various machine learning algorithms for Big Data Analytics, Web Mining and Social Network Analysis.			
<b>Teaching-Learning Process (General Instructions)</b>			
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.			
<ol style="list-style-type: none"> <li>1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.</li> <li>2. Show Video/animation films to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Topics will be introduced in a multiple representation.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>Introduction to Big Data Analytics:</b> Big Data, Scalability and Parallel Processing, Designing Data Architecture, Data Sources, Quality, Pre-Processing and Storing, Data Storage and Analysis, Big Data Analytics Applications and Case Studies.			
<b>Textbook 1: Chapter 1: 1.2 -1.7</b>			
<b>Teaching-Learning Process</b>	Chalk and board <a href="https://www.youtube.com/watch?v=n_Krer6YWW4">https://www.youtube.com/watch?v=n_Krer6YWW4</a> <a href="https://onlinecourses.nptel.ac.in/noc20_cs92/preview">https://onlinecourses.nptel.ac.in/noc20_cs92/preview</a>		
<b>Module-2</b>			
<b>Introduction to Hadoop (T1):</b> Introduction, Hadoop and its Ecosystem, Hadoop Distributed File System, MapReduce Framework and Programming Model, Hadoop Yarn, Hadoop Ecosystem Tools.			
<b>Hadoop Distributed File System Basics (T2):</b> HDFS Design Features, Components, HDFS User Commands.			
<b>Essential Hadoop Tools (T2):</b> Using Apache Pig, Hive, Sqoop, Flume, Oozie, HBase.			
<b>Textbook 1: Chapter 2 :2.1-2.6</b>			
<b>Textbook 2: Chapter 3</b>			

  
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- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Students can pick one experiment from the questions lot of PART A with equal choice to all the students in a batch.
- **PART B** : Student should develop a mini project and it should be demonstrated in the laboratory examination (with report and presentation).
- Weightage of marks for **PART A is 60%** and for **PART B is 40%**. General rubrics suggested to be followed for part A and part B.
- Change of experiment is allowed only once (in part A) and marks allotted to the procedure part to be made zero.
- The duration of SEE is 03 hours.

**Suggested Learning Resources:**

1. Donald Hearn & Pauline Baker: Computer Graphics with OpenGL Version,3rd/4th Edition, Pearson Education,2011
2. James D Foley, Andries Van Dam, Steven K Feiner, John F Huges Computer graphics with OpenGL: Pearson education

**Weblinks and Video Lectures (e-Resources):**

1. <https://nptel.ac.in/courses/106/106/106106090/>
2. <https://nptel.ac.in/courses/106/102/106102063/>
3. <https://nptel.ac.in/courses/106/103/106103224/>
4. <https://nptel.ac.in/courses/106/102/106102065/>
5. <https://www.tutorialspoint.com/opencv/>
6. <https://medium.com/analytics-vidhya/introduction-to-computer-vision-opencv-in-python-fb722e805e8b>

  
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EDUCATION

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(Approved by AICTE, New Delhi, Recognised by Govt. of Karnataka and Affiliated to Visvesvaraya Technological University, Belagavi)



## Criteria 1.1

# Curriculum Planning and Implementation

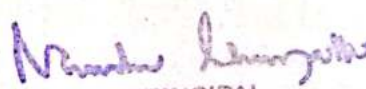
## 7. Syllabus Copy

2022 – 2023

*Manda Kanyas*  
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**I Semester**

Course Title:	<b>Mathematics-I for Civil Engineering stream</b>		
Course Code:	<b>BMATC101</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Total Marks	100
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Exam Hours	03
<b>Course objectives:</b> The goal of the course <b>Mathematics-I for Civil Engineering stream(22MATC11)</b> is to <ul style="list-style-type: none"> <li>• <b>Familiarize</b> the importance of calculus associated with onevariable and two variables for Civil engineering.</li> <li>• <b>Analyze</b> Civil engineering problems applying Ordinary Differential Equations.</li> <li>• <b>Develop</b> the knowledge of Linear Algebra referring to matrices.</li> </ul>			
<b>Teaching-Learning Process</b> <b>Pedagogy (General Instructions):</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.</li> <li>2. State the need for Mathematics with Engineering Studies and Provide real-life examples.</li> <li>3. Support and guide the students for self-study.</li> <li>4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.</li> <li>5. Encourage the students to group learning to improve their creative and analytical skills.</li> <li>6. Show short related video lectures in the following ways:             <ul style="list-style-type: none"> <li>• As an introduction to new topics (pre-lecture activity).</li> <li>• As a revision of topics (post-lecture activity).</li> <li>• As additional examples (post-lecture activity).</li> <li>• As an additional material of challenging topics (pre-and post-lecture activity).</li> <li>• As a model solution of some exercises (post-lecture activity).</li> </ul> </li> </ol>			
<b>Module-1:Calculus (8 hours)</b>			
<b>Introduction to polar coordinates and curvature relating to Civil engineering.</b> Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems. <b>Self-study:</b> Center and circle of curvature, evolutes and involutes. <b>Applications:</b> Structural design and paths, Strength of materials, Elasticity. <b>(RBT Levels: L1, L2 and L3)</b>			
<b>Module-2:Series Expansion and Multivariable Calculus (8 hours)</b>			

  
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**Introduction to series expansion and partial differentiation in the field of Civil engineering applications.**

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems.

Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables - Problems.

**Self-study:** Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

**Applications:** Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.

(RBT Levels: L1, L2 and L3)

**Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)**

**Introduction to first-order ordinary differential equations pertaining to the applications for Civil engineering.**

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on  $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$  and  $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$ . Orthogonal trajectories and Newton's law of cooling.

**Nonlinear differential equations:** Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems.

**Self-Study:** Applications of ODEs in Civil Engineering problems like bending of the beam, whirling of shaft, solution of non-linear ODE by the method of solvable for x and y.

**Applications:** Rate of Growth or Decay. Conduction of heat.

(RBT Levels: L1, L2 and L3)

**Module-4: Ordinary Differential Equations of Higher Order (8 hours)**

**Importance of higher-order ordinary differential equations in Civil engineering applications.**

Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations - Problems.

**Self-Study:** Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.

**Applications:** Oscillations of a spring. Transmission lines. Highway engineering.

(RBT Levels: L1, L2 and L3)

**Module-5: Linear Algebra (8 hours)**

**Introduction of linear algebra related to Civil engineering applications.**

Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

**Self-Study:** Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley-Hamilton theorem.

**Applications:** Structural Analysis, Balancing equations.

(RBT Levels: L1, L2 and L3)

**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)**  
**10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Solutions of Second-order ordinary differential equations with initial/boundary conditions
7	Solution of a differential equation of oscillations of a spring/deflection of a beam with different loads
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by the Rayleigh power method.

**Suggested software:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	apply the knowledge of calculus to solve problems related to polar curves.
CO2	learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO3	analyze the solution of linear and nonlinear ordinary differential equations.
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**.



### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

### **Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

*Nanda Kumar*  
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**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup> Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup> Ed., 2018.

**Reference Books**

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup> Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup> Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3<sup>rd</sup> Ed., 2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup> Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4<sup>th</sup> Ed., 2018.
9. Gareth Williams: "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6<sup>th</sup> Ed., 2017.
10. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed., 2022.

**Web links and Video Lectures (e-Resources):**

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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**I Semester**

Course Title:	<b>Mathematics-I for Computer Science and Engineering stream</b>		
Course Code:	<b>BMATSI01</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Total Marks	100
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Exam Hours	03
		Credits	04

**Course objectives:**The goal of the course **Mathematics-I for Computer Science and Engineering stream(22MATSI1)** is to

- **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering.
- **Analyze** Computer science and engineering problems by applying Ordinary Differential Equations.
- **Apply** the knowledge of modular arithmetic to computer algorithms.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

**Teaching-Learning Process****Pedagogy (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

**Module-1:Calculus (8 hours)****Introduction to polar coordinates and curvature relating to Computer Science and Engineering.**

Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Computer graphics, Image processing.

**(RBT Levels: L1, L2 and L3)**

**Module-2:Series Expansion and Multivariable Calculus (8 hours)**

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**Introduction of series expansion and partial differentiation in Computer Science & Engineering applications.**

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule-Problems.

Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

**Self-study:** Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

**Applications:** Series expansion in computer programming. Computing errors and approximations.

(RBT Levels: L1, L2 and L3)

**Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)**

**Introduction to first-order ordinary differential equations pertaining to the applications for Computer Science & Engineering.**

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on  $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$  and  $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$ . Orthogonal trajectories, L-R & C-R circuits. Problems.

**Non-linear differential equations:** Introduction to general and singular solutions, Solvable for p only. Clairaut's equations. reducible to Clairaut's equations. Problems.

**Self-Study:** Applications of ODEs, Solvable for x and y.

**Applications of ordinary differential equations:** Rate of Growth or Decay, Conduction of heat. (RBT Levels: L1, L2 and L3)

**Module-4: Modular Arithmetic (8 hours)**

**Introduction of modular arithmetic and its applications in Computer Science and Engineering.** Introduction to Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences-RSA algorithm.

**Self-Study:** Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.

**Applications:** Cryptography, encoding and decoding, RSA applications in public key encryption. (RBT Levels: L1, L2 and L3)

**Module-5: Linear Algebra (8 hours)**

**Introduction of linear algebra related to Computer Science & Engineering.**

Elementary row transformation of a matrix. Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

**Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.

**Applications:** Boolean matrix, Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.

(RBT Levels: L1, L2 and L3).

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**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)**

**10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Finding GCD using Euclid's Algorithm
7	Solving linear congruences $ax \equiv b \pmod{m}$
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

**Suggested software:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
CO2	analyze the solution of linear and nonlinear ordinary differential equations
CO3	get acquainted and to apply modular arithmetic to computer algorithms
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
CO5	familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

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- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

##### Text Books

1. **B. S. Grewal:** "Higher Engineering Mathematics", Khanna Publishers. 44<sup>th</sup>Ed., 2021.
2. **E. Kreyszig:** "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.
3. **David M Burton:** "Elementary Number Theory" Mc Graw Hill, 7<sup>th</sup> Ed.,2017.

##### Reference Books

4. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
5. **Srimanta Pal & Subodh C.Bhunia:** "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup> Ed., 2016.
6. **N.P Bali and Manish Goyal:** "A Textbook of Engineering Mathematics" Laxmi

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- Publications, 10<sup>th</sup> Ed., 2022.
7. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
  8. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
  9. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3<sup>rd</sup> Ed., 2014.
  10. **James Stewart:** "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.
  11. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4<sup>th</sup> Ed., 2018.
  12. **Gareth Williams:** "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6<sup>th</sup> Ed., 2017.
  13. **Gilbert Strang:** "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed. 2022.
  14. **William Stallings:** "Cryptography and Network Security" Pearson Prentice Hall, 6<sup>th</sup> Ed., 2013.
  15. **Kenneth H Rosen:** "Discrete Mathematics and its Applications" McGraw-Hill, 8<sup>th</sup> Ed. 2019.
  16. **Ajay Kumar Chaudhuri:** "Introduction to Number Theory"NCBA Publications, 2<sup>nd</sup> Ed., 2009.
  17. **Thomas Koshy:** "Elementary Number Theory with Applications"Harcourt Academic Press, 2<sup>nd</sup> Ed., 2008.

**Web links and Video Lectures (e-Resources):**

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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**I Semester**

Course Title:	<b>Mathematics-I for Electrical &amp; Electronics Engineering Stream</b>		
Course Code:	<b>BMATE101</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

**Course objectives:** The goal of the course **Mathematics-I for Electrical & Electronics Engineering stream(22MATE11)** is to

- **Familiarize** the importance of calculus associated with one variable and multivariable for Electrical and Electronics engineering.
- **Analyze** Electrical and Electronics engineering problems by applying Ordinary Differential Equations.
- **Familiarize** the important tools in Integral Calculus that are essential in Electrical and Electronics engineering.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

**Teaching-Learning Process****Pedagogy (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

**Module-1:Calculus (8 hours)**

**Introduction to polar coordinates and curvature relating to EC & EE Engineering applications.** Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Communication signals, Manufacturing of microphones, and Image processing.  
(RBT Levels: L1, L2 and L3)

**Module-2:Series Expansion and Multivariable Calculus (8 hours)**



**Introduction of series expansion and partial differentiation in EC & EE Engineering applications.**

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule - Problems.

Partial differentiation, total derivative - differentiation of composite functions, Jacobian and problems. Maxima and minima for a function of two variables. Problems.

**Self-study:** Euler's Theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

**Applications:** Series expansion in communication signals, Errors and approximations, and vector calculus.

(RBT Levels: L1, L2 and L3)

### Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)

**Introduction to first-order ordinary differential equations pertaining to the applications for EC & EE engineering.**

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations- Integrating factors on  $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$  and  $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$ . Orthogonal trajectories, L-R and C-R circuits. Problems.

**Non-linear differential equations:** Introduction to general and singular solutions, Solvable for p only. Clairaut's equations, reducible to Clairaut's equations. Problems.

**Self-Study:** Applications of ODEs. Solvable for x and y.

**Applications of ordinary differential equations:** Rate of Growth or Decay, Conduction of heat.

(RBT Levels: L1, L2 and L3)

### Module-4: Integral Calculus (8 hours)

**Introduction to Integral Calculus in EC & EE Engineering applications.**

**Multiple Integrals:** Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. Problems.

**Self-Study:** Volume by triple integration, Center of gravity.

**Applications:** Antenna and wave propagation, Calculation of optimum power in electrical circuits, field theory.

(RBT Levels: L1, L2 and L3)

### Module-5: Linear Algebra (8 hours)

**Introduction of linear algebra related to EC & EE engineering applications.**

Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

**Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.

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**Applications of Linear Algebra:** Network Analysis, Markov Analysis, Critical point of a network system, Optimum solution.

(RBT Levels: L1, L2 and L3)

**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)**

**10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Program to compute area, volume and centre of gravity
7	Evaluation of improper integrals
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
CO2	analyze the solution of linear and nonlinear ordinary differential equations
CO3	apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/ SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course

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project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable. with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

**Suggested Learning Resources:**

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**


**Text Books**

1. **B. S. Grewal:** "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup>Ed., 2021.
2. **E. Kreyszig:** "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.


**Reference Books**

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. **Srimanta Pal & Subodh C.Bhunia:** "Engineering Mathematics" Oxford University Press,

3 <sup>rd</sup> Ed., 2016.							
3. <b>N.P Bali and Manish Goyal:</b> "A Textbook of Engineering Mathematics" Laxmi Publications, 10 <sup>th</sup> Ed., 2022.							
4. <b>C. Ray Wylie, Louis C. Barrett:</b> "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6 <sup>th</sup> Ed., 2017.							
5. <b>Gupta C.B, Sing S.R and Mukesh Kumar:</b> "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.							
6. <b>H. K. Dass and Er. Rajnish Verma:</b> "Higher Engineering Mathematics" S. Chand Publication, 3 <sup>rd</sup> Ed., 2014.							
7. <b>James Stewart:</b> "Calculus" Cengage Publications, 7 <sup>th</sup> Ed., 2019.							
8. <b>David C Lay:</b> "Linear Algebra and its Applications", Pearson Publishers, 4 <sup>th</sup> Ed., 2018.							
9. <b>Gareth Williams:</b> "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6 <sup>th</sup> Ed., 2017.							
10. <b>Gilbert Strang:</b> "Linear Algebra and its Applications". Cengage Publications, 4 <sup>th</sup> Ed. 2022.							
<b>Web links and Video Lectures (e-Resources):</b>							
<ul style="list-style-type: none"> <li>• <a href="http://nptel.ac.in/courses.php?disciplineID=111">http://nptel.ac.in/courses.php?disciplineID=111</a></li> <li>• <a href="http://www.class-central.com/subject/math(MOOCs)">http://www.class-central.com/subject/math(MOOCs)</a></li> <li>• <a href="http://academicearth.org/">http://academicearth.org/</a></li> <li>• VTU e-Shikshana Program</li> <li>• VTU EDUSAT Program</li> </ul>							
<b>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</b>							
<ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Assignments</li> <li>• Seminar</li> </ul>							
<b>COs and POs Mapping (Individual teacher has to fill up)</b>							
COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							
<b>Level 3- Highly Mapped,    Level 2-Moderately Mapped,    Level 1-Low Mapped,    Level 0- Not Mapped</b>							

  
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Course Title:	<b>Applied Physics for CSE Stream</b>		
Course Code:	<b>BPHYS102/202</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2-2-2-0	Total Marks	100
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Exam Hours	03
		Credits	04
<b>Course objectives</b>			
<ul style="list-style-type: none"> <li>To study the essentials of photonics and its application in computer science.</li> <li>To study the principles of quantum mechanics and its application in quantum computing.</li> <li>To study the electrical properties of materials</li> <li>To study the essentials of physics for computational aspects like design and data analysis.</li> </ul>			
<b>Teaching-Learning Process</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective			
<ol style="list-style-type: none"> <li>1. Flipped Class</li> <li>2. Chalk and Talk</li> <li>3. Blended Mode of Teaching and Learning</li> <li>4. Simulations, Interactive Simulations and Animations</li> <li>5. NPTEL and Other Videos for theory topics</li> <li>6. Smart Class Room</li> <li>7. Lab Experiment Videos</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<b>Laser and Optical Fibers:</b>			
<b>LASER:</b> Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State. Requisites of a laser system, Semiconductor Diode Laser, Applications: Bar code scanner, Laser Printer, Laser Cooling(Qualitative), Numerical Problems.			
<b>Optical Fiber:</b> Principle and Structure, Propagation of Light, Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA, Modes of Propagation, RI Profile, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic networking, Fiber Optic Communication. Numerical Problems			
<b>Pre requisite: Properties of light</b>			
<b>Self-learning: Total Internal Reflection</b>			
<b>Module-2 (8 Hours)</b>			
<b>Quantum Mechanics:</b>			
de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus - Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Quantization of Energy States, Waveforms and Probabilities. Numerical Problems.			
<b>Pre requisite: Wave-Particle dualism</b>			
<b>Self-learning: de Broglie Hypothesis</b>			
<b>Module-3 (8 Hours)</b>			
<b>Quantum Computing:</b>			
<b>Principles of Quantum Information &amp; Quantum Computing:</b>			
Introduction to Quantum Computing, Moore's law & its end, Differences between Classical & Quantum computing, Concept of qubit and its properties, Representation of qubit by Bloch sphere, Single and Two qubits, Extension to N qubits.			
<b>Dirac representation and matrix operations:</b>			
Matrix representation of 0 and 1 States, Identity Operator I, Applying I to $ 0\rangle$ and $ 1\rangle$ states, Pauli Matrices and its			

  
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operations on  $|0\rangle$  and  $|1\rangle$  states. Explanation of i) Conjugate of a matrix and ii) Transpose of a matrix. Unitary matrix U. Examples: Row and Column Matrices and their multiplication (Inner Product). Probability. and Quantum Superposition, normalization rule. Orthogonality, Orthonormality. Numerical Problems

#### Quantum Gates

**Single Qubit Gates:** Quantum Not Gate, Pauli - X, Y and Z Gates, Hadamard Gate, Phase Gate (or S Gate), T Gate

**Multiple Qubit Gates:** Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled -Z gate, Toffoli gate.

**Pre requisites:** Matrices

**Self-learning:** Moore's law

#### Module-4 (8 Hours)

#### Electrical Properties of Materials and Applications

##### Electrical Conductivity in metals

Resistivity and Mobility, Concept of Phonon, Matheissen's rule, Failures of Classical Free Electron Theory, Assumptions of Quantum Free Electron Theory, Fermi Energy, Density of States, Fermi Factor, Variation of Fermi Factor With Temperature and Energy. Numerical Problems.

##### Superconductivity

Introduction to Super Conductors, Temperature dependence of resistivity, Meissner's Effect, Critical Field, Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), Quantum Tunnelling, High Temperature superconductivity, Josephson Junctions (Qualitative), DC and RF SQUIDS (Qualitative), Applications in Quantum Computing: Charge, Phase and Flux qubits, Numerical Problems.

**Pre requisites:** Basics of Electrical conductivity

**Self-learning:** Resistivity and Mobility

#### Module-5 (8 hours)

#### Applications of Physics in computing:

##### Physics of Animation:

Taxonomy of physics based animation methods, Frames, Frames per Second, Size and Scale, Weight and Strength, Motion and Timing in Animations, Constant Force and Acceleration, The Odd rule, Odd-rule Scenarios, Motion Graphs, Examples of Character Animation: Jumping, Parts of Jump, Jump Magnification, Stop Time, Walking: Strides and Steps, Walk Timing. Numerical Problems

**Statistical Physics for Computing:** Descriptive statistics and inferential statistics, Poisson distribution and modeling the probability of proton decay, Normal Distributions (Bell Curves), Monte Carlo Method: Determination of Value of  $\pi$ . Numerical Problems.

**Pre requisites:** Motion in one dimension, Probability

**Self-learning:** Frames, Frames per Second

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	Describe the principles of LASERS and Optical fibers and their relevant applications.
CO2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
CO3	Summarize the essential properties of superconductors and its applications in qubits.
CO4	Illustrate the application of physics in design and data analysis.
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8<sup>th</sup> Edition, 2018.
2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
4. Concepts of Modern Physics, Aurther Beiser, McGrawhill, 6<sup>th</sup> Edition, 2009.
5. Lasers and Non Linear Optics, B B Loud, New age international, 2011 edition.
6. A Textbook of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
7. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.

8. Quantum Computing. Vishal Sahani, McGraw Hill Education, 2007 Edition.
9. Quantum Computing – A Beginner's Introduction, Parag K Lala, Indian Edition, Mc GrawHill, Reprint 2020.
10. Engineering Physics, S P Basavaraj, 2005 Edition, Subhash Stores.
11. Physics for Animators. Michele Bousquet with Alejandro Garcia, CRC Press, Taylor & Francis, 2016.
12. Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations, Maria Luisa Dalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli, Trends in Logic, Volume 48, Springer.
13. Statistical Physics: Berkely Physics Course. Volume 5. F. Reif, McGraw Hill.
14. Introduction to Superconductivity, Michael Tinkham, McGraw Hill, INC, II Edition

**Web links and Video Lectures (e-Resources):**

**LASER :** <https://www.youtube.com/watch?v=WgzvnezP1yc>

**Superconductivity :** <https://www.youtube.com/watch?v=MT5X15ppn48>

**Optical Fiber :** [https://www.youtube.com/watch?v=N\\_kA8EpCUQo](https://www.youtube.com/watch?v=N_kA8EpCUQo)

**Quantum Mechanics :** <https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s>

**Quantum Computing :** <https://www.youtube.com/watch?v=jHoEjvuPoB8>

**Quantum Computing :** <https://www.youtube.com/watch?v=ZuvCUU2jD30>

**Physics of Animation :** [https://www.youtube.com/watch?v=kj1kaA\\_8Fu4](https://www.youtube.com/watch?v=kj1kaA_8Fu4)

**Statistical Physics Simulation :** [https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability\\_en.html](https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability_en.html)

**NPTEL Superconductivity:** <https://archive.nptel.ac.in/courses/115/103/115103108/>

**NPTEL Quantum Computing :** <https://archive.nptel.ac.in/courses/115/101/115101092>

**Virtual LAB :** <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>

**Virtual LAB :** <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

<http://nptel.ac.in>

<https://swayam.gov.in>

[https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

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**Laboratory Component:**

Any Ten Experiments have to be completed from the list of experiments

**Note:** The experiments have to be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

**List of Experiments**

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Planck's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive Simulations(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	3	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	2
CO4	3	2	1	-	1	-	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped,


**Note :** The CO-PO mapping values are indicative. The course coordinator can alter the mapping using Competency and Performance Indicators mentioned in the AICTE Exam reforms.

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## Computer Science and Engineering and allied branches(Chemistry group)

<b>Course Title:</b>	<b>Applied Chemistry for Computer Science &amp; Engineering stream</b>		
<b>Course Code:</b>	<b>BCHE102/202</b>	CIEMarks	50
<b>Course Type(Theory/Practical/Integrated)</b>	Integrated	SEEMarks	50
		Total Marks	100
<b>TeachingHours/Week(L:T:P:S)<sup>1</sup></b>	2:2:2:0	Exam Hours	03
<b>TotalHoursofPedagogy</b>	40hoursTheory+ 10to12Labslots	Credits	04
<b>Courseobjectives</b>			
<ul style="list-style-type: none"> <li>Toenablestudentstoacquireknowledgeonprinciplesofchemistryforengineeringapplications.</li> <li>Todevelopanintuitiveunderstandingofchemistrybyemphasizingtherelatedbranchesofengineering.</li> <li>Toprovidestudentswithasolidfoundationinanalyticalreasoningrequiredtosolvesocietalproblems.</li> </ul>			
<b>Teaching-LearningProcess</b>			
Thesearesamplestrategies,whichteachercanusetoacceleratetheattainmentofthevariouscourseoutcomesandmakeTeaching-Learningmoreeffective			
<ul style="list-style-type: none"> <li>Tutorial&amp;remedialclassesforneedystudents(notregularT/R)</li> <li>ConductingMakeupclasses/Bridgecoursesforneedystudents</li> <li>Demonstrationofconceptseitherbybuildingmodelsorbyindustryvisit</li> <li>Experimentsinlaboratoriesshallbeexecutedinblendedmode(conventionalornon-conventionalmethods)</li> <li>UseofICT-Onlinevideos,onlinecourses</li> <li>Useofonlineplatformsforassignments/Notes/Quizzes(Ex.Googleclassroom)</li> </ul>			
<b>MODULE1:SensorsandEnergySystems(8hr)</b>			
<p><b>Sensors:</b>Introduction,working,principleandapplicationsofConductometricsensors,Electrochemical sensors,Thermometricsensors (Flame photometry)andOpticalsensors (colorimetry).Sensorsforthemeasurement of dissolved oxygen (DO). Electrochemical sensors for the pharmaceuticals.ElectrochemicalgassensorsforSOxandNOx.Disposableensorsinthedetectionofbiomoleculesandpesticides.</p> <p><b>EnergySystems:</b>Introductiontobatteries,construction,workingandapplicationsofLithiumionandSodiumionbatteries.QuantumDotSensitizedSolarCells(QDSSC's)-Principle, PropertiesandApplications.</p> <p><b>Self-learning:</b> Types of electrochemical sensor, Gas sensor - O<sub>2</sub> sensor, Biosensor - Glucosensors.</p>			
<b>MODULE2:MaterialsforMemoryandDisplaySystems(8hr)</b>			
<p><b>Memory Devices:</b> Introduction, Basic concepts of electronic memory, History of organic/polymerelectronicmemorydevices,Classificationofelectronicmemorydevices,</p>			

1.NOTE:Whereverthecontact hoursisnotsufficient,tutorialhourcanbeconvertedto theoryhours

  
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types of organic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials).

**Display Systems:** Photoactive and electroactive materials. Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's). Light emitting electrochemical cells.

**Self-learning:** Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminium (Al), and Brominated flame retardants in computers.

### MODULE 3: Corrosion and Electrode System (8hr)

**Corrosion Chemistry:** Introduction, electrochemical theory of corrosion, types of corrosion - differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

**Electrode System:** Introduction, types of electrodes. Ion selective electrode - definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode - construction, working and applications of calomel electrode. Concentration cell - Definition, construction and Numerical problems.

**Analytical Techniques:** Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron.

**Self-learning:** IR and UV-Visible spectroscopy.

### MODULE 4: Polymers and Green Fuels (8hr)

**Polymers:** Introduction, Molecular weight -

Number average, weight average and numerical problems. Preparation, properties, and commercial application of kevlar. Conducting polymers - synthesis and conducting mechanism of polyacetylene and commercial applications.

**Green Fuels:** Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Generation of energy (green hydrogen) by electrolysis of water and its advantages.

**Self-learning:** Regenerative fuel cells

### MODULE 5: E-Waste Management (8hr)

**E-Waste:** Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatments, hydrometallurgical extraction, pyrometallurgical methods, direct recycling). Extraction of gold from E-waste. Role of stakeholders in environmental management of e-waste (producers, consumers, recyclers, and statutory bodies).

**Self-learning:** Impact of heavy metal on environment and human health.

### PRACTICAL MODULE

A - Demonstration (any two) offline/virtual:

A1. Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch

A2. Determination of strength of an acid in Pb-acid battery  
 A3. Synthesis of Iron-oxide Nanoparticles  
 A4. Electrolysis of water

**B-Exercise (compulsorily any 4 to be conducted):**

B1. Conductometric estimation of acid mixture  
 B2. Potentiometric estimation of FAS using  $K_2Cr_2O_7$   
 B3. Determination of  $pK_a$  of vinegar using pH sensor (Glass electrode)  
 B4. Determination of rate of corrosion of mild steel by weight loss method  
 B5. Estimation of total hardness of water by EDTA method

**C-Structured Enquiry (compulsorily any 4 to be conducted):**

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)  
 C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)  
 C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method  
 C4. Estimation of Sodium present in soil/effluents sample using flame photometry  
 C5. Determination of Chemical Oxygen Demand (COD) of industrial wastewater sample

**D-Open Ended Experiments (any two):**

D1. Evaluation of acid content in beverages by using pH sensors and simulation.  
 D2. Construction of photovoltaic cell.  
 D3. Design an experiment to identify the presence of proteins in given sample.  
 D4. Searching suitable PDB file and target for molecular docking

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1.	Identify the terms processes involved in scientific and engineering and applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5.	Analyze properties and multi processes associated with chemical substances in disciplinary situations

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

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- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a **mix of topics** under that module.

#### Suggested Learning Resources:

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013-2<sup>nd</sup> Edition.
2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing
5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
6. Engineering Chemistry-I, D. Groun Krishana, Vikas Publishing
7. A Textbook of Engineering Chemistry, SSDara & Dr. SSUmare, S Chand & Company Ltd., 12<sup>th</sup> Edition, 2011.
8. A Text Book of Engineering Chemistry, R. V. Gadagand Nityananda Shetty, I. K. International Publishing house, 2<sup>nd</sup> Edition, 2016.
9. Text Book of Polymer Science, F. W. Billmeyer, John Wiley & Sons, 4<sup>th</sup> Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G. A. Ozin & A. C. Arsenault, RSC Publishing, 2005
11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3<sup>rd</sup> Edition, 1996.

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12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley-Blackwell, 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH; 1st edition, 2013.
15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFIC BUSINESS PRESS Inc., 2017. Dr. H. Panda.
16. Expanding the Vision of Sensor Materials. National Research Council 1995. Washington, DC: The National Academies Press. doi:10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh Band and Dr. Roopashree B. Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F.H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K.R. Mahadik and Dr. L. Sathiyarayanan, Nirali Prakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa academic press, 1st Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha Kulkarni, Capital Publishing Company, 3rd Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpal yengar, Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi. Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S. KS Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

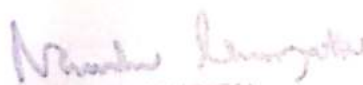
#### Weblinks and Video Lectures (e-Resources):

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWH>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEJk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

  
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**Activity Based Learning (Suggested Activities in Class) / Practical Based Learning**
<https://www.vlab.co.in/broad-area-chemical-sciences>
<https://demonstrations.wolfram.com/topics.php>
<https://interestingengineering.com/science>
**COs and POs Mapping (Individual teacher has to fill up)**

	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					



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Course Title:	Applied Physics for CV Stream		
Course Code:	BPHYC102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To understand the types of oscillation, shock waves &amp; its generation, and applications.</li> <li>To Study the elastic properties of materials and failures of engineering materials</li> <li>To Study the acoustics buildings and the essentials of radiometry and photometry.</li> <li>To understand the principles photonic devices and their application relevant to civil engineering.</li> <li>To understand the various natural disaster and safety</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective <ol style="list-style-type: none"> <li>Flipped Class</li> <li>Chalk and Talk</li> <li>Blended Mode of Teaching and Learning</li> <li>Simulations, Interactive Simulations and Animations</li> <li>NPTEL and Other Videos for theory topics</li> <li>Smart Class Room</li> <li>Lab Experiment Videos</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<b>Module -I: Oscillations and Shock waves:</b> <b>Oscillations:</b> Simple Harmonic motion (SHM), Differential equation for SHM (No derivation), Springs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation), Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of Forced oscillations (Qualitative), Resonance, Sharpness of resonance. Numerical Problems. <b>Shock waves:</b> Mach number and Mach Angle, Mach Regimes, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, Applications of Shock Waves, Numerical problems.			
<b>Pre-requisites: Basics of Oscillations</b> <b>Self-learning: Simple Harmonic motion, Differential equation for SHM</b>			
<b>Module-2 (8 Hours)</b>			
<b>Elasticity</b> Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between $\gamma$ , $n$ and $\sigma$ (with derivation), mention relation between $K$ , $Y$ and $\sigma$ , limiting values of Poisson's ratio. Beams, Bending moment and derivation of expression. Cantilever and I section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems.			
<b>Pre requisites: Elasticity, Stress &amp; Strain</b> <b>Self-learning: Stress-Strain Curve</b>			
<b>Module-3 (8 Hours)</b>			
<b>Acoustics, Radiometry and Photometry:</b> <b>Acoustics:</b> Introduction to Acoustics, Types of Acoustics, Reverberation and reverberation time, Absorption power and Absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), Measurement of absorption coefficient, Factors affecting the acoustics and remedial measures, Sound Insulation and its measurements. Noise and its Measurements, Impact of Noise in Multi-storied buildings.			



**Radiometry and Photometry:** Radiation Quantities, Spectral Quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).

**Prerequisites:** Basics of Sound, Waves & light properties.  
**Self-learning:** Introduction to acoustics.

#### Module-4 (8 Hours)

**Photonics:**

**LASER**

Properties of a LASER Beam, Interaction of Radiation with Matter, LASER action, Population Inversion, Metastable State, Requisites of a LASER System, Semiconductor LASER, LASER Range Finder, LIDAR, Road Profiling, Bridge Deflection, Speed Checker, Numerical Problems.

**Optical Fiber**

Principle and Construction of Optical Fibers, Acceptance angle and Numerical Aperture (NA), Expression for NA, Modes of Propagation, Attenuation and Fiber Losses, Fiber Optic Displacement Sensor, Fiber Optic Temperature Sensor, Numerical Problems

**Pre requisite:** Properties of light.

**Self-learning:** Total Internal Reflection.

#### Module-5 (8 Hours)

**Natural hazards and Safety**

Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rain fall, geological structure, human excavation etc., types of land slide, adverse effects, engineering solution for landslides), Forest Fires and detection using remote sensing, Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures. Numerical Problems.

**Pre requisite:** Oscillations.

**Self-learning:** Richterscale.

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	<b>Elucidate</b> the concepts in oscillations, waves, elasticity and material failures
CO2	<b>Summarize</b> concepts of acoustics in buildings and explain the concepts in radiation and photometry
CO3	<b>Discuss</b> the principles photonic devices and their application relevant to civil engineering.
CO4	<b>Describe</b> the various natural hazards and safety precautions.
CO5	<b>Practice</b> working in groups to conduct experiments in physics and <b>perform</b> precise and honest measurements.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

#### CIE for the theory component of the IC

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be

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awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

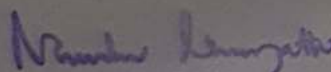
There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### **Suggested Learning Resources:**

##### **Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
2. A Textbook of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
3. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
4. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,
5. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.
6. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshab, Springer, 2<sup>nd</sup> edition.
7. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara. sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
8. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition
9. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy; Willey India Pvt. Ltd, Delhi 2014.
10. An Introduction to Disaster Management, Natural Disastr & Man Made Hazards, S. Vaidyanathan, IKON Books P
11. Natural Hazards, Edward Bryant, Cambridge University. Press, 2<sup>nd</sup> Edition
12. Natural Hazards by Ramesh .P. Singh, CRC Press, Taylor and Francis group.
13. Disaster Education and Management, Rajendra Kumar Bhandari, Springer. India 2014
14. Principles of Fire Safety Engineering Understanding Fire & Fire Protection. Akhil Kumar Das, PHI Learning , II Edition.

#### **Web links and Video Lectures (e-Resources):**

  
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**Web links:**

**Simple Harmonic motion:**<https://www.youtube.com/watch?v=k2FvSzWeVxQ>

**Shock waves:**<https://physics.info/shock/>

**Shock waves and its applications:**[https://www.youtube.com/watch?v=tz\\_3M3v3kxk](https://www.youtube.com/watch?v=tz_3M3v3kxk)

**Stress-strain curves:**<https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>

**Stress curves:**<https://www.youtube.com/watch?v=f08Y39UiC-o>

**Oscillations and waves :**<https://openstax.org/books/college-physics-2e>

**Earthquakes:**[www.asc-india.org](http://www.asc-india.org)

**Earthquakes and Hazards:**<http://quake.usgs.gov/tsunami>

**Landslide hazards:**<http://landslides.usgs.gov>

**Acoustics:**<https://www.youtube.com/watch?v=fHBPvMDFyO8>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

<http://nptel.ac.in>

<https://swayam.gov.in>

[https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

**Laboratory Component:**

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

**List of Experiments**

1. Determination of Young's modulus of the material of the given bar Uniform Bending.
2. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
3. Study of Forced Mechanical Oscillations and Resonance.
4. Study of the frequency response of Series & Parallel LCR circuits.
5. Determination of Fermi Energy of the given Conductor.
6. Determination of Resistivity by Four Probe Method.
7. Determination of effective spring constant of the given springs in series and parallel combinations.
8. Determination of Young's modulus of the material of the given bar Single Cantilever.
9. Determination of the Moment of Inertia of the given irregular body using torsional pendulum.
10. Determination of Wavelength of Laser using Diffraction Grating.
11. Determination of Acceptance angle and Numerical Aperture of the given Optical Fiber.
12. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Application of Statistics using Spread Sheets.
16. PHET Interactive Simulations :

(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

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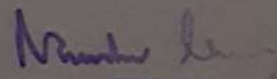
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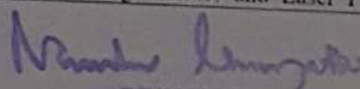
COs and POs Mapping (Individual teacher has to fill up)												
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	1	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	3	-	-	-	1	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

Note : The CO-PO mapping values are indicative. The course coordinator can alter the mapping using **Competency and Performance Indicators** mentioned in the **AICTE Exam reforms**

  
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Course Title:	<b>Applied Physics for EEE Stream</b>		
Course Code:	<b>BPHYE102/202</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours+10-12 Lab Slots	Credits	04
<b>Course objectives</b>			
<ul style="list-style-type: none"> <li>To study the principles of quantum mechanics</li> <li>To understand the properties of dielectrics and superconductors</li> <li>To study the essentials of photonics for engineering applications.</li> <li>To understand fundamentals of vector calculus and EM waves.</li> <li>To study the knowledge about semiconductors and devices.</li> </ul>			
<b>Teaching-Learning Process</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective			
<ol style="list-style-type: none"> <li>1. Flipped Class</li> <li>2. Chalk and Talk</li> <li>3. Blended Mode of Learning</li> <li>4. Simulations, Interactive Simulations and Animations</li> <li>5. NPTEL and Other Videos for theory topics</li> <li>6. Smart Class Room</li> <li>7. Lab Experiment Videos</li> </ol>			
<b>Module-1 (08 Hours)</b>			
<b>Quantum Mechanics:</b>			
de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation, Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Waveforms and Probabilities. Numerical Problems			
<b>Pre-requisite: Wave-Particle dualism</b>			
<b>Self-learning: de Broglie Hypothesis</b>			
<b>Module-2 (08 hours)</b>			
<b>Electrical Properties of Solids:</b>			
<b>Conductors:</b>			
Quantum Free Electron Theory of Metals: Assumptions, Fermi-energy, Fermi factor, Variation of Fermi Factor with Temperature and Energy. Mention of expression for electrical conductivity.			
<b>Dielectric Properties:</b> Polar and non-polar dielectrics, Electrical Polarization Mechanisms, internal fields in solids, Clausius-Mossotti equation (Derivation), Solid, Liquid and Gaseous dielectrics. Application of dielectrics in transformers, Capacitors, Electrical Insulation. Numerical Problems.			
<b>Superconductivity:</b>			
Introduction to Superconductors, Temperature dependence of resistivity, Meissner Effect, Critical Field. Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), High Temperature superconductivity, SQUID, MAGLEV, Numerical problems.			
<b>Pre-requisites: Classical Free Electron Theory</b>			
<b>Self-learning: Dielectrics Basics</b>			
<b>Module-3 (08 hours)</b>			
<b>Lasers and Optical Fibers:</b>			
<b>Lasers:</b> Characteristics of LASER, Interaction of radiation with matter, Expression for Energy Density and its significance, Requisites of a Laser System. Conditions for Laser action. Principle, Construction and Working of Carbon Dioxide Laser. Application of Lasers in Defense (Laser range finder) and Laser Printing. Numerical			

  
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**Problems**

**Optical Fibers:** Total Internal Reflection, Propagation mechanism, Angle of Acceptance, Numerical Aperture, Fractional Index Change, Modes of Propagation, Number of Modes and V Number, Types of Optical Fibers, Attenuation and Mention of Expression for Attenuation coefficient, Attenuation Spectrum of an Optical Fiber with Optical Windows. Discussion of Block Diagram of Point to Point Communication, Intensity based Fiber Optic Displacement Sensor, Merits and Demerits, Numerical problems.

**Pre-requisite:** Properties of light

**Self-learning:** Total Internal Reflection

**Module-4 (08 hours)****Maxwell's Equations and EM waves:**

**Maxwell's Equations:** Fundamentals of Vector Calculus, Divergence and Curl of Electric field and Magnetic field (static), Gauss' divergence theorem and Stoke's theorem. Description of laws of Electrostatics, Magnetism, Faraday's laws of EMI, Current Density, Equation of Continuity, Displacement Current (with derivation), Maxwell's equations in vacuum, Numerical Problems

**EM Waves:** The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane Electromagnetic Waves in vacuum, their transverse nature.

**Pre-requisite:** Electricity & Magnetism

**Self-learning:** Fundamentals of vector calculus.

**Module-5 (08 hours)****Semiconductors and Devices:**

Fermi level in Intrinsic & Extrinsic Semiconductor, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression), Relation between Fermi energy & Energy gap in intrinsic semiconductors (derivation), Law of mass action, Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application. Photo-diode and Power responsivity, Construction and working of Semiconducting Laser, Four probe method to determine resistivity, Phototransistor, Numerical problems.

**Pre-requisite:** Basics of Semiconductors

**Self-learning:** Fermi level in Intrinsic & Extrinsic Semiconductor

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	<b>Describe</b> the fundamental principles of the Quantum Mechanics and the essentials of Photonics.
CO2	<b>Elucidate</b> the concepts of conductors, dielectrics and superconductivity
CO3	<b>Discuss</b> the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO4	<b>Summarize</b> the properties of semiconductors and the working principles of semiconductor devices.
CO5	<b>Practice</b> working in groups to conduct experiments in physics and <b>Perform</b> precise and honest measurements.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

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Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**  
**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2. An Introduction to Lasers theory and applications by M.N.Avadhanulu and P.S. Hemne revised Edition 2012. S. Chand and Company Ltd -New Delhi.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Concepts of Modern Physics-Arthur Beiser: 6th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
5. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
6. Introduction to Electrodynamics, David Griffith, 4<sup>th</sup> Edition, Cambridge University Press 2017.
7. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
8. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
9. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.

#### Web links and Video Lectures (e-Resources):

Laser:[https://www.britannica.com/technology/laser\\_k](https://www.britannica.com/technology/laser_k)

Laser:<https://nptel.ac.in/courses/115/102/115102124/>

Quantum mechanics:<https://nptel.ac.in/courses/115/104/115104096/>

Physics:<http://hyperphysics.phy-astr.gsu.edu/hbase/iframe.html>

Numerical Aperture of fiber:<https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement>

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**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**<http://nptel.ac.in><https://swayam.gov.in><https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham><https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>[https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)<https://phet.colorado.edu><https://www.myphysicslab.com>**Laboratory Component:**

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended

Based on the convenience classify the following experiments into above categories selecting at least three experiments for each type. Select at least one simulation/spreadsheet activity.

**List of Experiments**

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Plank's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive

Simulations(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	1	-	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

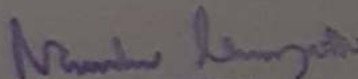
Note : The CO-PO mapping values are indicative. The course coordinator can alter the mapping using Competency and Performance Indicators mentioned in the AICTE Exam reforms.

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Elements of Electrical Engineering			
Course Title:	Elements of Electrical Engineering		
Course Code:	BEEE103	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b>			
<ul style="list-style-type: none"> <li>To explain the basic laws used in the analysis of DC circuits, electromagnetism.</li> <li>To explain the behavior of circuit elements in single-phase circuits.</li> <li>To explain three phase circuits, balanced loads and measurement of three phase power.</li> <li>To explain the measuring techniques, measuring instruments and domestic wiring.</li> <li>To explain electricity billing, equipment and personal safety measures.</li> </ul>			
<b>Teaching-Learning Process</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective			
<ol style="list-style-type: none"> <li>Chalk and talk</li> <li>Animated/NPTEL videos</li> <li>Cut sections</li> <li>PPTs</li> </ol>			
<b>Module-1 (08 Hrs)</b>			
<b>DC circuits:</b> Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. <b>Electromagnetism:</b> Faraday's Laws of Electromagnetic Induction, Lenz's Law, Flemings rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling. Energy stored in magnetic field. Simple Numerical.			
<b>Module-2 (08 Hrs)</b>			
<b>Single-phase AC circuits:</b> Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phasor representation of alternating quantities. Analysis of R, L, C, R-L, R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor. Series, Parallel and Series-Parallel circuits. Simple Numerical.			
<b>Module-3 (08 Hrs)</b>			
<b>Three-phase AC circuits:</b> Necessity and advantage of 3-phase system. Generation of 3-phase power. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits. Measurement of 3-phase power by 2-wattmeter method. Simple Numerical.			
<b>Module-4 (08 Hrs)</b>			
<b>Measuring instruments:</b> construction and working principle of whetstone's bridge, Kelvin's double bridge, Megger, Maxwell's bridge for inductance, Schering's bridge for capacitance, concepts of current transformer and potential transformer. (Only balance equations and Excluding Vector diagram approach) <b>Domestic Wiring:</b> Requirements, Types of wiring: casing, capping, Two way and three way control of load.			
<b>Module-5 (08 Hrs)</b>			
<b>Electricity bill:</b> Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. <b>Equipment Safety measures:</b> Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. <b>Personal safety measures:</b> Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB).			

  
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**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Understand the concepts of DC circuits and Electromagnetism.
CO2	Understand the concepts of single phase and Three phase AC circuits.
CO3	Apply the basic Electrical laws to solve circuits.
CO4	Understand the concepts of measurements and measuring Instruments
CO5	Explain the concepts of domestic wiring, electricity billing, circuit protective devices and personal safety measures.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>. and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

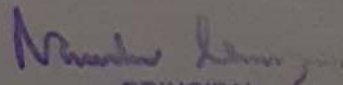
If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

  
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**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books:**

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

**Reference Books:**

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.
4. Electrical and electronic measurements and instrumentation by A K Sawhney, Dhanapat Rai and Co. edition, January 2015

**Web links and Video Lectures (e-Resources):**

- [www.nptel.ac.in](http://www.nptel.ac.in)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Wherever required, faculty shall demonstrate the concepts through laboratory experiments.

**COs and POs Mapping (Individual teacher has to fill up)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	0	1	1	1	1	0	0	0	1
CO2	3	3	2	1	1	1	0	0	0	0	0	1
CO3	3	2	1	1	1	1	1	1	0	0	0	1
CO4	3	2	2	1	0	1	1	1	0	0	0	1
CO5	3	1	2	0	1	2	1	1	0	0	1	1

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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Course Title:	ENGINEERING MECHANICS		
Course Code:	BCIVC103/203	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Total Marks	100
Total Hours of Pedagogy	25 hrs Lecture+25 hrs Tutorial = 50 hrs	Exam Hours	03
		Credits	03

**Course objectives**

- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To analyse the member forces in trusses
- To make students to learn the effect of friction on different planes
- To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

**Teaching-Learning Process**

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

**Module-1 (10)**

**Resultant of coplanar force system:** Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

**Module-2 (10)**

**Equilibrium of coplanar force system:** Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads. Numerical examples.

**Module-3(10)**

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**Analysis of Trusses:** Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.

**Friction:** Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.

**Module-4(10)**

**Centroid of Plane areas:** Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples.

**Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections,, Numerical examples.

**Module-5 (10)**

**Kinematics:**

Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion

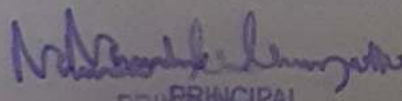
Projectiles: Introduction, numerical examples on projectiles.

**Kinetics:** Introduction, D'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

C01	Compute the resultant of a force system and resolution of a force
C02	Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces
C03	Analyse the frictional resistance offered by different planes
C04	Locate the centroid and compute the moment of inertia of sections
C05	Analyze the bodies in motion

  
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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assessment depending on the requirement of the course and plan to attain the COs and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

**Suggested Learning Resources:****Text Books**

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics. 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

**Reference Books:**

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Bhavikatti S S. Engineering Mechanics, 2019, New Age International
6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

**Web links and Video Lectures (e-Resources):**

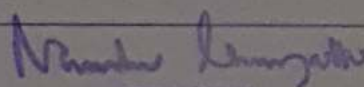
- <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
- <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
- <https://www.youtube.com/watch?v=ljDIIMvxeq&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5>
- <https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18>
- <https://www.youtube.com/watch?v=3YBXteL-qY4>
- <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
- <https://www.youtube.com/watch?v=lheoBL2QaQU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
- [https://www.youtube.com/watch?v=atoP5\\_DeTPE](https://www.youtube.com/watch?v=atoP5_DeTPE)
- <https://www.youtube.com/watch?v=kmsmp9OzAsI>
- <https://www.youtube.com/watch?v=x1ef048b3CE>
- [https://www.youtube.com/watch?v=l\\_Nck-X49qc](https://www.youtube.com/watch?v=l_Nck-X49qc)
- [https://play.google.com/store/apps/details?id=appinventor.ai\\_jgarc322.Resultant\\_Force](https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force)
- <https://www.youtube.com/watch?v=RIBeeW1DSZg>
- <https://www.youtube.com/watch?v=R8wKV0UQtlo>
- [https://www.youtube.com/watch?v=0RZHHgL8m\\_A](https://www.youtube.com/watch?v=0RZHHgL8m_A)
- <https://www.youtube.com/watch?v=BlS5KnQOWkY>

**Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning**

- [https://www.youtube.com/watch?v=Zrc\\_gB1YYS0](https://www.youtube.com/watch?v=Zrc_gB1YYS0)
- <https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bicudonoiluc>
- [https://www.youtube.com/watch?v=Hn\\_ioUo9m4](https://www.youtube.com/watch?v=Hn_ioUo9m4)
- <https://play.google.com/store/apps/details?id=com.teobou>
- <https://www.youtube.com/watch?v=WOHRp3V-QA0>

*Nanda Lengka*  
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Course Title:	<b>Principles of Programming using C</b>	
Course Code:	<b>BPOPS103/203</b>	CIE Marks 50
Course Type (Theory/Practical /Integrated )	Integrated	SEE Marks 50
		Total Marks 100
Teaching Hours/Week (L:T:P: S)	2:0:2	Exam Hours 3+2
Total Hours of Pedagogy	40 hours	Credits 03
	<b>Course Objectives:</b>  CLO 1. Elucidate the basic architecture and functionalities of a Computer CLO 2. Apply programming constructs of C language to solve the real-world problems CLO 3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems CLO 4. Design and Develop Solutions to problems using structured programming constructs such as functions and procedures	
	<b>Teaching-Learning Process (General Instructions)</b>  These are sample strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promote critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem and encourage the student to come up with their own creative way to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.</li> <li>Use <a href="https://pythontutor.com/visualize.html#mode=edit">https://pythontutor.com/visualize.html#mode=edit</a> in order to visualize the operations of C Programs</li> </ol>	
	<b>Module-1 (6 Hours of Pedagogy)</b>	
	<b>Introduction to C:</b> Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.	
	<b>Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 - 8.6, 9.1-9.14</b>	
Teaching-Learning Process	Chalk and talk method/PowerPoint Presentation/ Web Content: <a href="https://tinyurl.com/4xmrexre">https://tinyurl.com/4xmrexre</a>	

  
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<b>Module-2 (6 Hours of Pedagogy)</b>	
	<p>Operators in C, Type conversion and typecasting.</p> <p><b>Decision control and Looping statements:</b> Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.</p> <p><b>Textbook: Chapter 9.15-9.16, 10.1-10.6</b></p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>Module-3 (8 Hours of Pedagogy)</b>	
	<p>Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.</p> <p>Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays, applications of arrays.</p> <p>Textbook: Chapter 11.1-11.10, 12.1-12.10,12.12</p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>Module-4 (6 Hours of Pedagogy)</b>	
	<p><b>Strings and Pointers:</b> Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. <b>Pointers:</b> Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers</p> <p><b>Textbook: Chapter 13.1-13.6, 14-14.7</b></p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>Module-5 (6 Hours of Pedagogy)</b>	
	<p><b>Structure, Union, and Enumerated Data Type:</b> Introduction, structures and functions, Unions, unions inside structures, Enumerated data type.</p> <p><b>Files:</b> Introduction to files, using files in C, reading and writing data files. , Detecting end of file</p> <p><b>Textbook: Chapter 15.1 – 15.10, 16.1-16.5</b></p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>CourseOutcomes(CourseSkillSet)</b>	
Attheendofthecoursethestudentwillbeableto:	
CO1. Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.	
CO 2. Apply programming constructs of C language to solve the real world problem	
CO 3. Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting	
CO 4. Explore user-defined data structures like structures, unions and pointers in implementing solutions	

CO5.Design and Develop Solutions to problems using modular programming constructs using functions

### Programming Assignments

- 1 Simulation of a SimpleCalculator.
- 2 Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
- 3 An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4. Write a C Program to display the following by reading the number of rows as input,
 

```

          1
        1 2 1
      1 2 3 2 1
    1 2 3 4 3 2 1
    -----
    nth row
```
- 5 Implement Binary Search on Integers.
- 6 Implement Matrix multiplication and validate the rules of multiplication.
- 7 Compute  $\sin(x)/\cos(x)$  using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
- 8 Sort the given set of N numbers using Bubble sort.
- 9 Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
- 10 Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
- 11 Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
12. Write a C program to copy a text file to another, read both the input file name and target file name.

Note:

SEE marks for the practical course is 50 Marks.

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SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. OR based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Students can pick one experiment from the questions lot with equal choice to all the students in a batch. - Student should develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem.

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

**The duration of SEE is 02 hours**

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

#### **CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the

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continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.

- The laboratory test (duration 03 hours) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for 20 marks.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module

#### Suggested Learning Resources:

##### Textbooks

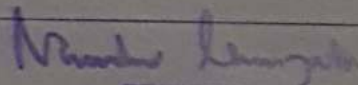
1. Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.

##### Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

#### Web links and Video Lectures (e-Resources):

1. [elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html](http://elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html)
2. <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.

  
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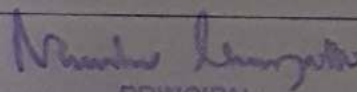
3. <https://tinyurl.com/4xmrcxr>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes
- Assignments
- Seminars

## I Semester

INNOVATION and DESIGN THINKING			
Course Code	BIDTK158/258	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01
<p><b>Course Category:</b> Foundation</p> <p><b>Preamble:</b> This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.</p> <p><b>Course objectives:</b></p> <ul style="list-style-type: none"> <li>To explain the concept of design thinking for product and service development</li> <li>To explain the fundamental concept of innovation and design thinking</li> <li>To discuss the methods of implementing design thinking in the real world.</li> </ul>			
<p><b>Teaching-Learning Process (General Instructions)</b></p> <p>These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.</li> <li>Show Video/animation films to explain concepts</li> <li>Encourage collaborative (Group Learning) Learning in the class</li> <li>Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Topics will be introduced in multiple representations.</li> <li>Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>PROCESS OF DESIGN</b>			
<b>Understanding Design thinking</b>			
Shared model in team-based design - Theory and practice in Design thinking - Explore presentation signers across globe - MVP or Prototyping			
<b>Teaching-Learning Process</b>	Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos		
<b>Module-2</b>			
<b>Tools for Design Thinking</b>			
Real-Time design interaction capture and analysis - Enabling efficient collaboration in digital space - Empathy for design - Collaboration in distributed Design			
<b>Teaching-Learning</b>	Case studies on design thinking for real-time interaction and analysis		

  
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<b>Process</b>	Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking	
<b>Module-3</b>		
<b>Design Thinking in IT</b> Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping		
<b>Teaching-Learning Process</b>	Case studies on design thinking and business acceptance of the design Simulation on the role of virtual eco-system for collaborated prototyping	
<b>Module-4</b>		
<b>DT For strategic innovations</b> Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.		
<b>Teaching-Learning Process</b>	Business model examples of successful designs Presentation by the students on the success of design Live project on design thinking in a group of 4 students	
<b>Module-5</b>		
Design thinking workshop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test		
<b>Teaching-Learning Process</b>	8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop	
<b>Course Outcomes:</b> Upon the successful completion of the course, students will be able to:		
CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Appreciate various design process procedure	K2
CO2	Generate and develop design ideas through different technique	K2
CO3	Identify the significance of reverse Engineering to Understand products	K2
CO4	Draw technical drawing for design ideas	K3

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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

- Two Tests (preferably in MCQ pattern ) each of **30 Marks**; The first test after the completion of the 40 -50% syllabus of the course. A second test after the completion of 90-100% of the syllabus of the course.
- Two Assignments/two quizzes/two seminars/one field survey and report presentation/one-course project totaling **40 marks**

Total Marks scored (test + assignments) out of 100 shall be scaled down to **50 marks**

At the beginning of the semester, the instructor/faculty teaching the course has to announce the methods of CIE for the course.

The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

#### Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for subject

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hour**

#### Suggested Learning Resources:

##### Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand - Improve - Apply", Springer, 2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

#### References:

*Manda Kanyata*  
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5. Yousef Haik and Tamer M. Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
6. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover - 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

**Web links and Video Lectures (e-Resources):**

1. [www.tutor2u.net/business/presentations/. /productlifecycle/default.html](http://www.tutor2u.net/business/presentations/. /productlifecycle/default.html)
2. [https://docs.oracle.com/cd/E11108\\_02/otn/pdf/. /E11087\\_01.pdf](https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf)
3. [www.bizfilings.com](http://www.bizfilings.com) > Home > Marketing > Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. [www.vertabelo.com/blog/documentation/reverse-engineering](http://www.vertabelo.com/blog/documentation/reverse-engineering)  
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM>  
[thevirtualinstructor.com/foreshortening.html](http://thevirtualinstructor.com/foreshortening.html)  
<https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>  
<https://dschool.stanford.edu/use-our-methods/> 6. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process> 7.  
<http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49 8.  
<https://www.nngroup.com/articles/design-thinking/> 9.  
<https://designthinkingforeducators.com/design-thinking/> 10.  
[www.designthinkingformobility.org/wp-content/.../10/NapkinPitch\\_Worksheet.pdf](http://www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- <http://dschool.stanford.edu/dgift/>

[https://onlinecourses.nptel.ac.in/noc19\\_mg60/preview](https://onlinecourses.nptel.ac.in/noc19_mg60/preview)

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Introduction to Civil Engineering			
Course Title:			
Course Code:	BESCK104A/204	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	25 hrs Lecture+25 hrs Tutorial = 50 hrs	Credits	03

**Course objectives**

- To make students learn the scope of various specializations of civil engineering.
- To make students learn the concepts of sustainable infrastructure
- To develop students' ability to analyse the problems involving forces, moments with their applications.
- To develop the student's ability to find out the center of gravity and moment of inertia and their applications.
- To make the students learn about kinematics

**Teaching-Learning Process**

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby sites to give brief information about the Civil Engineering structures.
3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
4. Encourage collaborative (Group) Learning in the class.
5. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
10. Individual teachers can devise innovative pedagogy to improve teaching-learning.

**Module-1 (10)****Civil Engineering Disciplines and Building Science**

**Introduction to Civil Engineering:** Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management.

**Basic Materials of Construction:** Bricks, Cement & mortars, Plain, Reinforced & Pre-stressed Concrete, Structural steel, Construction Chemicals.

**Structural elements of a building:** foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase

**Module-2 (10)****Societal and Global Impact of Infrastructure**

**Infrastructure:** Introduction to sustainable development goals, Smart city concept, clean city concept,

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Safe city concept

**Environment:** Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control

**Built-environment:** Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.

**Module-3(10)**

**Analysis of force systems:** Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force systems

**Module-4(10)**

**Centroid:** Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples

**Module-5 (10)**

**Moment of inertia:** Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up sections, Numerical Examples.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Understand the various disciplines of civil engineering
CO2	Understand the infrastructure requirement for sustainable development
CO3	Compute the resultant and equilibrium of force systems.
CO4	Locate the centroid of plane and built-up sections
CO5	Compute the moment of inertia of plane and built-up sections.

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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

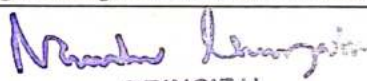
- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

**Suggested Learning Resources:****Text Books**

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

**Reference Books:**

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.

  
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5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International

6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

**Web links and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
- <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
- <https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5>
- <https://www.youtube.com/watch?v=VORcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18>
- <https://www.youtube.com/watch?v=3YBXteL-qY4>
- <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
- <https://www.youtube.com/watch?v=lheoBL2QaQ&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
- [https://www.youtube.com/watch?v=atoP5\\_DeTPE](https://www.youtube.com/watch?v=atoP5_DeTPE)
- <https://www.youtube.com/watch?v=kmsmp9OzAsI>
- <https://www.youtube.com/watch?v=x1ef048b3CE>
- [https://www.youtube.com/watch?v=l\\_Nck-X49qc](https://www.youtube.com/watch?v=l_Nck-X49qc)
- [https://play.google.com/store/apps/details?id=appinventor.ai\\_jgarc322.Resultant\\_Force](https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force)
- <https://www.youtube.com/watch?v=RIBeeW1DSZg>
- <https://www.youtube.com/watch?v=R8wKV0UQtlo>
- [https://www.youtube.com/watch?v=0RZHHgL8m\\_A](https://www.youtube.com/watch?v=0RZHHgL8m_A)
- <https://www.youtube.com/watch?v=Bl5KnQOWkY>

**Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning**

- [https://www.youtube.com/watch?v=Zrc\\_gB1YYS0](https://www.youtube.com/watch?v=Zrc_gB1YYS0)
- <https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc>
- [https://www.youtube.com/watch?v=Hn\\_iozUo9m4](https://www.youtube.com/watch?v=Hn_iozUo9m4)
- <https://play.google.com/store/apps/details?id=com.teobou>
- <https://www.youtube.com/watch?v=WOHRp3V-QA0>

**COs and POs Mapping (Individual teacher has to fill up)**

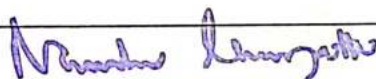
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
C01	1					1						
C02	1					1	1					
C03	2	3										
C04	2	3										
C05	2	3										

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

**Note:** Depending on the assessment tool used, higher order POs can be identified by the concerned course instructor.

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Introduction to Electrical Engineering			
Course Code:	BESCK104B	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Total Marks	100
Total Hours of Pedagogy	40 hours	Exam Hours	03
		Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To explain the laws used in the analysis of DC and AC circuits.</li> <li>To explain the behavior of circuit elements in single-phase circuits.</li> <li>To explain the construction and operation of transformers, DC generators and motors and induction motors.</li> <li>To introduce concepts of circuit protecting devices and earthing.</li> <li>To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective <ol style="list-style-type: none"> <li>Chalk and talk</li> <li>Animated/NPTEL videos</li> <li>Cut sections</li> <li>PPTs</li> </ol>			
<b>Module-1 (08 Hrs)</b>			
<b>Introduction:</b> Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach. <b>Power Generation:</b> Hydel, Nuclear, Solar & wind power generation (Block Diagram approach). <b>DC Circuits:</b> Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.			
<b>Module-2 (08 Hrs)</b>			
<b>A.C. Fundamentals:</b> Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions) Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical). <b>Three Phase Circuits:</b> Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities (excluding proof)			
<b>Module-3(08 Hrs)</b>			
<b>DC Machines:</b> <b>DC Generator:</b> Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical. <b>DC Motor:</b> Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC motors. Simple numerical.			

  
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<b>Module-4(08 Hrs)</b>	
<p><b>Transformers:</b> Necessity of transformer, principle of operation, Types and construction of single-phase transformers, EMF equation. losses, variation of losses with respect to load. Efficiency and simple numerical.</p> <p><b>Three-phase induction Motors:</b> Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.</p>	
<b>Module-5 (08 Hrs)</b>	
<p><b>Domestic Wiring:</b> Requirements, Types of wiring: casing, capping. Two way and three way control of load.</p> <p><b>Electricity Bill:</b> Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of “unit” used for consumption of electrical energy. two-part electricity tariff, calculation of electricity bill for domestic consumers.</p> <p><b>Equipment Safety measures:</b> Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.</p> <p><b>Personal safety measures:</b> Electric Shock, Earthing and its types, Safety Precautions to avoid shock.</p>	
<b>Course outcome (Course Skill Set)</b>	
At the end of the course the student will be able to:	
CO1	Understand the concepts of various energy sources and Electric circuits.
CO2	Apply the basic Electrical laws to solve circuits.
CO3	Discuss the construction and operation of various Electrical Machines.
CO4	Identify suitable Electrical machine for practical implementation.
CO5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

  
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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

#### Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:


**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

##### Text Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

##### Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3<sup>rd</sup> edition, 2014.

  
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<b>Web links and Video Lectures (e-Resources):</b>												
<ul style="list-style-type: none"> <li>• <a href="http://www.nptel.ac.in">www.nptel.ac.in</a></li> </ul>												
<b>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</b>												
<ul style="list-style-type: none"> <li>•</li> </ul>												
<b>COs and POs Mapping (Individual teacher has to fill up)</b>												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	0	1	1	1	1	0	0	0	1
CO2	3	3	2	1	1	1	0	0	0	0	0	1
CO3	3	2	1	1	1	1	1	1	0	0	0	1
CO4	3	2	2	1	0	1	1	1	0	0	0	1
CO5	3	1	2	0	1	2	1	1	0	0	1	1
<b>Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped</b>												

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Course Title:	Introduction to Electronics & Communication		
Course Code:	BESCK104C/204C	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<p><b>Course objectives</b></p> <ol style="list-style-type: none"> <li>1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.</li> <li>2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits. logic design, embedded systems, and communication systems.</li> <li>3. Professionalism &amp; Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.</li> </ol>			
<p><b>Teaching-Learning Process</b></p> <p>These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.</li> <li>2. Arrange visits to nearby PSUs such as BHEL, BEL, ISRO, etc., and small-scale hardware Industries to give brief information about the electronics manufacturing industry.</li> <li>3. Show Video/animation films to explain the functioning of various analog and digital circuits.</li> <li>4. Encourage collaborative (Group) Learning in the class</li> <li>5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking</li> <li>6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>7. Topics will be introduced in multiple representations.</li> <li>8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1 (8 hours )</b>			
<p><b>Power Supplies</b> –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.</p> <p><b>Amplifiers</b> – Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, multi-stage amplifiers (Text 1)</p>			
<b>Module-2(8 hours )</b>			

  
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<p><b>Oscillators</b> – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations)</p> <p><b>Operational amplifiers</b> -Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits. Text 1)</p>
<b>Module-3 ( 8 hours)</b>
<p><b>Boolean Algebra and Logic Circuits:</b> Binary numbers, Number Base Conversion, octal &amp; Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5.2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7)</p> <p><b>Combinational logic:</b> Introduction, Design procedure, Adders- Half adder, Full adder (Text 2:4.1, 4.2, 4.3)</p>
<b>Module-4 ( 8 hours)</b>
<p><b>Embedded Systems</b> – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC</p> <p><b>Sensors and Interfacing</b> – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)</p>
<b>Module-5 ( 8 hours)</b>
<p><b>Analog Communication Schemes</b> – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM , FM. Concept of Radio wave propagation (Ground, space, sky)</p> <p><b>Digital Modulation Schemes:</b> Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques. ( Text 4)</p>

  
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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

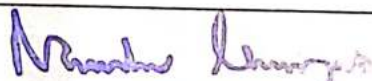
If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

  
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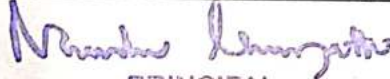
Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015.  
DOI <https://doi.org/10.4324/9781315737980>. eBook ISBN 9781315737980
2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-84.
3. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016
4. S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017.

  
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<b>Course Title</b>		<b>Introduction to C Programming</b>	
<b>Course Code:</b>	BESCK104E/204E	<b>CIE Marks</b>	50
<b>Course Type (Theory/Practical /Integrated )</b>	Integrated	<b>SEE Marks</b>	50
		<b>Total Marks</b>	100
<b>Teaching Hours/Week (L:T:P: S)</b>	2:0:2:0	<b>Exam Hours</b>	03
<b>Total Hours of Pedagogy</b>	40 hours	<b>Credits</b>	03
<b>Course Objectives:</b>			
<p>CLO 1. Elucidate the basic architecture and functionalities of a Computer</p> <p>CLO 2. Apply programming constructs of C language to solve the real-world problems</p> <p>CLO 3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems</p> <p>CLO 4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world-and when that's possible, it helps to improve the students' understanding.</li> <li>9. Use <a href="https://pythontutor.com/visualize.html#mode=edit">https://pythontutor.com/visualize.html#mode=edit</a> in order to visualize the operations of C Programs</li> </ol>			
<b>Module-1 (6 Hours of Pedagogy)</b>			
<p><b>Introduction to C:</b> Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C,  <b>Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 – 8.6, 9.1-9.14</b></p>			
<b>Teaching-Learning Process</b>		Chalk and talk method/PowerPoint Presentation	
<b>Module-2 (6 Hours of Pedagogy)</b>			
<p>Operators in C, Type conversion and typecasting.</p> <p><b>Decision control and Looping statements:</b> Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.  <b>Textbook: Chapter 9.15-9.16, 10.1-10.6</b></p>			
<b>Teaching-Learning Process</b>		Chalk and talk method/PowerPoint Presentation	
<b>Module-3 (6 Hours of Pedagogy)</b>			
<p><b>Functions:</b> Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.</p> <p><b>Arrays:</b> Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays,</p>			

  
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Passing arrays to functions.

**Textbook: Chapter 11.1-11.13, 12.1-12.6**

Teaching-Learning Process Chalk and talk method/PowerPoint Presentation

**Module-4 (6 Hours of Pedagogy)**

Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays.

**Applications of arrays and introduction to strings:** Applications of arrays, case study with sorting techniques.

**Introduction to strings:** Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.

**Textbook: Chapter 12.7-12.12**

Teaching-Learning Process Chalk and talk method/PowerPoint Presentation

**Module-5 (6 Hours of Pedagogy)**

**Strings:** String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings.

**Pointers:** Understanding the Computers Memory, Introduction to Pointers, Declaring Pointer Variables

**Structures:** Introduction to structures

**Textbook: Chapter 13.1-13.6, 14.1-14.3, 15.1**

Teaching-Learning Process Chalk and talk method/PowerPoint Presentation

**Course Outcomes (Course Skill Set)**

At the end of the course the student will be able to:

CO1. Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.

CO 2. Apply programming constructs of C language to solve the real world problem

CO 3. Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting

CO 4. Explore user-defined data structures like structures, unions and pointers in implementing solutions

CO5. Design and Develop Solutions to problems using modular programming constructs using functions

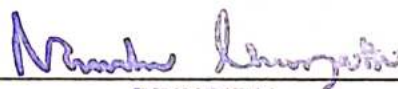
#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks.

CIE for the theory component of the IC



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- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to 30 marks

#### CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for 20 marks.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination (SEE):

##### SEE for IC

Theory SEE will be conducted by University as per the scheduled time table, with common question papers for the course (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion**



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will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

**Passing standard:**

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than 30 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.

**Suggested Learning Resources:**

**Textbooks**

- Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.

**Reference Books:**

- E. Balaguruswamy. Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
- Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

**Web links and Video Lectures (e-Resources):**

- [elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html](http://elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html)
- <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes
- Assignments
- Seminars


**Lab Assignments**

1	C Program to find Mechanical Energy of a particle using $E = mgh + 1/2 mv^2$ .
2	C Program to convert Kilometers into Meters and Centimeters.
3	C Program To Check the Given Character is Lowercase or Uppercase or Special Character.
4	Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants $b_1, b_2, b_3$ such that the equation is balanced on both sides and it must be the reduced form.
5	Implement Matrix multiplication and validate the rules of multiplication.
6	Compute $\sin(x)/\cos(x)$ using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.

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7	Sort the given set of $N$ numbers using Bubble sort.
8	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
9	Implement structures to read, write and compute average marks and the student scoring above and below the average marks for a class of $N$ students.
10	Develop a program using pointer to compute the sum, mean and standard deviation of all elements stored in an array of $N$ real numbers.

  
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Course Title:	Introduction to Python Programming		
Course Code:	BPLCK105B/205B	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Integrated	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2:0:2:0	Total Marks	100
Total Hours of Pedagogy	40 hours	Exam Hours	03
		Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>• Learn the syntax and semantics of the Python programming language.</li> <li>• Illustrate the process of structuring the data using lists, tuples</li> <li>• Appraise the need for working with various documents like Excel, PDF, Word and Others.</li> <li>• Demonstrate the use of built-in functions to navigate the file system.</li> <li>• Implement the Object Oriented Programming concepts in Python.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching -Learning more effective <ol style="list-style-type: none"> <li>1. Use <a href="https://pythontutor.com/visualize.html#mode=edit">https://pythontutor.com/visualize.html#mode=edit</a> in order to visualize the python code</li> <li>2. Demonstrate and visualize basic data types (list, tuple, dictionary).</li> <li>3. Chalk and talk</li> <li>4. online and videos</li> </ol>			
<b>Module-1 (08 hrs)</b>			
<b>Python Basics:</b> Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, <b>Flow control:</b> Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), <b>Functions:</b> def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling. A Short Program: Guess the Number <b>Textbook 1: Chapters 1 – 3</b>			
<b>Module-2 (08 hrs)</b>			
<b>Lists:</b> The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References, <b>Dictionaries and Structuring Data:</b> The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, <b>Textbook 1: Chapters 4 – 5</b>			
<b>Module-3 (08 hrs)</b>			

  
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<p><b>Manipulating Strings:</b> Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup</p> <p><b>Reading and Writing Files:</b> Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print.format() Function, Project: Generating Random Quiz Files, Project: Multiclipboard,</p> <p><b>Textbook 1: Chapters 6 , 8</b></p>
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**Module-4 (08 hrs)**

<p><b>Organizing Files:</b> The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File,</p> <p><b>Debugging:</b> Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger.</p> <p><b>Textbook 1: Chapters 9-10</b></p>
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**Module-5 (08 hrs)**

<p><b>Classes and objects:</b> Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying,</p> <p><b>Classes and functions:</b> Time, Pure functions, Modifiers, Prototyping versus planning,</p> <p><b>Classes and methods:</b> Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,</p> <p><b>Textbook 2: Chapters 15 – 17</b></p>
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**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

C01	Demonstrate proficiency in handling loops and creation of functions.
C02	Identify the methods to create and manipulate lists, tuples and dictionaries.
C03	Develop programs for string processing and file organization
C04	Interpret the concepts of Object-Oriented Programming as used in Python.

**Programming Exercises:**

- Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
  - Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
- Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
  - Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
- Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
- Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
- Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary]

with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]

6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].
7. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
8. Write a function named DivExp which takes TWO parameters a, b and returns a value c ( $c=a/b$ ). Write suitable assertion for  $a>0$  in function DivExp and raise an exception for when  $b=0$ . Develop a suitable program which reads two values from the console and calls a function DivExp.
9. Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N ( $N \geq 2$ ) complex numbers and to compute the addition of N complex numbers.
10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use \_\_init\_\_() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.]

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

#### CIE for the theory component of the IC

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be

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evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination (SEE): SEE for IC**

Theory SEE will be conducted by University as per the scheduled time table, with common question papers for the course (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).**

#### **Passing standard:**

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than 30 marks.

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- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.

**Suggested Learning Resources:****Text Books**

1. Al Sweigart, "Automate the Boring Stuff with Python", 1<sup>st</sup> Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)  
(Chapters 1 to 18, except 12) for lambda functions use this link:  
<https://www.learnbyexample.org/python-lambda-function/>
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2<sup>nd</sup> Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)  
(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

**Web links and Video Lectures (e-Resources):**

- <https://www.learnbyexample.org/python/>
- <https://www.learnpython.org/>
- <https://pythontutor.com/visualize.html#mode=edit>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes for list, tuple, string dictionary slicing operations using below link  
<https://github.com/sushantkhara/Data-Structures-And-Algorithms-with-Python/raw/main/Python%203%20%20400%20exercises%20and%20solutions%20for%20beginners.pdf>

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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Course Title:	Introduction to Cyber Security		
Course Code:	BETCK1051/205I	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To familiarize cybercrime terminologies and perspectives</li> <li>To understand Cyber Offenses and Botnets</li> <li>To gain knowledge on tools and methods used in cybercrimes</li> <li>To understand phishing and computer forensics</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective <ol style="list-style-type: none"> <li>Chalk and Board</li> <li>Demonstration</li> <li>Interactive learning</li> <li>Videos and online material</li> </ol>			
<b>Module-1 (8 hours of pedagogy)</b>			
<b>Introduction to Cybercrime:</b>  <b>Cybercrime:</b> Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws., Global Perspectives  Textbook:1 Chapter 1 (1.1 to 1.5, 1.7-1.9)			
<b>Module-2 (8 hours of pedagogy)</b>			
<b>Cyber Offenses:</b>  <b>How Criminals Plan Them:</b> Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercafe & cybercrimes.  <b>Botnets:</b> The fuel for cybercrime, Attack Vector.  Textbook:1 Chapter 2 (2.1 to 2.7)			
<b>Module-3 (8 hours of pedagogy)</b>			

  
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**Tools and Methods used in Cybercrime:** Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attackes, Attacks on Wireless networks.

Textbook:1 Chapter 4 (4.1 to 4.9, 4.12)

**Module-4 ( 8 ours of pedagogy)**

**Phishing and Identity Theft:** Introduction, methods of phishing, phishing,phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft

Textbook:1 Chapter 5 (5.1. to 5.3)

**Module-5 (8 hours of pedagogy)**

**Understnading Computer Forensics:** Introdcution, Historical Background of Cyberforensics, Digital Foresics Science, Need for Computer Foresics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.

Textbook:1 Chapter 7 (7.1. to 7.5, 7.7 to 7.9)

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Explain the cybercrime terminologies
CO2	Describe Cyber offenses and Botnets
CO3	Illustrate Tools and Methods used on Cybercrime
CO4	Explain Phishing and Identity Theft
CO5	Justify the need of computer forensics

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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation(CIE):

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

#### Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions) **should have a mix of topics** under that module

#### Suggested Learning Resources:

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)

##### Web links and Video Lectures (e-Resources):

- [https://www.youtube.com/watch?v=yC\\_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvMNQjS\\_rt9swsu](https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvMNQjS_rt9swsu)
- [https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJkztzIO4DtI4\\_](https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJkztzIO4DtI4_)
- [https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL\\_uaeekrhGzJlB8XQBxU3z\\_hDwT95xlk](https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3z_hDwT95xlk)
- <https://www.youtube.com/watch?v=KqSqyKwVuAB>

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16-2-2023

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Illustration of standard case study of cyber crime
- Setup a cyber court at Institute level

**COs and POs Mapping (Individual teacher has to fill up)**

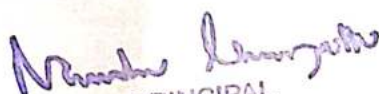
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1												
CO2												
CO3												
CO4												
CO5												

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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16-2-2023

Course Title:	Introduction to Internet of Things (IOT)		
Course Code:	BETCK105H/205H	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>• Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.</li> <li>• Understand the recent application domains of IoT in everyday life.</li> <li>• Gain insights about the current trends of Associated IOT technologies and IOT Analytics.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding</li> <li>9. Use any of these methods: Chalk and board, Active Learning, Case Studies</li> </ol>			
<b>Module-1 (8 hours of pedagogy)</b>			
<b>Basics of Networking:</b> Introduction, Network Types, Layered network models  <b>Emergence of IoT:</b> Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components  Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4			
<b>Module-2 (8 hours of pedagogy)</b>			
<b>IoT Sensing and Actuation:</b> Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.  Textbook 1: Chapter 5 – 5.1 to 5.9			
<b>Module-3 (8 hours of pedagogy)</b>			

  
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IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.

Textbook 1: Chapter 6 – 6.1 to 6.5

**Module-4 ( 8 ours of pedagogy)**

**ASSOCIATED IOT TECHNOLOGIES**

Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.

**IOT CASE STUDIES**

Agricultural IoT – Introduction and Case Studies

Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2

**Module-5 (8 hours of pedagogy)**

**IOT CASE STUDIES AND FUTURE TRENDS**

Vehicular IoT – Introduction

Healthcare IoT – Introduction, Case Studies

IoT Analytics – Introduction

Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2	Classify various sensing devices and actuator types.
CO3	Demonstrate the processing in IoT.
CO4	Explain Associated IOT Technologoes
CO5	Illustrate architecture of IOT Applications

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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation(CIE):

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions) **should have a mix of topics** under that module

#### Suggested Learning Resources:


##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.

##### Reference:

2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
3. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

#### Web links and Video Lectures (e-Resources):

  
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- 1. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/>


**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Demonstrate a sensor based application
- 

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

  
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26.10.2022

Theory - 01 Credit Course

BICOK107-207

**Indian Constitution**

Course Title:	Indian Constitution		
Course Code:		CIE Marks	50
Course Type (Theory/Practical /Integrated)	BICOK107-207	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

**Course objectives :**

The course INDIAN CONSTITUTION (22ICO17 / 27) will enable the students,

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR 's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

**Teaching-Learning Process**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching -Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

- (i) Direct instructional method ( Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion.
- (vii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.

**Module-1****(03 hours of pedagogy)**

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.

**Module-2****(03 hours of pedagogy)**

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.

**Module-3****(03 hours of pedagogy)**

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.

**Module-4****(03 hours of pedagogy)**

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

**Module-5****(03 hours of pedagogy)**

State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

**Course outcome (Course Skill Set)**

At the end of the course 22ICO17/27 the student will be able to:

C01	Analyse the basic structure of Indian Constitution.
C02	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
C03	know about our Union Government, political structure & codes, procedures.
C04	Understand our State Executive & Elections system of India.
C05	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation(CIE):

##### Two Unit Tests each of 30 Marks (duration 01 hour)

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

##### Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others.. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

#### Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour**. The student must secure a minimum of 35% of the maximum marks for SEE.

#### Suggested Learning Resources:

##### Textbook:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions. Bengaluru. - 2022.
2. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice -Hall, 2008.

##### Reference Books:

1. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, and et al: published by Cengage Learning India, Latest Edition - 2019.
2. "The Constitution of India" by Merunandan K B: published by Merugu Publication, Second Edition. Bengaluru.
3. "Samvidhana Odu" - for Students & Youths by Justice H N Nagamohan Dhas, Sahayana, kerekon.
4. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engineering Ethics", Prentice -Hall, 2004.

#### Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions
- ✓ Seminars and assignments

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Theory - 01 Credit Course

**ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)**

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	BKBKK107-207	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

**Course objectives : ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:**

The course (22KBK17/27) will enable the students,

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conversation.
5. To know about Karnataka state and its language, literature and General information about this state.

**ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

**Module - 1**

(03 hours of pedagogy)

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities, Key to Transcription
3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

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<b>Module - 2</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns</li> <li>2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals</li> <li>3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರಕೃತಿಗಳು -ಸಪ್ರಮಿ ವಿಭಕ್ತಿ ಪ್ರಕೃತಿ - (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) - Predictive Forms, Locative Case</li> </ol>	
<b>Module - 3</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರಕೃತಿಯ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು - Dative Cases, and Numerals</li> <li>2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು -Ordinal numerals and Plural markers</li> <li>3. ನ್ಯೂನ/ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು &amp; ವರ್ಣ ಗುಣವಾಚಕಗಳು - Defective/Negative Verbs &amp; Colour Adjectives</li> </ol>	
<b>Module- 4</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಆರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)</li> <li>2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication</li> <li>3. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು - Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs</li> <li>4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ- Comparative, Relationship, Identification and Negation Words</li> </ol>	
<b>Module - 5</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು -Different types of Tense, Time and Verbs</li> <li>2. ದ್, -ತ್, -ತು, - ಇತು, - ಆಗಿ, - ಅಲ್ಲ, - ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms</li> <li>3. Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು -Kannada Words in Conversation</li> </ol>	

### Course outcome (Course Skill Set)

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

At the end of the course the student will be able to:

C01	To understand the necessity of learning of local language for comfortable life.
C02	To speak, read and write Kannada language as per requirement.
C03	To communicate (converse) in Kannada language in their daily life with kannada speakers.
C04	To Listen and understand the Kannada language properly.
C05	To speak in polite conversation.

### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than

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35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

**Two Unit Tests each of 30 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others.. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**University Prescribed Textbook :**

**ಬಳಕೆ ಕನ್ನಡ**

**ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ**

**ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,**

**ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.**

**ಸೂಚನೆ :**

1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
2. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

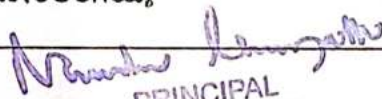
- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions,
- ✓ Seminars and assignments

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## Theory - 01 Credit Course

**ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ**

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:		CIE Marks	50
Course Type (Theory/Practical /Integrated)	BKSKK107-207	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Total Marks	100
Total Hours of Pedagogy	15 hours	Exam Hours	01 Theory
		Credits	01
<b>Course objectives :</b> ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:			
The course (22KSK17/27) will enable the students,			
<ol style="list-style-type: none"> <li>1. ವ್ಯಕ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.</li> <li>2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು.</li> <li>3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.</li> <li>4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.</li> <li>5. ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.</li> </ol>			
<b>ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.			
<ol style="list-style-type: none"> <li>1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಯಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li> <li>2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.</li> <li>3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.</li> </ol>			
<b>ಘಟಕ -1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ</li> <li>2. ಕರ್ನಾಟಕದ ಐತಿಹಾಸಿಕ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ</li> <li>3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ</li> </ol>			
<b>ಘಟಕ - 2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ಯಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ಯಕ್ಕಿ ಲಕ್ಕಮ್ಮ.</li> <li>2. ಕೀರ್ತನೆಗಳು : ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸಿದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು</li> <li>3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ</li> </ol>			
<b>ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಅಯ್ಯ ಕೆಲವು ಭಾಗಗಳು</li> <li>2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ</li> <li>3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು</li> </ol>			
<b>ಘಟಕ - 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ. ಎನ್. ಮೂರ್ತಿರಾವ್</li> <li>2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರಿಗೌಡ ಬೀಚನಹಳ್ಳಿ</li> </ol>			
<b>ಘಟಕ - 5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ</li> <li>2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ</li> </ol>			

  
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**Course outcome (Course Skill Set)**

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (22KSK17/27) ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ :

At the end of the course the student will be able to:

CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಿಸುತ್ತದೆ.
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಿಸುತ್ತದೆ.
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):****Two Unit Tests each of 30 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**University Prescribed Textbook :****ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**

ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,  
ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,  
ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

**ಸೂಚನೆ :**

1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
2. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments.

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**Professional Writing Skills in English**

Course Title:	Professional Writing Skills in English		
Course Code:	BPWSK206-106	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

**Course objectives:**

The course Professional Writing Skills in English (22PWS26) will enable the students,

1. To Identify the Common Errors in Writing and Speaking of English.
2. To Achieve better Technical writing and Presentation skills for employment.
3. To read Technical proposals properly and make them to write good technical reports.
4. To Acquire Employment and Workplace communication skills.
5. To learn about Techniques of Information Transfer through presentation in different level.

**Teaching-Learning Process**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.

(i) Direct instructional method ( Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning.

(v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills.

Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.

**Language Lab :** To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.

**Module-1****(03 hours of pedagogy)**

**Identifying Common Errors in Writing and Speaking English :** Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.

**Module-2****(03 hours of pedagogy)**

**Nature and Style of sensible writing: Organizing** Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.

**Module-3****(03 hours of pedagogy)**

**Technical Reading and Writing Practices:** Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.

**Module-4****(03 hours of pedagogy)**

**Professional Communication for Employment:** Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos.

**Module-5****(03 hours of pedagogy)**

**Professional Communication at Workplace:** Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.

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**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	To understand and identify the Common Errors in Writing and Speaking.
CO2	To Achieve better Technical writing and Presentation skills.
CO3	To read Technical proposals properly and make them to Write good technical reports.
CO4	Acquire Employment and Workplace communication skills.
CO5	To learn about Techniques of Information Transfer through presentation in different level.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):****Two Unit Tests each of 30 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (To have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**Suggested Learning Resources:****Textbook:**

- 1) "Professional Writing Skills in English" published by Phillip Learning – Education (ILS), Bangalore – 2022.
- 2) "Functional English" (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].

**Reference Books:**

- 1) English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
- 2) Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
- 3) Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
- 4) High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
- 5) Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments

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26.10.2022

Theory - 01 Credit Course

BENGGK106-206

**Communicative English**

Course Title:	Communicative English		
Course Code:	BENGGK106-206	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
<p><b>Course objectives:</b> The course Communicative English (22ENG16) will enable the students.</p> <ol style="list-style-type: none"> <li>To know about Fundamentals of Communicative English and Communication Skills in general.</li> <li>To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.</li> <li>To impart basic English grammar and essentials of important language skills.</li> <li>To enhance with English vocabulary and language proficiency for better communication skills.</li> <li>To learn about Techniques of Information Transfer through presentation.</li> </ol>			
<p><b>Teaching-Learning Process :</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching -Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market. (i) Direct instructional method ( Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.</p>			
<p><b>Language Lab :</b> To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.</p>			
<b>Module-1</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Introduction to Communicative English :</b> Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.</p>			
<b>Module-2</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Introduction to Phonetics :</b> Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.</p>			
<b>Module-3</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Basic English Communicative Grammar and Vocabulary PART - I :</b> Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.</p>			
<b>Module-4</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Basic English Communicative Grammar and Vocabulary PART - II:</b> Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.</p>			
<b>Module-5</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Communication Skills for Employment :</b> Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.</p>			

  
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**Course outcome (Course Skill Set)**

At the end of the course Communicative English (22ENG16) the student will be able to:

CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
CO3	To impart basic English grammar and essentials of language skills as per present requirement.
CO4	Understand and use all types of English vocabulary and language proficiency.
CO5	Adopt the Techniques of Information Transfer through presentation.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):****Two Unit Tests each of 30 Marks (duration 01 hour)**

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- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

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**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**Suggested Learning Resources:****Textbook:**

- 1) **Communication Skills** by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
- 2) **A Textbook of English Language Communication Skills**, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.

**Reference Books:**

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
3. **English Language Communication Skills – Lab Manual cum Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. **A Course in Technical English – D Praveen Sam, KN Shoba**, Cambridge University Press – 2020.
5. **Practical English Usage** by Michael Swan, Oxford University Press – 2016.

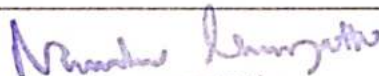
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions. Seminars and assignments

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SIE.T. TUMKUR.

**II Semester**

Course Title:	<b>Mathematics-II for Civil Engineering stream</b>		
Course Code:	<b>BMATC201</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
<p><b>Course objectives:</b>The goal of the course <b>Mathematics-II for Civil Engineering stream (22MATC21)</b> is to</p> <ul style="list-style-type: none"> <li>• <b>Familiarize</b> the importance of Integral calculus and Vector calculus essential for civil engineering.</li> <li>• <b>Analyze</b> Civil engineering problems by applying Partial Differential Equations.</li> <li>• <b>Develop</b> the knowledge of solving civil engineering problems numerically.</li> </ul>			
<p><b>Teaching-Learning Process</b>  <b>Pedagogy (General Instructions):</b>  These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.</li> <li>2. State the need for Mathematics with Engineering Studies and Provide real-life examples.</li> <li>3. Support and guide the students for self-study.</li> <li>4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.</li> <li>5. Encourage the students to group learning to improve their creative and analytical skills.</li> <li>6. Show short related video lectures in the following ways: <ul style="list-style-type: none"> <li>• As an introduction to new topics (pre-lecture activity).</li> <li>• As a revision of topics (post-lecture activity).</li> <li>• As additional examples (post-lecture activity).</li> <li>• As an additional material of challenging topics (pre-and post-lecture activity).</li> <li>• As a model solution of some exercises (post-lecture activity).</li> </ul> </li> </ol>			
<b>Module-1: Integral Calculus (8 hours)</b>			
<p><b>Introduction to Integral Calculus in Civil Engineering applications.</b>  <b>Multiple Integrals:</b> Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.  <b>Beta and Gamma functions:</b> Definitions, properties, relation between Beta and Gamma functions. Problems.  <b>Self-Study:</b> Volume by triple integration, Center of gravity.  <b>Applications:</b> Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.  <b>(RBT Levels: L1, L2 and L3)</b></p>			

  
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**Module-2: Vector Calculus(8 hours)**

**Introduction to Vector Calculus in Civil Engineering applications.**

**Vector Differentiation:** Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.

**Vector Integration:** Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems.

**Self-Study:** Volume integral and Gauss divergence theorem.

**Applications:** Heat and mass transfer, oil refinery problems, environmental engineering. Analysis of streamlines, velocity and acceleration of a moving particle.

(RBT Levels: L1, L2 and L3)

**Module-3: Partial Differential Equations (PDEs)(8 hours)**

**Importance of partial differential equations for Civil Engineering applications**

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.

**Self-Study:** Solution of one-dimensional heat equation and wave equation by the method of separation of variables.

**Applications:** Design of structures (vibration of rod/membrane)

(RBT Levels: L1, L2 and L3)

**Module-4: Numerical Methods -1(8 hours)**

**Importance of numerical methods for discrete data in the field of Civil Engineering.**

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems.

Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.

**Numerical integration:** Trapezoidal, Simpson's  $(1/3)^{\text{rd}}$  and  $(3/8)^{\text{th}}$  rules (without proof). Problems.

**Self-Study:** Bisection method, Lagrange's inverse Interpolation.

**Applications:** Estimating the approximate roots, extremum values, area, volume, and surface area. Finding approximate solutions to civil engineering problems.

(RBT Levels: L1, L2 and L3)

**Module-5: Numerical Methods -2(8 hours)**

**Introduction to various numerical techniques for handling Civil Engineering applications.**

**Numerical Solution of Ordinary Differential Equations (ODE's):** Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.

**Self-Study:** Adam-Bashforth method.

**Applications:** Finding approximate solutions to ODE related to civil engineering fields.

(RBT Levels: L1, L2 and L3)

**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)****10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	Program to compute surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
4	Verification of Green's theorem
5	Solution of one-dimensional heat equation and wave equation
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta $4^{th}$ order and Milne's predictor-corrector method

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Apply the knowledge of multiple integrals to compute area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO3	Demonstrate partial differential equations and their solutions for physical interpretations.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/PYTHON/SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

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Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

*Narash Channappa*  
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**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers. 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

**Reference Books**

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C.Bhunia: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup>Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup>Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication, 3<sup>rd</sup> Ed.,2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.

**Web links and Video Lectures (e-Resources):**

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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16-2-2022

## II Semester

Course Title:	<b>Mathematics-II for Computer Science and Engineering stream</b>		
Course Code:	<b>BMATS201</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

**Course objectives:**The goal of the course **Mathematics-II for Computer Science and Engineering stream(22MATS21)** is to

- **Familiarize** the importance of Integral calculus and Vector calculus.
- **Learn** vector spaces and linear transformations.
- **Develop** the knowledge of numerical methods and apply them to solve transcendental and differential equations.

### Teaching-Learning Process

#### Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

### Module-1 Integral Calculus (8 hours)

#### Introduction to Integral Calculus in Computer Science & Engineering.

**Multiple Integrals:** Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. Problems.

**Self-Study:** Center of gravity, Duplication formula.

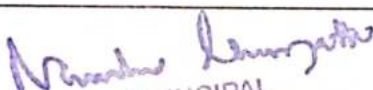
**Applications:** Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.

**(RBT Levels: L1, L2 and L3)**

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<b>Module-2 Vector Calculus(8 hours)</b>
<p><b>Introduction to Vector Calculus in Computer Science &amp; Engineering.</b>            Scalar and vector fields. Gradient, directional derivative. curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.</p> <p><b>Curvilinear coordinates:</b>Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality. Problems.</p> <p><b>Self-Study:</b> Vector integration and Vector line integral.</p> <p><b>Applications:</b> Conservation of laws, Electrostatics, Analysis of streamlines.</p>
<b>Module-3 Vector Space and Linear Transformations(8 hours)</b>
<p><b>Importance of Vector Space and Linear Transformations in the field of Computer Science &amp; Engineering.</b></p> <p><b>Vector spaces:</b> Definition and examples. subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Problems.</p> <p><b>Linear transformations:</b> Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality. Problems.</p> <p><b>Self-study:</b> Angles and Projections. Rotation, Reflection, Contraction and Expansion.</p> <p><b>Applications:</b> Image processing, AI &amp; ML, Graphs and networks, Computer graphics.</p> <p><b>(RBT Levels: L1, L2 and L3)</b></p>
<b>Module-4 Numerical Methods -1(8 hours)</b>
<p><b>Importance of numerical methods for discrete data in the field of computer science &amp; engineering.</b></p> <p>Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson methods (only formulae). Problems.</p> <p>Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.</p> <p><b>Numerical integration:</b> Trapezoidal, Simpson's <math>(1/3)^{rd}</math> and <math>(3/8)^{th}</math> rules(without proof). Problems.</p> <p><b>Self-Study:</b> Bisection method, Lagrange's inverse Interpolation.</p> <p><b>Applications:</b> Estimating the approximate roots, extremum values, Area, volume, and surface area. Errors in finite precision.</p> <p><b>(RBT Levels: L1, L2 and L3)</b></p>
<b>Module-5 Numerical Methods -2(8 hours)</b>
<p><b>Introduction to various numerical techniques for handling Computer Science &amp; Engineering applications.</b></p> <p><b>Numerical Solution of Ordinary Differential Equations (ODE's):</b> Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.</p> <p><b>Self-Study:</b> Adam-Bashforth method.</p> <p><b>Applications:</b> Estimating the approximate solutions of ODE.</p> <p><b>(RBT Levels: L1, L2 and L3).</b></p>

  
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**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)****10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	Program to compute area, surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
4	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
5	Computing the inner product and orthogonality
6	Solution of algebraic and transcendental equations by Ramanujan's, Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's (1/3) <sup>rd</sup> and (3/8) <sup>th</sup> rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4 <sup>th</sup> order and Milne's predictor-corrector method

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal, and irrotational vectors. Orthogonal curvilinear coordinates.
CO3	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO4	Apply the knowledge of numerical methods in analysing the discrete data and solving the physical and engineering problems.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.

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- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination(SEE):**

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- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

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**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

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2. Srimanta Pal & Subodh C.Bhunia: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup> Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup> Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3<sup>rd</sup> Ed., 2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4<sup>th</sup> Ed.. 2018.
9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6<sup>th</sup> Ed., 2017.
10. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed., 2022.

**Web links and Video Lectures (e-Resources):**

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity-Based Learning (Suggested Activities in Class)/ Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							


Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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16.7.2023

## II Semester

Course Title:	<b>Mathematics-II for Electrical &amp; Electronics Engineering Stream</b>		
Course Code:	<b>BMATE201</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
<b>Course objectives:</b> The goal of the course <b>Mathematics-II for Electrical &amp; Electronics Engineering Stream(22MATE21)</b> is to <ul style="list-style-type: none"><li>• <b>Familiarize</b> the importance of Vector calculus, Vector Space and Linear transformation for electronics and electrical engineering.</li><li>• <b>Have an insight</b> into solving ordinary differential equations by using Laplace transform techniques.</li><li>• <b>Develop</b> the knowledge of solving electronics and electrical engineering problems numerically.</li></ul>			
<b>Teaching-Learning Process</b> <b>Pedagogy (General Instructions):</b> These are sample Strategies. which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"><li>1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.</li><li>2. State the need for Mathematics with Engineering Studies and Provide real-life examples.</li><li>3. Support and guide the students for self-study.</li><li>4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.</li><li>5. Encourage the students to group learning to improve their creative and analytical skills.</li><li>6. Show short related video lectures in the following ways:<ul style="list-style-type: none"><li>• As an introduction to new topics (pre-lecture activity).</li><li>• As a revision of topics (post-lecture activity).</li><li>• As additional examples (post-lecture activity).</li><li>• As an additional material of challenging topics (pre-and post-lecture activity).</li><li>• As a model solution of some exercises (post-lecture activity).</li></ul></li></ol>			
<b>Module-1:Vector Calculus (8 hours)</b>			

  
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**Introduction to Vector Calculus in EC & EE engineering applications.**  
**Vector Differentiation:** Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.  
**Vector Integration:** Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems.

**Self-Study:** Volume integral and Gauss divergence theorem.  
**Applications:** Conservation of laws, Electrostatics, Analysis of streamlines and electric potentials.

**(RBT Levels: L1, L2 and L3)**

#### **Module-2: Vector Space and Linear Transformations(8 hours)**

**Importance of Vector Space and Linear Transformations in the field of EC & EE engineering applications.**  
**Vector spaces:** Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension.  
**Linear transformations:** Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem. Inner product spaces and orthogonality.

**Self-study:** Angles and Projections. Rotation, reflection, contraction and expansion.  
**Applications:** Image processing, AI & ML, Graphs and networks, Computer graphics.

**(RBT Levels: L1, L2 and L3)**

#### **Module-3: Laplace Transform(8 hours)**

**Importance of Laplace Transform for EC & EE engineering applications.**  
 Existence and Uniqueness of Laplace transform (LT), transform of elementary functions, region of convergence. Properties—Linearity, Scaling, t-shift property, s-domain shift, differentiation in the s-domain, division by t, differentiation and integration in the time domain. LT of special functions—periodic functions (square wave, saw-tooth wave, triangular wave, full & half wave rectifier), Heaviside Unit step function, Unit impulse function.

**Inverse Laplace Transforms:**  
 Definition, properties, evaluation using different methods, convolution theorem (without proof), problems, and applications to solve ordinary differential equations.

**Self-Study:** Verification of convolution theorem.  
**Applications:** Signals and systems, Control systems, LR, CR & LCR circuits.

**(RBT Levels: L1, L2 and L3)**

#### **Module-4: Numerical Methods -1(8 hours)**

**Importance of numerical methods for discrete data in the field of EC & EE engineering applications.**  
 Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems.  
 Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.  
**Numerical integration:** Trapezoidal, Simpson's  $(1/3)^{th}$  and  $(3/8)^{th}$  rules (without proof). Problems.

**Self-Study:** Bisection method, Lagrange's inverse Interpolation, Weddle's rule.

**Applications:** Estimating the approximate roots, extremum values, area, volume, and surface area.  
(RBT Levels: L1, L2 and L3)

**Module-5:Numerical Methods -2(8 hours)**

**Introduction to various numerical techniques for handling EC & EE applications.**

**Numerical Solution of Ordinary Differential Equations (ODEs):**

Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method. Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.

**Self-Study:** Adam-Bashforth method.

**Applications:** Estimating the approximate solutions of ODE for electric circuits.

(RBT Levels: L1, L2 and L3)

**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)**

**10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	Finding gradient, divergent, curl and their geometrical interpretation and Verification of Green's theorem
2	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
3	Visualization in time and frequency domain of standard functions
4	Computing inverse Laplace transform of standard functions
5	Laplace transform of convolution of two functions
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4 <sup>th</sup> order and Milne's predictor-corrector method

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, lineintegral and surface integral.
CO2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO3	To understand the concept of Laplace transform and to solve initial value problems.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/PYTHON/ SCILAB

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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.


Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is

  
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to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CBE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

#### Suggested Learning Resources:

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**


##### Text Books

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

##### Reference Books

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C.Bhunja: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup>Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup>Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication, 3<sup>rd</sup> Ed.,2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4<sup>th</sup> Ed., 2018.
9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6<sup>th</sup> Ed., 2017.
10. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed., 2022.

#### Web links and Video Lectures (e-Resources):

  
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- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program


**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

  
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### Civil Engineering and Allied branches(Chemistry group)

Course Title:	Applied Chemistry for Civil Engineering stream		
Course Code:	BCHEC202 /202	CIE Marks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
TeachingHours/Week(L:T:P:S) <sup>1</sup>	2:2:2:0	Exam Hours	03
TotalHoursofPedagogy	40hoursTheory+10to12Labs	Credits	04
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To enable students to acquire knowledge on principles of chemistry for engineering applications.</li> <li>To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.</li> <li>To provide students with a solid foundation in analytical reasoning required to solve societal problems.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective <ul style="list-style-type: none"> <li>Tutorial &amp; remedial classes for needy students (not regular T/R)</li> <li>Conducting Makeup classes/Bridge courses for needy students</li> <li>Demonstration of concept either by building models or by industry visit</li> <li>Experiments in laboratories shall be executed in blended mode (conventional or non-conventional methods)</li> <li>Use of ICT-Online videos, online courses</li> <li>Use of online platforms for assignments/Notes/Quizzes (Ex. Google classroom)</li> </ul>			
<b>Module-1: Structural Materials (8hr)</b>			
<b>Metals and Alloys:</b> Introduction, Properties and application of Iron and its alloys, Aluminium and its alloys <b>Cement:</b> Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement. <b>Refractories:</b> Introduction, classification based on chemical composition, properties and application of refractory materials. <b>Glass:</b> Introduction, Composition, Types, Preparation of Soda-lime glass, properties and application of glass. <b>Self-learning:</b> Chemistry of reinforced concrete from various sources of water (seawater, groundwater, treated water).			
<b>Module-2: Energy Conversion and Storage, Corrosion (8hr)</b>			
<b>Energy conversion:</b> Introduction, construction, working, and applications of Photovoltaic cells, methanol-oxygen fuel cell. <b>Storage devices:</b> Introduction, construction and working of Li-ion battery.			

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

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**Corrosion:** Introduction, electrochemical corrosion of steel in concrete, types (differential metal and aeration), Stress corrosion in civil structures, corrosion control (design and selection of materials, galvanization, anodization and sacrificial anode method).

**Self-learning:** Corrosion inhibitors

#### Module-3: Water Technology and Nanotechnology (8hr)

**Water technology:** Introduction, water parameters, hardness of water, determination of temporary, permanent and total hardness by EDTA method, numerical problems, softening of water by ion exchange method, desalination of water by electrodialysis, determination of COD, numerical problems. Forward osmosis: Introduction, Process and applications.

**Nanotechnology:** Introduction, size dependent properties of nanomaterial (surface area and catalytic), Synthesis of nanomaterial by sol-gel method and co-precipitation method.

**Nanomaterials:** Introduction, properties and engineering applications of carbon nanotubes, graphene and nanomaterials for water treatment (Metal oxide).

**Self-learning:** Sewage treatment (Primary, secondary and tertiary)

#### Module-4: Polymer and Composites (8hr)

**Polymer:** Introduction, methods of polymerization, molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and Chloropolyvinyl chloride (CPVC).

**Fibers:** Synthesis, properties and applications of nylon fibers.

**Polymer composites:** Introduction, properties and applications of fiber reinforced polymer composites (FRPC).

**Geopolymer concrete:** Introduction, synthesis, constituents, properties and applications.

**Adhesives:** Introduction, properties and applications of epoxy resin.

**Biodegradable polymers:** Synthesis of polylactic acid (PLA) and their applications.

**Self-**

**learning: Biopolymer:** Introduction, structural properties, and applications of cellulose and lignin.

#### Module-5: Phase Rule and Analytical Techniques (8hr)

**Phase rule:** Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: Two component-lead-silver system.

**Analytical techniques:** Introduction, principle, instrumentation of potentiometric sensors and its application in the estimation of iron, conductometric sensors and its application in the estimation of acid mixture, pH-sensors and its application in the determination of soil sample.

**Self-learning:** Chromatographic technique, application of chromatography (column and thin-layered chromatography) in the separation of components.

#### PRACTICAL MODULE

##### A-Demonstration (any two) offline/virtual:

A1. Synthesis of polyurethane

A2. Quantitative estimation of Aluminium by precipitation method

A3. Synthesis of iron oxide nanoparticles

A4. Determination of chloride content in the given water sample by Argentometric method

##### B-Exercise (compulsorily any 4 to be conducted):

B1. Conductometric estimation of acid mixture

B2. Potentiometric estimation of FAS using  $K_2Cr_2O_7$

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B3. Determination of pKa of vinegar using pH sensor (Glass electrode)  
 B4. Determination of rate of corrosion of mild steel by weight loss method  
 B5. Estimation of total hardness of water by EDTA method

**C-Structured Enquiry (compulsorily 4 to be conducted):**

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)  
 C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)  
 C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method  
 C4. Estimation of Sodium present in soil/effluents sample using flame photometry  
 C5. Determination of Chemical Oxygen Demand (COD) of industrial wastewater sample

**D-Open Ended Experiments (any two):**

D1. Gravimetric estimation of gypsum in Portland cement  
 D2. Electroplating of desired metal on substrate  
 D3. Estimation of manganese dioxide in pyrolusite  
 D4. Analysis of cement for its components

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1.	Identify the terms processes involved in scientific and engineering and applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5.	Analyze processes associated with chemical substances in properties and multidisciplinary situations

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

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- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks** shall be for the test conducted at the end of the semester.

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- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:

##### Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)

1. WileyEngineeringChemistry,WileyIndiaPvt.Ltd.NewDelhi,2013-2<sup>nd</sup>Edition.
2. EngineeringChemistry,Satyaprakash&ManishaAgrawal,KhannaBookPublishing,Delhi
3. ATextBookofEngg.Chemistry,ShashiChawla,DhanpatRai&Co.(P)Ltd.
4. EssentialsOfPhysicalChemistry,Bahl&Tuli,S.ChandPublishing
5. AppliedChemistry,SunitaRattan,Kataria5.EngineeringChemistry,Baskar,Wiley
6. EngineeringChemistry-I,D.Groukrishana,VikasPublishing
7. ATextbookofEngineeringChemistry,SSDara&Dr.SSUmare,SChand&CompanyLtd.,12<sup>th</sup>Edition,2011.
8. ATextBookofEngineeringChemistry,R.V.GadagandNityanandaShetty,I.K.International Publishinghouse.2<sup>nd</sup>Edition,2016.
9. TextBookofPolymerScience,F.W.Billmeyer,JohnWiley&Sons,4<sup>th</sup>Edition,1999.
10. NanotechnologyAChemicalApproachtoNanomaterials,G.A.Ozin&A.C.Arsenault,RSCPublishing,2005.
11. CorrosionEngineering,M.G.Fontana,N.D.Greene,McGrawHillPublications,NewYork,3<sup>rd</sup>Edition, 1996.
12. Linden'sHandbookofBatteries,KirbyW.Beard,FifthEdition,McGrawHill,2019.
13. OLEDDisplayFundamentalsandApplications,Takatoshi Tsujimura,Wiley-Blackwell,2012
14. Supercapacitors: Materials, Systems,andApplications, MaxLu, Francois Beguin,Elzbieta Frackowiak,Wiley-VCH;1st edition,2013.
15. "HandbookonElectroplatingwithManufactureofElectrochemicals",ASIAPACIFICBUSINESSPRESS Inc.,2017.Dr. H.Panda.
16. ExpandingtheVisionofSensorMaterials.NationalResearchCouncil1995,Washington,DC:TheNationalAcademies Press. doi:10.17226/4782.
17. EngineeringChemistry,EditedbyDr.MaheshBandDr.RoopashreeB,SunstarPublisher,Bengaluru.

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ISBN978-93-85155-70-3, 2022.

18. High Performance Metallic Materials for Cost Sensitive Applications, F.H. Froes, et al. John Wiley & Sons, 2010.
19. Instrumental Methods of Analysis, Dr. K.R. Mahadik and Dr. L. Sathiyarayanan, Nirali Prakashan, 2020.
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020.
21. Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, New Age Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication, 2015-16<sup>th</sup> Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1<sup>st</sup> Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3<sup>rd</sup> Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2<sup>nd</sup> Edition, 2010.
26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpalyengar, Subash Publications, 5<sup>th</sup> Edition, 2014
27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

**Web links and Video Lectures (e-Resources):**

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLYhwmwFtznRhuz8L1bb3X-9IbHrDMjHWWH>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEJk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

**Activity Based Learning (Suggested Activities in Class) / Practical Based learning**

- <https://www.vlab.co.in/broad-area-chemical-sciences>
- <https://demonstrations.wolfram.com/topics.php>
- <https://interestingengineering.com/science>

**COs and POs Mapping (Individual teacher has to fill up)**

PO												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

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## Electrical & Electronics Engineering and Allied branches(Chemistry group)

<b>CourseTitle:</b>	<b>Chemistry for Electrical and Electronics Engineering stream</b>		
<b>CourseCode:</b>	<b>BCHEE202/202</b>	CIEMarks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEEMarks	50
		Total Marks	100
TeachingHours/Week(L:T:P:S) <sup>1</sup>	2:2:2:0	Exam Hours	03
TotalHoursofPedagogy	40hoursTheory+10to 12Lab slots	Credits	04
<b>Courseobjectives</b>			
<ul style="list-style-type: none"> <li>• Toenablestudentstoacquireknowledgeonprinciplesofchemistryforengineeringapplications.</li> <li>• Todevelopanintuitiveunderstandingofchemistrybyemphasizingtherelatedbranchesofengineering.</li> <li>• Toprovidestudentswithasolidfoundationinanalyticalreasoningrequiredtosolvesocietal problems.</li> </ul>			
<b>Teaching-LearningProcess</b>			
<p>Thesearesamplestrategies,whichteachercanusetoacceleratetheattainmentofthevariouscourseoutcomesandmakeTeaching-Learningmoreeffective</p> <ul style="list-style-type: none"> <li>• Tutorial&amp;remedialclassesforneedystudents(notregularT/R)</li> <li>• ConductingMakeupclasses/Bridgecoursesforneedystudents</li> <li>• Demonstrationofconceptseitherbybuildingmodelsorbyindustryvisit</li> <li>• Experimentsinlaboratoriesshallbeexecutedinblendedmode(conventionalornon-conventionalmethods)</li> <li>• UseofICT-Onlinevideos,onlinecourses</li> <li>• Useofonlineplatformsforassignments/Notes/Quizzes(Ex.Googleclassroom)</li> </ul>			
<b>MODULE1:ChemistryofElectronicMaterials(8hr)</b>			
<p><b>ConductorsandInsulators:</b>Introduction,principlewithexamples.</p> <p><b>Semiconductors:</b> Introduction, production of electronic grade silicon-Czochralski process(CZ) andFloatZone(FZ)methods.</p> <p><b>Polymers:</b>Introduction,Molecularweight-Numberaverage,Weightaverageandnumericalproblems.Cconductingpolymers-synthesisandconductingmechanismofpolyacetylene.Preparation, propertiesandcommercialapplicationsofgrapheneoxide.</p> <p><b>PCB:</b> Electroless plating - Introduction, Electroless plating of copper in the manufacture ofdouble-sidedPCB.</p> <p><b>Self-learning:</b>Technologicalimportanceofmetalfinishinganddistinctionbetween electroplatingandelectrolessplating.</p>			
<b>MODULE2:EnergyConversionandStorage(8hr)</b>			
<p><b>Batteries:</b> Introduction, classification of batteries. Components, construction, working andapplications of modern batteries; Na-ion battery, solid state battery (Li-polymer battery)andflowbattery(Vanadiumredoxflowbattery).</p> <p><b>FuelCells:</b>Introduction,construction,workingandapplicationsofmethanol-oxygenand</p>			

1.NOTE:Whereverthecontact hoursisnotsufficient,tutorialhourcanbeconvertedto theoryhours

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polymer electrolyte membrane (PEM) fuel cell.

**Solar Energy:** Introduction, importance of solar PV cell, construction and working of solar PV cell, advantages and disadvantages.

**Self-learning:** Electrodes for electrostatic double layer capacitors, pseudocapacitors, and hybrid capacitor.

### MODULE 3: Corrosion Science and E-waste Management (8hr)

**Corrosion Chemistry:** Introduction, electrochemical theory of corrosion, types of corrosion - differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

**E-waste Management:** Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling. Extraction of copper and gold from e-waste.

**Self-learning:** Recycling of PCB and battery components

### MODULE 4: Nanomaterials and Display Systems (8hr)

**Nanomaterials:** Introduction, size dependent properties of nanomaterials (Surface area, Catalytic, Conducting), preparation of nanomaterials by sol-gel and co-precipitation method with example. Introduction, properties and applications - Nanofibers, Nanophotonics, Nanosensors.

**Display Systems:** Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light emitting diodes (QLED's).

**Perovskite Materials:** Introduction, properties and applications in optoelectronic devices.

**Self-learning:** Properties & electrochemical applications of carbon nanotubes and graphene.

### MODULE 5: Sensors in Analytical Techniques (8hr)

**Electrode System:** Introduction, types of electrodes. Ion selective electrode - definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode - construction, working and applications of calomel electrode. Concentration cell - Definition, construction and Numerical problems.

**Sensors:** Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors.

**Analytical Techniques:** Introduction, principle and instrumentation of Colorimetric sensors; its application in the estimation of copper, principle and instrumentation of Potentiometric sensors; principle and instrumentation of its application in the estimation of iron, Conductometric sensors; its application in the estimation of weak acid.

**Self-learning:** IR and UV-Visible spectroscopy.

### PRACTICAL MODULE

**A-Demonstration (any two) offline/virtual:**

A1. Synthesis of polyurethane

A2. Determination of strength of an acid in Pb-acid battery

A3. Synthesis of iron oxide nanoparticles

A4. Electroplating of copper on metallic objects

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**B-Exercise(compulsorilyany4tobeconducted):**

- B1. Conductometric estimation of acid mixture  
 B2. Potentiometric estimation of FAS using  $K_2Cr_2O_7$   
 B3. Determination of  $pK_a$  of vinegar using pH sensor (Glass electrode)  
 B4. Determination of rate of corrosion of mild steel by weight loss method  
 B5. Estimation of total hardness of water by EDTA method

**C-Structured Enquiry (compulsorilyany4tobeconducted):**

- C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)  
 C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)  
 C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method  
 C4. Estimation of Sodium present in soil/effluents sample using flame photometry  
 C5. Determination of Chemical Oxygen Demand (COD) of industrial wastewater sample

**D-Open Ended Experiments (any two):**

- D1. Estimation of metal in e-waste by optical sensors  
 D2. Electroless plating of Nickel on Copper  
 D3. Determination of glucose by electrochemical sensors  
 D4. Synthesis of polyaniline and its conductivity measurement

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1.	Identify the terms and processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5.	Analyze properties and multi processes associated with chemical substances in disciplinary situations

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be

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evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### **Suggested Learning Resources:**

##### **Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)**

1. WileyEngineeringChemistry,WileyIndiaPvt.Ltd.NewDelhi,2013-2<sup>nd</sup>Edition.
2. EngineeringChemistry,Satyaprakash&ManishaAgrawal,KhannaBookPublishing,Delhi
3. ATextBookofEngg.Chemistry,ShashiChawla,DhanpatRai&Co.(P)Ltd.
4. EssentialsofPhysicalChemistry,Bahl & Tuli,S.ChandPublishing
5. AppliedChemistry,SunitaRattan,Kataria5.EngineeringChemistry,Baskar,Wiley
6. EngineeringChemistry-I,D.Grouur Krishana,VikasPublishing
7. ATextbookofEngineeringChemistry,SSDara&Dr.SSUmare,SChand&CompanyLtd.,12<sup>th</sup>Edition,2011
8. ATextBookofEngineeringChemistry,R.V.GadagandNityanandaShetty,I.K.InternationalPublishinghouse. 2<sup>nd</sup>Edition,2016.
9. TextBookofPolymerScience,F.W.Billmeyer,JohnWiley&Sons,4<sup>th</sup>Edition,1999.
10. NanotechnologyAChemicalApproachtoNanomaterials,G.A.Ozin &A.C.Arsenault,RSCPublishing,2005.
11. CorrosionEngineering,M.G.Fontana,N.D.Greene,McGrawHillPublications,NewYork,3<sup>rd</sup>Edition,1996.
12. Linden'sHandbookofBatteries,KirbyW.Beard,FifthEdition,McGrawHill,2019.
13. OLEDDisplayFundamentalsandApplications,TakatoshiTsumijura,Wiley-Blackwell,2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin,ElzbietaFrackowiak,Wiley-VCH;1st edition,2013.

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15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFIC BUSINESS PRESS Inc., 2017. Dr.H. Panda,
16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi:10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh Band Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F.H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyarayanan, Nirali Prakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha Kulkarni, Capital Publishing Company, 3rd Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumariah & Pushpalengar., Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S, KS Anantha Raju, CBS publishers Pvt Ltd.
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

**Weblinks and Video Lectures (e-Resources):**

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWH>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEjk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

**Activity Based Learning (Suggested Activities in Class) / Practical Based learning**

- <https://www.vlab.co.in/broad-area-chemical-sciences>
- <https://demonstrations.wolfram.com/topics.php>
- <https://interestingengineering.com/science>

COs and POs Mapping (Individual teacher has to fill up)												
	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

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Course Title:	Computer Aided Engineering Drawing (Common to All)		
Course Code	BCEDK203/203	CIE Marks	50
Teaching Hour/Week (L:T:P:S)	2:0:2:0	SEE Marks	50
Total Hours of Teaching - Learning	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b>			
CLO1: To understand the basic principles and conventions of engineering drawing			
CLO2: To use drawing as a communication mode			
CLO3: To generate pictorial views using CAD software			
CLO4: To understand the development of surfaces			
CLO5: To visualize engineering components			
<b>Teaching-Learning (General Instructions):</b>			
<ul style="list-style-type: none"> <li>• Students should be made aware of powerful engineering communication tool –Drawing.</li> <li>• Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.</li> <li>• Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.</li> <li>• For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for othershapes)</li> <li>• Use any CAD software for generating orthographic and pictorial views.</li> <li>• Make use of sketch book with graph sheets for manual / preparatory sketching</li> </ul>			
<b>Module-1</b>			
<b>Introduction: for CIE only</b>			
Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.			
<b>Orthographic Projections of Points, Lines and Planes:</b>			
Introduction to Orthographic projections: Orthographic projections of points in 1 <sup>st</sup> and 3 <sup>rd</sup> quadrants.			
Orthographic projections of lines (Placed in First quadrant only).			
Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).			
<i>Application on projections of Lines &amp; Planes (For CIE only)</i>			
<b>Module-2</b>			
<b>Orthographic Projection of Solids:</b>			
Orthographic projection of right regular solids ( <b>Solids Resting on HP only</b> ): Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes & Tetrahedron.			
<i>Projections of Frustum of cone and pyramids (For practice only, not for CIE and SEE).</i>			

<b>Module-3</b>
<p><b>Isometric Projections:</b> Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. <b>Conversion of simple isometric drawings into orthographic views.</b> Problems on applications of Isometric projections of simple objects / engineering components. <b>Introduction to drawing views using 3D environment (For CIE only).</b></p>
<b>Module-4</b>
<p><b>Development of Lateral Surfaces of Solids:</b> Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays. <b>Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only)</b></p>
<b>Module-5</b>
<p><b>Multidisciplinary Applications &amp; Practice (For CIE Only):</b> <b>Free hand Sketching;</b> True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools &amp; Furniture's etc <b>Drawing Simple Mechanisms;</b> Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart &amp; Four-wheeler carts to dimensions etc <b>Electric Wiring and lighting diagrams;</b> Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software <b>Basic Building Drawing;</b> Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software, <b>Electronics Engineering Drawings-</b> Like, Simple Electronics Circuit Drawings, practice on layers concept. <b>Graphs &amp; Charts:</b> Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.</p>
<p><b>Course Outcomes</b> At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>CO 1. Draw and communicate the objects with definite shape and dimensions</li> <li>CO 2. Recognize and Draw the shape and size of objects through different views</li> <li>CO 3. Develop the lateral surfaces of the object</li> <li>CO 4. Create a Drawing views using CAD software.</li> <li>CO 5. Identify the interdisciplinary engineering components or systems through its graphical representation.</li> </ul>

  
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**Assessment Details (both CIE and SEE):**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks) and that for SEE minimum passing marks is 35% of the maximum marks (18 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE)**

- CIE shall be evaluated for max. marks of 100 and later the same shall be scaled-down to 50 marks as detailed below:
- CIE component should comprise of Continuous evaluation of Drawing work of students as and when the Modules are covered based on below detailed weightage.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Sketching (b)
Module 1	15	10	05
Module 2	20	15	05
Module 3	20	20	00
Module 4	20	20	00
Module 5	25	15	10
<b>Total</b>	<b>100</b>	<b>80</b>	<b>20</b>
<b>Consideration of Class work</b>		<b>Total of [(a) + (b)] = 100 Scaled down to 30 Marks</b>	

- At least one Test covering all the modules is to be conducted for 100 marks and evaluation to be based SEE pattern, and the same is to be scaled down to 20 Marks.
- The final CIE = Class work marks + Test marks

**Semester End Examination (SEE)**

- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it by 50%
- Question paper shall be set jointly by both Internal and External Examiner and made available for each batch as per schedule. *Questions are to be set preferably from TextBooks.*
- **Related to Module-1:** One full question can be set either from "points & lines" or "planes".
- Evaluation shall be carried jointly by both the examiners.
- Scheme of Evaluation: *To be defined by the examiners jointly and the same shall be submitted to the university along with question paper.*
- One full question shall be set from each of the Module from Modules 1,2,3 and 4 as per the below table weightage details. However, the student may be awarded full marks, if she completes solution on computer display without sketch.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Preparatory sketching (b)
Module 1	20	15	05
Module 2	30	25	05
Module 3	25	20	05
Module 4	25	20	05
<b>Total</b>	<b>100</b>	<b>80</b>	<b>20</b>
<b>Consideration of SEE Marks</b>		<b>Total of (a) + (b) ÷ 2 = Final SEE marks</b>	

**Suggested Learning Resources:****Text Books**

- *S.N. Lal, & T Madhusudhan*., Engineering Visulisation, 1<sup>st</sup> Edition, Cengage,Publication
- *Parthasarathy N. S., Vela Murali*, Engineering Drawing, Oxford University Press,2015.

**Reference Books**

- *Bhattacharya S. K.*, Electrical Engineering Drawing, New Age International publishers, second edition 1998. reprint2005.
- *Chris Schroder*, Printed Circuit Board Design using AutoCAD, Newnes,1997.
- *K S Sai Ram* Design of steel structures, , Third Edition byPearson
- *Nainan p kurian* Design of foundation systems, Narosapublications
- *A S Pabla*, Electrical power distribution, 6th edition, Tata Mcgrawhill
- *Bhatt, N.D.*, *Engineering Drawing: Plane and Solid Geometry*, 53<sup>rd</sup> edition, Charotar Publishing House Pvt. Limited. 2019.
- *K. R. Gopalakrishna, & Sudhir Gopalakrishna*: Textbook Of Computer Aided Engineering Drawing, 39<sup>th</sup> Edition, Subash Stores, Bangalore,2017

**COs and POs Mapping (CO-PO mappings are only Indicative)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2			3	1		1	1	3		2
CO2	3	2			3	1		1	1	3		2
CO3	3	2			3	1		1	1	3		2
CO4	3	3			3	1	1		1	3		1
CO5	3	2			3				1	3		2

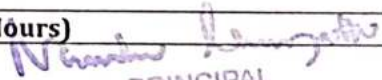
Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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Course Title:	<b>Basic Electronics (For ECE and Allied Branches)</b>		
Course Code:	<b>BBEE103/203</b>	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<p><b>Course objectives:</b> Students will be taught</p> <ul style="list-style-type: none"> <li>• Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.</li> <li>• Biasing circuits for transistor (BJT) as an amplifier.</li> <li>• Study of linear Op-amps and its applications.</li> <li>• Logic circuits and their optimization.</li> <li>• Principles of Transducers and Communication.</li> </ul>			
<p><b>Teaching-Learning Process</b>  These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective</p> <ol style="list-style-type: none"> <li>1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.</li> <li>2. Show Video/animation films to explain the functioning of various analog and digital circuits.</li> <li>3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.</li> <li>4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<p><b>Semiconductor Diodes:</b> Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis (Text 1: 2.1,2.2,2.3,2.4)  <b>Diode Applications:</b> Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Rectifier Power Supply: Capacitor Filter Circuit, RC <math>\pi</math> Filter (includes numerical)  (Text 1: 3.1,3.2,3.4,3.5)  <b>Zener Diodes:</b> Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulator. (Text1:2.9, 3.7)</p>			
<b>Module-2(8 Hours)</b>			
<p><b>Bipolar Junction Transistors:</b> Introduction BJT Voltages &amp; Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, DC Load line and Bias point  (Text 1: 4.2, 4.3, 4.5,4.6, 5.1)  <b>Field Effect Transistor:</b> Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs (Text 1: 9.1,9.2,9.5)</p>			
<b>Module-3(8 Hours)</b>			
<p><b>Operational Amplifiers:</b> Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, Slew rate, Bandwidth, input offset voltage, Input bias Current and Input offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations, Differential Amplifier, Inverting &amp; Non Inverting Amplifier  <b>Op-Amp Applications:</b> Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator (Text 2: 1.1, 1.2, 1.3, 1.5, 2.2, 2.3, 2.4, 2.6, 6.5.1, 6.5.2, 6.5.3, 6.12, 6.13).</p>			
<b>Module-4(8 Hours)</b>			

  
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**Boolean Algebra and Logic Circuits:** Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 3: 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7)

**Combinational logic:** Introduction, Design procedure, Adders- Half adder, Full adder (Text 3: 4.1, 4.2, 4.3)

**Module-5(8 Hours)**

**Introduction to Transducers:** Introduction, Resistive Transducers, Inductive Transducers, Capacitive Transducers, Thermal transducers, Optoelectronic transducer, and Piezoelectric transducers (Text 4: Chapter 18: 18.1, 18.2, 18.3, 18.4, 18.5)

**Communications:** Introduction to communication, Communication System, Modulation (Text book 5: 1.1, 1.2, 1.3)

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

**CO1:** Develop the basic knowledge on construction, operation and characteristics of semiconductor devices. (Level: C3)

**CO2:** Apply the acquired knowledge to construct small scale circuits consisting of semiconductor devices (Level: C3)

**CO3:** Develop competence knowledge to construct basic digital circuit by make use of basic gate and its function. (Level: C3)

**CO4:** Construct the conceptual blocks for basic communication system. (Level: C3)

**CO5:** Apply the knowledge of various transducers principle in sensor system. (Level: C3)

**A. CO v/s PO Mapping Table**

Cos/P Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	3	3	2	-	2	2						
CO2	3	2	3	-	2	1						
CO3	3	2	3	-	3				1			
CO4	2	1	1	-	2	1			1			1
CO5	2	1	1	-	2	1			1			1

  
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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>. and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.


**Suggested Learning Resources:**

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. Electronic Devices and Circuits, David A Bell, 5<sup>th</sup> Edition, Oxford, 2016
2. Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4<sup>th</sup> Edition
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8
4. Electronic Instrumentation and Measurements (3rd Edition) – David A. Bell, Oxford University Press, 2013
5. Electronic Communication Systems, George Kennedy, 4<sup>th</sup> Edition, TMH

**Web links and Video Lectures (e-Resources):**

- <https://nptel.ac.in/courses/122106025>
- <https://nptel.ac.in/courses/108105132>
- <https://nptel.ac.in/courses/117104072>

  
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16-2-2022

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

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SHRIDEVI  
EDUCATION

SHRIDEVI CHARITABLE TRUST (P.)  
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(Approved by AICTE, New Delhi, Recognised by Govt. of Karnataka and Affiliated to Visvesvaraya Technological University, Belagavi)



## Criteria 1.1

# Curriculum Planning and Implementation

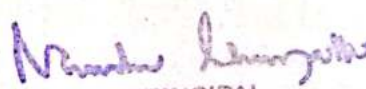
## 7. Syllabus Copy

2022 – 2023

*Manda Kanyas*  
PRINCIPAL  
SIRA R. TUMKUR.

**I Semester**

Course Title:	<b>Mathematics-I for Civil Engineering stream</b>		
Course Code:	<b>BMATC101</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
<p><b>Course objectives:</b>The goal of the course <b>Mathematics-I for Civil Engineering stream(22MATC11)</b> is to</p> <ul style="list-style-type: none"> <li>• <b>Familiarize</b> the importance of calculus associated with onevariable and two variables for Civil engineering.</li> <li>• <b>Analyze</b> Civil engineering problems applying Ordinary Differential Equations.</li> <li>• <b>Develop</b> the knowledge of Linear Algebra referring to matrices.</li> </ul>			
<p><b>Teaching-Learning Process</b>  <b>Pedagogy (General Instructions):</b>          These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.</li> <li>2. State the need for Mathematics with Engineering Studies and Provide real-life examples.</li> <li>3. Support and guide the students for self-study.</li> <li>4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.</li> <li>5. Encourage the students to group learning to improve their creative and analytical skills.</li> <li>6. Show short related video lectures in the following ways:             <ul style="list-style-type: none"> <li>• As an introduction to new topics (pre-lecture activity).</li> <li>• As a revision of topics (post-lecture activity).</li> <li>• As additional examples (post-lecture activity).</li> <li>• As an additional material of challenging topics (pre-and post-lecture activity).</li> <li>• As a model solution of some exercises (post-lecture activity).</li> </ul> </li> </ol>			
<b>Module-1:Calculus (8 hours)</b>			
<p><b>Introduction to polar coordinates and curvature relating to Civil engineering.</b>          Polar coordinates, Polar curves, angle between the radius vector and the tangent, and angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.  <b>Self-study:</b> Center and circle of curvature, evolutes and involutes.  <b>Applications:</b>Structural design and paths, Strength of materials, Elasticity.  <b>(RBT Levels: L1, L2 and L3)</b></p>			
<b>Module-2:Series Expansion and Multivariable Calculus (8 hours)</b>			

  
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**Introduction to series expansion and partial differentiation in the field of Civil engineering applications.**

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems.

Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables - Problems.

**Self-study:** Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

**Applications:** Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.

(RBT Levels: L1, L2 and L3)

**Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)**

**Introduction to first-order ordinary differential equations pertaining to the applications for Civil engineering.**

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on  $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$  and  $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$ . Orthogonal trajectories and Newton's law of cooling.

**Nonlinear differential equations:** Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems.

**Self-Study:** Applications of ODEs in Civil Engineering problems like bending of the beam, whirling of shaft, solution of non-linear ODE by the method of solvable for x and y.

**Applications:** Rate of Growth or Decay. Conduction of heat.

(RBT Levels: L1, L2 and L3)

**Module-4: Ordinary Differential Equations of Higher Order (8 hours)**

**Importance of higher-order ordinary differential equations in Civil engineering applications.**

Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations - Problems.

**Self-Study:** Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.

**Applications:** Oscillations of a spring. Transmission lines. Highway engineering.

(RBT Levels: L1, L2 and L3)

**Module-5: Linear Algebra (8 hours)**

**Introduction of linear algebra related to Civil engineering applications.**

Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

**Self-Study:** Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley-Hamilton theorem.

**Applications:** Structural Analysis, Balancing equations.

(RBT Levels: L1, L2 and L3)

**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)**  
**10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Solutions of Second-order ordinary differential equations with initial/boundary conditions
7	Solution of a differential equation of oscillations of a spring/deflection of a beam with different loads
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by the Rayleigh power method.

**Suggested software:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	apply the knowledge of calculus to solve problems related to polar curves.
CO2	learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO3	analyze the solution of linear and nonlinear ordinary differential equations.
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**.



### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

### **Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

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**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

**Reference Books**

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C.Bhunia: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup> Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup> Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3<sup>rd</sup> Ed., 2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4<sup>th</sup> Ed.. 2018.
9. Gareth Williams: "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6<sup>th</sup> Ed., 2017.
10. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed., 2022.

**Web links and Video Lectures (e-Resources):**

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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**I Semester**

Course Title:	<b>Mathematics-I for Computer Science and Engineering stream</b>		
Course Code:	<b>BMATSI01</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Total Marks	100
Total Hours of Pedagogy	40 hours Theory + 10 to12 Lab slots	Exam Hours	03
		Credits	04

**Course objectives:**The goal of the course **Mathematics-I for Computer Science and Engineering stream(22MATSI1)** is to

- **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering.
- **Analyze** Computer science and engineering problems by applying Ordinary Differential Equations.
- **Apply** the knowledge of modular arithmetic to computer algorithms.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

**Teaching-Learning Process****Pedagogy (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

**Module-1:Calculus (8 hours)****Introduction to polar coordinates and curvature relating to Computer Science and Engineering.**

Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Computer graphics, Image processing.

**(RBT Levels: L1, L2 and L3)**

**Module-2:Series Expansion and Multivariable Calculus (8 hours)**

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**Introduction of series expansion and partial differentiation in Computer Science & Engineering applications.**

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule-Problems.

Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

**Self-study:** Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

**Applications:** Series expansion in computer programming. Computing errors and approximations.

(RBT Levels: L1, L2 and L3)

**Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)**

**Introduction to first-order ordinary differential equations pertaining to the applications for Computer Science & Engineering.**

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on  $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$  and  $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$ . Orthogonal trajectories, L-R & C-R circuits. Problems.

**Non-linear differential equations:** Introduction to general and singular solutions, Solvable for p only. Clairaut's equations. reducible to Clairaut's equations. Problems.

**Self-Study:** Applications of ODEs, Solvable for x and y.

**Applications of ordinary differential equations:** Rate of Growth or Decay, Conduction of heat.

(RBT Levels: L1, L2 and L3)

**Module-4: Modular Arithmetic (8 hours)**

**Introduction of modular arithmetic and its applications in Computer Science and Engineering.** Introduction to Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences-RSA algorithm.

**Self-Study:** Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.

**Applications:** Cryptography, encoding and decoding, RSA applications in public key encryption.

(RBT Levels: L1, L2 and L3)

**Module-5: Linear Algebra (8 hours)**

**Introduction of linear algebra related to Computer Science & Engineering.**

Elementary row transformation of a matrix. Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

**Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.

**Applications:** Boolean matrix, Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.

(RBT Levels: L1, L2 and L3).

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**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)****10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Finding GCD using Euclid's Algorithm
7	Solving linear congruences $ax \equiv b(\text{mod } m)$
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

**Suggested software:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
CO2	analyze the solution of linear and nonlinear ordinary differential equations
CO3	get acquainted and to apply modular arithmetic to computer algorithms
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
CO5	familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

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- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

##### Text Books

1. **B. S. Grewal:** "Higher Engineering Mathematics", Khanna Publishers. 44<sup>th</sup>Ed., 2021.
2. **E. Kreyszig:** "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.
3. **David M Burton:** "Elementary Number Theory" Mc Graw Hill, 7<sup>th</sup> Ed.,2017.

##### Reference Books

4. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
5. **Srimanta Pal & Subodh C.Bhunia:** "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup> Ed., 2016.
6. **N.P Bali and Manish Goyal:** "A Textbook of Engineering Mathematics" Laxmi

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- Publications, 10<sup>th</sup> Ed., 2022.
7. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
  8. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
  9. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3<sup>rd</sup> Ed., 2014.
  10. **James Stewart:** "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.
  11. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4<sup>th</sup> Ed., 2018.
  12. **Gareth Williams:** "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6<sup>th</sup> Ed., 2017.
  13. **Gilbert Strang:** "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed. 2022.
  14. **William Stallings:** "Cryptography and Network Security" Pearson Prentice Hall, 6<sup>th</sup> Ed., 2013.
  15. **Kenneth H Rosen:** "Discrete Mathematics and its Applications" McGraw-Hill, 8<sup>th</sup> Ed. 2019.
  16. **Ajay Kumar Chaudhuri:** "Introduction to Number Theory"NCBA Publications, 2<sup>nd</sup> Ed., 2009.
  17. **Thomas Koshy:** "Elementary Number Theory with Applications"Harcourt Academic Press, 2<sup>nd</sup> Ed., 2008.

**Web links and Video Lectures (e-Resources):**

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

*Murthy Srinivas*  
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**I Semester**

Course Title:	<b>Mathematics-I for Electrical &amp; Electronics Engineering Stream</b>		
Course Code:	<b>BMATE101</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

**Course objectives:** The goal of the course **Mathematics-I for Electrical & Electronics Engineering stream(22MATE11)** is to

- **Familiarize** the importance of calculus associated with one variable and multivariable for Electrical and Electronics engineering.
- **Analyze** Electrical and Electronics engineering problems by applying Ordinary Differential Equations.
- **Familiarize** the important tools in Integral Calculus that are essential in Electrical and Electronics engineering.
- **Develop** the knowledge of Linear Algebra to solve the system of equations.

**Teaching-Learning Process****Pedagogy (General Instructions):**

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

**Module-1:Calculus (8 hours)**

**Introduction to polar coordinates and curvature relating to EC & EE Engineering applications.** Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Communication signals, Manufacturing of microphones, and Image processing.  
(RBT Levels: L1, L2 and L3)

**Module-2:Series Expansion and Multivariable Calculus (8 hours)**



**Introduction of series expansion and partial differentiation in EC & EE Engineering applications.**

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule - Problems.

Partial differentiation, total derivative - differentiation of composite functions, Jacobian and problems. Maxima and minima for a function of two variables. Problems.

**Self-study:** Euler's Theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

**Applications:** Series expansion in communication signals, Errors and approximations, and vector calculus.

(RBT Levels: L1, L2 and L3)

### Module-3: Ordinary Differential Equations (ODEs) of First Order (8 hours)

**Introduction to first-order ordinary differential equations pertaining to the applications for EC & EE engineering.**

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations- Integrating factors on  $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right)$  and  $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$ . Orthogonal trajectories, L-R and C-R circuits. Problems.

**Non-linear differential equations:** Introduction to general and singular solutions, Solvable for p only. Clairaut's equations, reducible to Clairaut's equations. Problems.

**Self-Study:** Applications of ODEs. Solvable for x and y.

**Applications of ordinary differential equations:** Rate of Growth or Decay, Conduction of heat.

(RBT Levels: L1, L2 and L3)

### Module-4: Integral Calculus (8 hours)

**Introduction to Integral Calculus in EC & EE Engineering applications.**

**Multiple Integrals:** Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. Problems.

**Self-Study:** Volume by triple integration, Center of gravity.

**Applications:** Antenna and wave propagation, Calculation of optimum power in electrical circuits, field theory.

(RBT Levels: L1, L2 and L3)

### Module-5: Linear Algebra (8 hours)

**Introduction of linear algebra related to EC & EE engineering applications.**

Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.

**Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley-Hamilton theorem.

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**Applications of Linear Algebra:** Network Analysis, Markov Analysis, Critical point of a network system, Optimum solution.

(RBT Levels: L1, L2 and L3)

**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)**

**10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	2D plots for Cartesian and polar curves
2	Finding angle between polar curves, curvature and radius of curvature of a given curve
3	Finding partial derivatives and Jacobian
4	Applications to Maxima and Minima of two variables
5	Solution of first-order ordinary differential equation and plotting the solution curves
6	Program to compute area, volume and centre of gravity
7	Evaluation of improper integrals
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions
CO2	analyze the solution of linear and nonlinear ordinary differential equations
CO3	apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume
CO4	make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors
CO5	familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/ SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course

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project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable. with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

**Suggested Learning Resources:**

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**


**Text Books**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

**Reference Books**

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C.Bhunia: "Engineering Mathematics" Oxford University Press,

3 <sup>rd</sup> Ed., 2016.							
3. <b>N.P Bali and Manish Goyal:</b> "A Textbook of Engineering Mathematics" Laxmi Publications, 10 <sup>th</sup> Ed., 2022.							
4. <b>C. Ray Wylie, Louis C. Barrett:</b> "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6 <sup>th</sup> Ed., 2017.							
5. <b>Gupta C.B, Sing S.R and Mukesh Kumar:</b> "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.							
6. <b>H. K. Dass and Er. Rajnish Verma:</b> "Higher Engineering Mathematics" S. Chand Publication, 3 <sup>rd</sup> Ed., 2014.							
7. <b>James Stewart:</b> "Calculus" Cengage Publications, 7 <sup>th</sup> Ed., 2019.							
8. <b>David C Lay:</b> "Linear Algebra and its Applications", Pearson Publishers, 4 <sup>th</sup> Ed., 2018.							
9. <b>Gareth Williams:</b> "Linear Algebra with Applications", Jones Bartlett Publishers Inc., 6 <sup>th</sup> Ed., 2017.							
10. <b>Gilbert Strang:</b> "Linear Algebra and its Applications". Cengage Publications, 4 <sup>th</sup> Ed. 2022.							
<b>Web links and Video Lectures (e-Resources):</b>							
<ul style="list-style-type: none"> <li>• <a href="http://nptel.ac.in/courses.php?disciplineID=111">http://nptel.ac.in/courses.php?disciplineID=111</a></li> <li>• <a href="http://www.class-central.com/subject/math(MOOCs)">http://www.class-central.com/subject/math(MOOCs)</a></li> <li>• <a href="http://academicearth.org/">http://academicearth.org/</a></li> <li>• VTU e-Shikshana Program</li> <li>• VTU EDUSAT Program</li> </ul>							
<b>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</b>							
<ul style="list-style-type: none"> <li>• Quizzes</li> <li>• Assignments</li> <li>• Seminar</li> </ul>							
<b>COs and POs Mapping (Individual teacher has to fill up)</b>							
COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							
<b>Level 3- Highly Mapped,    Level 2-Moderately Mapped,    Level 1-Low Mapped,    Level 0- Not Mapped</b>							

  
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Course Title:	<b>Applied Physics for CSE Stream</b>		
Course Code:	<b>BPHYS102/202</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2-2-2-0	Total Marks	100
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Exam Hours	03
		Credits	04
<b>Course objectives</b>			
<ul style="list-style-type: none"> <li>To study the essentials of photonics and its application in computer science.</li> <li>To study the principles of quantum mechanics and its application in quantum computing.</li> <li>To study the electrical properties of materials</li> <li>To study the essentials of physics for computational aspects like design and data analysis.</li> </ul>			
<b>Teaching-Learning Process</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective			
<ol style="list-style-type: none"> <li>1. Flipped Class</li> <li>2. Chalk and Talk</li> <li>3. Blended Mode of Teaching and Learning</li> <li>4. Simulations, Interactive Simulations and Animations</li> <li>5. NPTEL and Other Videos for theory topics</li> <li>6. Smart Class Room</li> <li>7. Lab Experiment Videos</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<b>Laser and Optical Fibers:</b>			
<b>LASER:</b> Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State. Requisites of a laser system, Semiconductor Diode Laser, Applications: Bar code scanner, Laser Printer, Laser Cooling(Qualitative), Numerical Problems.			
<b>Optical Fiber:</b> Principle and Structure, Propagation of Light, Acceptance angle and Numerical Aperture (NA), Derivation of Expression for NA, Modes of Propagation, RI Profile, Classification of Optical Fibers, Attenuation and Fiber Losses, Applications: Fiber Optic networking, Fiber Optic Communication. Numerical Problems			
<b>Pre requisite: Properties of light</b>			
<b>Self-learning: Total Internal Reflection</b>			
<b>Module-2 (8 Hours)</b>			
<b>Quantum Mechanics:</b>			
de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus - Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Quantization of Energy States, Waveforms and Probabilities. Numerical Problems.			
<b>Pre requisite: Wave-Particle dualism</b>			
<b>Self-learning: de Broglie Hypothesis</b>			
<b>Module-3 (8 Hours)</b>			
<b>Quantum Computing:</b>			
<b>Principles of Quantum Information &amp; Quantum Computing:</b>			
Introduction to Quantum Computing, Moore's law & its end, Differences between Classical & Quantum computing, Concept of qubit and its properties, Representation of qubit by Bloch sphere, Single and Two qubits, Extension to N qubits.			
<b>Dirac representation and matrix operations:</b>			
Matrix representation of 0 and 1 States, Identity Operator I, Applying I to $ 0\rangle$ and $ 1\rangle$ states, Pauli Matrices and its			

  
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operations on  $|0\rangle$  and  $|1\rangle$  states. Explanation of i) Conjugate of a matrix and ii) Transpose of a matrix. Unitary matrix U. Examples: Row and Column Matrices and their multiplication (Inner Product). Probability. and Quantum Superposition, normalization rule. Orthogonality, Orthonormality. Numerical Problems

#### Quantum Gates

**Single Qubit Gates:** Quantum Not Gate, Pauli - X, Y and Z Gates, Hadamard Gate, Phase Gate (or S Gate), T Gate

**Multiple Qubit Gates:** Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled -Z gate, Toffoli gate.

**Pre requisites:** Matrices

**Self-learning:** Moore's law

#### Module-4 (8 Hours)

#### Electrical Properties of Materials and Applications

##### Electrical Conductivity in metals

Resistivity and Mobility, Concept of Phonon, Matheissen's rule, Failures of Classical Free Electron Theory, Assumptions of Quantum Free Electron Theory, Fermi Energy, Density of States, Fermi Factor, Variation of Fermi Factor With Temperature and Energy. Numerical Problems.

##### Superconductivity

Introduction to Super Conductors, Temperature dependence of resistivity, Meissner's Effect, Critical Field, Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), Quantum Tunnelling, High Temperature superconductivity, Josephson Junctions (Qualitative), DC and RF SQUIDS (Qualitative), Applications in Quantum Computing: Charge, Phase and Flux qubits, Numerical Problems.

**Pre requisites:** Basics of Electrical conductivity

**Self-learning:** Resistivity and Mobility

#### Module-5 (8 hours)

#### Applications of Physics in computing:

##### Physics of Animation:

Taxonomy of physics based animation methods, Frames, Frames per Second, Size and Scale, Weight and Strength, Motion and Timing in Animations, Constant Force and Acceleration, The Odd rule, Odd-rule Scenarios, Motion Graphs, Examples of Character Animation: Jumping, Parts of Jump, Jump Magnification, Stop Time, Walking: Strides and Steps, Walk Timing. Numerical Problems

**Statistical Physics for Computing:** Descriptive statistics and inferential statistics, Poisson distribution and modeling the probability of proton decay, Normal Distributions (Bell Curves), Monte Carlo Method: Determination of Value of  $\pi$ . Numerical Problems.

**Pre requisites:** Motion in one dimension, Probability

**Self-learning:** Frames, Frames per Second

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	Describe the principles of LASERS and Optical fibers and their relevant applications.
CO2	Discuss the basic principles of the Quantum Mechanics and its application in Quantum Computing.
CO3	Summarize the essential properties of superconductors and its applications in qubits.
CO4	Illustrate the application of physics in design and data analysis.
CO5	Practice working in groups to conduct experiments in physics and perform precise and honest measurements.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. Solid State Physics, S O Pillai, New Age International Private Limited, 8<sup>th</sup> Edition, 2018.
2. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
3. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
4. Concepts of Modern Physics, Aurther Beiser, McGrawhill, 6<sup>th</sup> Edition, 2009.
5. Lasers and Non Linear Optics, B B Loud, New age international, 2011 edition.
6. A Textbook of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
7. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.

8. Quantum Computing. Vishal Sahani, McGraw Hill Education, 2007 Edition.
9. Quantum Computing – A Beginner's Introduction, Parag K Lala, Indian Edition, Mc GrawHill, Reprint 2020.
10. Engineering Physics, S P Basavaraj, 2005 Edition, Subhash Stores.
11. Physics for Animators. Michele Bousquet with Alejandro Garcia, CRC Press, Taylor & Francis, 2016.
12. Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations, Maria Luisa Dalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli, Trends in Logic, Volume 48, Springer.
13. Statistical Physics: Berkely Physics Course. Volume 5. F. Reif, McGraw Hill.
14. Introduction to Superconductivity, Michael Tinkham, McGraw Hill, INC, II Edition

**Web links and Video Lectures (e-Resources):**

**LASER :** <https://www.youtube.com/watch?v=WgzvnezP1yc>

**Superconductivity :** <https://www.youtube.com/watch?v=MT5X15ppn48>

**Optical Fiber :** [https://www.youtube.com/watch?v=N\\_kA8EpCUQo](https://www.youtube.com/watch?v=N_kA8EpCUQo)

**Quantum Mechanics :** <https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s>

**Quantum Computing :** <https://www.youtube.com/watch?v=jHoEjvuPoB8>

**Quantum Computing :** <https://www.youtube.com/watch?v=ZuvCUU2jD30>

**Physics of Animation :** [https://www.youtube.com/watch?v=kj1kaA\\_8Fu4](https://www.youtube.com/watch?v=kj1kaA_8Fu4)

**Statistical Physics Simulation :** [https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability\\_en.html](https://phet.colorado.edu/sims/html/plinko-probability/latest/plinko-probability_en.html)

**NPTEL Superconductivity:** <https://archive.nptel.ac.in/courses/115/103/115103108/>

**NPTEL Quantum Computing :** <https://archive.nptel.ac.in/courses/115/101/115101092>

**Virtual LAB :** <https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>

**Virtual LAB :** <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

<http://nptel.ac.in>

<https://swayam.gov.in>

[https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

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**Laboratory Component:**

Any Ten Experiments have to be completed from the list of experiments

**Note:** The experiments have to be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

**List of Experiments**

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Planck's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive Simulations(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	3	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	2
CO4	3	2	1	-	1	-	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped,


**Note :** The CO-PO mapping values are indicative. The course coordinator can alter the mapping using Competency and Performance Indicators mentioned in the AICTE Exam reforms.

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## Computer Science and Engineering and allied branches(Chemistry group)

<b>Course Title:</b>	<b>Applied Chemistry for Computer Science &amp; Engineering stream</b>		
<b>Course Code:</b>	<b>BCHE102/202</b>	CIEMarks	50
<b>Course Type(Theory/Practical/Integrated)</b>	Integrated	SEEMarks	50
		Total Marks	100
<b>TeachingHours/Week(L:T:P:S)<sup>1</sup></b>	2:2:2:0	Exam Hours	03
<b>TotalHoursofPedagogy</b>	40hoursTheory+ 10to12Labslots	Credits	04
<b>Courseobjectives</b> <ul style="list-style-type: none"> <li>Toenablestudentstoacquireknowledgeonprinciplesofchemistryforengineeringapplications.</li> <li>Todevelopanintuitiveunderstandingofchemistrybyemphasizingtherelatedbranchesofengineering.</li> <li>Toprovidestudentswithasolidfoundationinanalyticalreasoningrequiredtosolvesocietalproblems.</li> </ul>			
<b>Teaching-LearningProcess</b> Thesearesamplestrategies,whichteachercanusetoacceleratetheattainmentofthevariouscourseoutcomesandmakeTeaching-Learningmoreeffective <ul style="list-style-type: none"> <li>Tutorial&amp;remedialclassesforneedystudents(notregularT/R)</li> <li>ConductingMakeupclasses/Bridgecoursesforneedystudents</li> <li>Demonstrationofconceptseitherbybuildingmodelsorbyindustryvisit</li> <li>Experimentsinlaboratoriesshallbeexecutedinblendedmode(conventionalornon-conventionalmethods)</li> <li>UseofICT-Onlinevideos,onlinecourses</li> <li>Useofonlineplatformsforassignments/Notes/Quizzes(Ex.Googleclassroom)</li> </ul>			
<b>MODULE1:SensorsandEnergySystems(8hr)</b>			
<b>Sensors:</b> Introduction,working,principleandapplicationsofConductometricsensors,Electrochemical sensors,Thermometricsensors (Flame photometry)andOpticalsensors (colorimetry).Sensorsforthemeasurement of dissolved oxygen (DO). Electrochemical sensors for the pharmaceuticals.ElectrochemicalgassensorsforSOxandNOx.Disposableensorsin thedetectionofbiomoleculesandpesticides.			
<b>EnergySystems:</b> Introductiontobatteries,construction,workingandapplicationsofLithiumionandSodiumionbatteries.QuantumDotSensitizedSolarCells(QDSSC's)-Principle, PropertiesandApplications.			
<b>Self-learning:</b> Types of electrochemical sensor, Gas sensor - O <sub>2</sub> sensor, Biosensor - Glucosensors.			
<b>MODULE2:MaterialsforMemoryandDisplaySystems(8hr)</b>			
<b>Memory Devices:</b> Introduction, Basic concepts of electronic memory, History of organic/polymerelectronicmemorydevices,Classificationofelectronicmemorydevices,			

1.NOTE:Whereverthecontact hoursisnotsufficient,tutorialhourcanbeconvertedto theoryhours

  
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types of organic memory devices (organic molecules, polymeric materials, organic-inorganic hybrid materials).

**Display Systems:** Photoactive and electroactive materials. Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's). Light emitting electrochemical cells.

**Self-learning:** Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminium (Al), and Brominated flame retardants in computers.

### MODULE 3: Corrosion and Electrode System (8hr)

**Corrosion Chemistry:** Introduction, electrochemical theory of corrosion, types of corrosion - differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

**Electrode System:** Introduction, types of electrodes. Ion selective electrode - definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode - construction, working and applications of calomel electrode. Concentration cell - Definition, construction and Numerical problems.

**Analytical Techniques:** Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron.

**Self-learning:** IR and UV-Visible spectroscopy.

### MODULE 4: Polymers and Green Fuels (8hr)

**Polymers:** Introduction, Molecular weight -

Number average, weight average and numerical problems. Preparation, properties, and commercial application of kevlar. Conducting polymers - synthesis and conducting mechanism of polyacetylene and commercial applications.

**Green Fuels:** Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Generation of energy (green hydrogen) by electrolysis of water and its advantages.

**Self-learning:** Regenerative fuel cells

### MODULE 5: E-Waste Management (8hr)

**E-Waste:** Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatments, hydrometallurgical extraction, pyrometallurgical methods, direct recycling). Extraction of gold from E-waste. Role of stakeholders in environmental management of e-waste (producers, consumers, recyclers, and statutory bodies).

**Self-learning:** Impact of heavy metal on environment and human health.

### PRACTICAL MODULE

A - Demonstration (any two) offline/virtual:

A1. Chemical Structure drawing using software: ChemDraw or ACD/ChemSketch

A2. Determination of strength of an acid in Pb-acid battery  
 A3. Synthesis of Iron-oxide Nanoparticles  
 A4. Electrolysis of water

**B-Exercise (compulsorily any 4 to be conducted):**

B1. Conductometric estimation of acid mixture  
 B2. Potentiometric estimation of FAS using  $K_2Cr_2O_7$   
 B3. Determination of  $pK_a$  of vinegar using pH sensor (Glass electrode)  
 B4. Determination of rate of corrosion of mild steel by weight loss method  
 B5. Estimation of total hardness of water by EDTA method

**C-Structured Enquiry (compulsorily any 4 to be conducted):**

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)  
 C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)  
 C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method  
 C4. Estimation of Sodium present in soil/effluents sample using flame photometry  
 C5. Determination of Chemical Oxygen Demand (COD) of industrial wastewater sample

**D-Open Ended Experiments (any two):**

D1. Evaluation of acid content in beverages by using pH sensors and simulation.  
 D2. Construction of photovoltaic cell.  
 D3. Design an experiment to identify the presence of proteins in given sample.  
 D4. Searching suitable PDB file and target for molecular docking

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1.	Identify the terms and processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5.	Analyze properties and multi processes associated with chemical substances in disciplinary situations

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

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- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a **mix of topics** under that module.

#### Suggested Learning Resources:

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013-2<sup>nd</sup> Edition.
2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing
5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
6. Engineering Chemistry-I, D. Groun Krishana, Vikas Publishing
7. A Textbook of Engineering Chemistry, SSDara & Dr. SSUmare, S Chand & Company Ltd., 12<sup>th</sup> Edition, 2011.
8. A Text Book of Engineering Chemistry, R. V. Gadagand Nityananda Shetty, I. K. International Publishing house, 2<sup>nd</sup> Edition, 2016.
9. Text Book of Polymer Science, F. W. Billmeyer, John Wiley & Sons, 4<sup>th</sup> Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G. A. Ozin & A. C. Arsenault, RSC Publishing, 2005
11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3<sup>rd</sup> Edition, 1996.

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12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley-Blackwell, 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH; 1st edition, 2013.
15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFIC BUSINESS PRESS Inc., 2017. Dr. H. Panda.
16. Expanding the Vision of Sensor Materials. National Research Council 1995. Washington, DC: The National Academies Press. doi:10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh Band and Dr. Roopashree B. Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F.H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K.R. Mahadik and Dr. L. Sathiyarayanan, Nirali Prakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa academic press, 1st Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha Kulkarni, Capital Publishing Company, 3rd Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpal yengar, Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi. Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S. KS Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

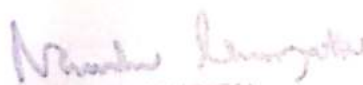
#### Weblinks and Video Lectures (e-Resources):

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWH>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEJk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

  
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**Activity Based Learning (Suggested Activities in Class) / Practical Based Learning**
<https://www.vlab.co.in/broad-area-chemical-sciences>
<https://demonstrations.wolfram.com/topics.php>
<https://interestingengineering.com/science>
**COs and POs Mapping (Individual teacher has to fill up)**

	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					



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Course Title:	Applied Physics for CV Stream		
Course Code:	BPHYC102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Credits	04
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To understand the types of oscillation, shock waves &amp; its generation, and applications.</li> <li>To Study the elastic properties of materials and failures of engineering materials</li> <li>To Study the acoustics buildings and the essentials of radiometry and photometry.</li> <li>To understand the principles photonic devices and their application relevant to civil engineering.</li> <li>To understand the various natural disaster and safety</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective <ol style="list-style-type: none"> <li>1. Flipped Class</li> <li>2. Chalk and Talk</li> <li>3. Blended Mode of Teaching and Learning</li> <li>4. Simulations, Interactive Simulations and Animations</li> <li>5. NPTEL and Other Videos for theory topics</li> <li>6. Smart Class Room</li> <li>7. Lab Experiment Videos</li> </ol>			
<b>Module-1 (8 Hours)</b>			
<b>Module -I: Oscillations and Shock waves:</b> <b>Oscillations:</b> Simple Harmonic motion (SHM), Differential equation for SHM (No derivation), Springs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation), Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of Forced oscillations (Qualitative), Resonance, Sharpness of resonance. Numerical Problems. <b>Shock waves:</b> Mach number and Mach Angle, Mach Regimes, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, Applications of Shock Waves, Numerical problems.			
<b>Pre-requisites: Basics of Oscillations</b> <b>Self-learning: Simple Harmonic motion, Differential equation for SHM</b>			
<b>Module-2 (8 Hours)</b>			
<b>Elasticity</b> Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between $Y$ , $n$ and $\sigma$ (with derivation), mention relation between $K$ , $Y$ and $\sigma$ , limiting values of Poisson's ratio. Beams, Bending moment and derivation of expression. Cantilever and I section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems.			
<b>Pre requisites: Elasticity, Stress &amp; Strain</b> <b>Self-learning: Stress-Strain Curve</b>			
<b>Module-3 (8 Hours)</b>			
<b>Acoustics, Radiometry and Photometry:</b> <b>Acoustics:</b> Introduction to Acoustics, Types of Acoustics, Reverberation and reverberation time, Absorption power and Absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), Measurement of absorption coefficient, Factors affecting the acoustics and remedial measures, Sound Insulation and its measurements. Noise and its Measurements, Impact of Noise in Multi-storied buildings.			



**Radiometry and Photometry:** Radiation Quantities, Spectral Quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).

**Prerequisites:** Basics of Sound, Waves & light properties.  
**Self-learning:** Introduction to acoustics.

#### Module-4 (8 Hours)

**Photonics:**

**LASER**

Properties of a LASER Beam, Interaction of Radiation with Matter, LASER action, Population Inversion, Metastable State, Requisites of a LASER System, Semiconductor LASER, LASER Range Finder, LIDAR, Road Profiling, Bridge Deflection, Speed Checker, Numerical Problems.

**Optical Fiber**

Principle and Construction of Optical Fibers, Acceptance angle and Numerical Aperture (NA), Expression for NA, Modes of Propagation, Attenuation and Fiber Losses, Fiber Optic Displacement Sensor, Fiber Optic Temperature Sensor, Numerical Problems

**Pre requisite:** Properties of light.

**Self-learning:** Total Internal Reflection.

#### Module-5 (8 Hours)

**Natural hazards and Safety**

Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rain fall, geological structure, human excavation etc., types of land slide, adverse effects, engineering solution for landslides), Forest Fires and detection using remote sensing, Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures. Numerical Problems.

**Pre requisite:** Oscillations.

**Self-learning:** Richters scale.

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	<b>Elucidate</b> the concepts in oscillations, waves, elasticity and material failures
CO2	<b>Summarize</b> concepts of acoustics in buildings and explain the concepts in radiation and photometry
CO3	<b>Discuss</b> the principles photonic devices and their application relevant to civil engineering.
CO4	<b>Describe</b> the various natural hazards and safety precautions.
CO5	<b>Practice</b> working in groups to conduct experiments in physics and <b>perform</b> precise and honest measurements.

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

#### CIE for the theory component of the IC

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be

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awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

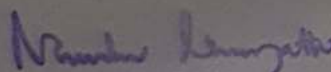
There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### **Suggested Learning Resources:**

##### **Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
2. A Textbook of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
3. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
4. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltc.,
5. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.
6. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshab, Springer, 2<sup>nd</sup> edition.
7. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara. sixth edition, Pearson Education Asia Pvt. Ltd., New Delhi.
8. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition
9. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy; Willey India Pvt. Ltd, Delhi 2014.
10. An Introduction to Disaster Management, Natural Disastr & Man Made Hazards, S. Vaidyanathan, IKON Books P
11. Natural Hazards, Edward Bryant, Cambridge University. Press, 2<sup>nd</sup> Edition
12. Natural Hazards by Ramesh .P. Singh, CRC Press, Taylor and Francis group.
13. Disaster Education and Management, Rajendra Kumar Bhandari, Springer. India 2014
14. Principles of Fire Safety Engineering Understanding Fire & Fire Protection. Akhil Kumar Das, PHI Learning , II Edition.

#### **Web links and Video Lectures (e-Resources):**

  
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**Web links:**

**Simple Harmonic motion:** <https://www.youtube.com/watch?v=k2FvSzWeVxQ>

**Shock waves:** <https://physics.info/shock/>

**Shock waves and its applications:** [https://www.youtube.com/watch?v=tz\\_3M3v3kxk](https://www.youtube.com/watch?v=tz_3M3v3kxk)

**Stress-strain curves:** <https://web.mit.edu/course/3/3.11/www/modules/ss.pdf>

**Stress curves:** <https://www.youtube.com/watch?v=f08Y39UiC-o>

**Oscillations and waves :** <https://openstax.org/books/college-physics-2e>

**Earthquakes:** [www.asc-india.org](http://www.asc-india.org)

**Earthquakes and Hazards:** <http://quake.usgs.gov/tsunami>

**Landslide hazards:** <http://landslides.usgs.gov>

**Acoustics:** <https://www.youtube.com/watch?v=fHBPvMDFyO8>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

<http://nptel.ac.in>

<https://swayam.gov.in>

[https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

**Laboratory Component:**

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended

Based on the convenience classify the following experiments into above categories. Select at least one simulation/spreadsheet activity.

**List of Experiments**

1. Determination of Young's modulus of the material of the given bar Uniform Bending.
2. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
3. Study of Forced Mechanical Oscillations and Resonance.
4. Study of the frequency response of Series & Parallel LCR circuits.
5. Determination of Fermi Energy of the given Conductor.
6. Determination of Resistivity by Four Probe Method.
7. Determination of effective spring constant of the given springs in series and parallel combinations.
8. Determination of Young's modulus of the material of the given bar Single Cantilever.
9. Determination of the Moment of Inertia of the given irregular body using torsional pendulum.
10. Determination of Wavelength of Laser using Diffraction Grating.
11. Determination of Acceptance angle and Numerical Aperture of the given Optical Fiber.
12. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Application of Statistics using Spread Sheets.
16. PHET Interactive Simulations :

(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

*Narash Channayya*

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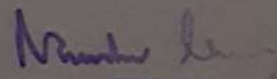
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**COs and POs Mapping (Individual teacher has to fill up)**

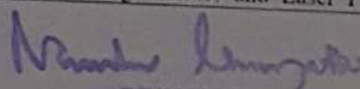
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	1	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	3	-	-	-	1	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

**Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped**

**Note :** The CO-PO mapping values are indicative. The course coordinator can alter the mapping using **Competency and Performance Indicators** mentioned in the **AICTE Exam reforms**

  
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Course Title:	<b>Applied Physics for EEE Stream</b>		
Course Code:	<b>BPHYE102/202</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours+10-12 Lab Slots	Credits	04
<b>Course objectives</b>			
<ul style="list-style-type: none"> <li>To study the principles of quantum mechanics</li> <li>To understand the properties of dielectrics and superconductors</li> <li>To study the essentials of photonics for engineering applications.</li> <li>To understand fundamentals of vector calculus and EM waves.</li> <li>To study the knowledge about semiconductors and devices.</li> </ul>			
<b>Teaching-Learning Process</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective			
<ol style="list-style-type: none"> <li>1. Flipped Class</li> <li>2. Chalk and Talk</li> <li>3. Blended Mode of Learning</li> <li>4. Simulations, Interactive Simulations and Animations</li> <li>5. NPTEL and Other Videos for theory topics</li> <li>6. Smart Class Room</li> <li>7. Lab Experiment Videos</li> </ol>			
<b>Module-1 (08 Hours)</b>			
<b>Quantum Mechanics:</b>			
de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation, Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Waveforms and Probabilities. Numerical Problems			
<b>Pre-requisite: Wave-Particle dualism</b>			
<b>Self-learning: de Broglie Hypothesis</b>			
<b>Module-2 (08 hours)</b>			
<b>Electrical Properties of Solids:</b>			
<b>Conductors:</b>			
Quantum Free Electron Theory of Metals: Assumptions, Fermi-energy, Fermi factor, Variation of Fermi Factor with Temperature and Energy. Mention of expression for electrical conductivity.			
<b>Dielectric Properties:</b> Polar and non-polar dielectrics, Electrical Polarization Mechanisms, internal fields in solids, Clausius-Mossotti equation (Derivation), Solid, Liquid and Gaseous dielectrics. Application of dielectrics in transformers, Capacitors, Electrical Insulation. Numerical Problems.			
<b>Superconductivity:</b>			
Introduction to Superconductors, Temperature dependence of resistivity, Meissner Effect, Critical Field. Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), High Temperature superconductivity, SQUID, MAGLEV, Numerical problems.			
<b>Pre-requisites: Classical Free Electron Theory</b>			
<b>Self-learning: Dielectrics Basics</b>			
<b>Module-3 (08 hours)</b>			
<b>Lasers and Optical Fibers:</b>			
<b>Lasers:</b> Characteristics of LASER, Interaction of radiation with matter, Expression for Energy Density and its significance, Requisites of a Laser System. Conditions for Laser action. Principle, Construction and Working of Carbon Dioxide Laser. Application of Lasers in Defense (Laser range finder) and Laser Printing. Numerical			

  
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**Problems**

**Optical Fibers:** Total Internal Reflection, Propagation mechanism, Angle of Acceptance, Numerical Aperture, Fractional Index Change, Modes of Propagation, Number of Modes and V Number, Types of Optical Fibers, Attenuation and Mention of Expression for Attenuation coefficient, Attenuation Spectrum of an Optical Fiber with Optical Windows. Discussion of Block Diagram of Point to Point Communication, Intensity based Fiber Optic Displacement Sensor, Merits and Demerits, Numerical problems.

**Pre-requisite: Properties of light**

**Self-learning: Total Internal Reflection**

**Module-4 (08 hours)****Maxwell's Equations and EM waves:**

**Maxwell's Equations:** Fundamentals of Vector Calculus, Divergence and Curl of Electric field and Magnetic field (static), Gauss' divergence theorem and Stoke's theorem. Description of laws of Electrostatics, Magnetism, Faraday's laws of EMI, Current Density, Equation of Continuity, Displacement Current (with derivation), Maxwell's equations in vacuum, Numerical Problems

**EM Waves:** The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane Electromagnetic Waves in vacuum, their transverse nature.

**Pre-requisite: Electricity & Magnetism**

**Self-learning: Fundamentals of vector calculus.**

**Module-5 (08 hours)****Semiconductors and Devices:**

Fermi level in Intrinsic & Extrinsic Semiconductor, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression), Relation between Fermi energy & Energy gap in intrinsic semiconductors (derivation), Law of mass action, Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application. Photo-diode and Power responsivity, Construction and working of Semiconducting Laser, Four probe method to determine resistivity, Phototransistor, Numerical problems.

**Pre-requisite: Basics of Semiconductors**

**Self-learning: Fermi level in Intrinsic & Extrinsic Semiconductor**

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	<b>Describe</b> the fundamental principles of the Quantum Mechanics and the essentials of Photonics.
CO2	<b>Elucidate</b> the concepts of conductors, dielectrics and superconductivity
CO3	<b>Discuss</b> the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO4	<b>Summarize</b> the properties of semiconductors and the working principles of semiconductor devices.
CO5	<b>Practice</b> working in groups to conduct experiments in physics and <b>Perform</b> precise and honest measurements.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

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Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**  
**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2. An Introduction to Lasers theory and applications by M.N.Avadhanulu and P.S. Hemne revised Edition 2012. S. Chand and Company Ltd -New Delhi.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Concepts of Modern Physics-Arthur Beiser: 6th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
5. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
6. Introduction to Electrodynamics, David Griffith, 4<sup>th</sup> Edition, Cambridge University Press 2017.
7. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
8. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
9. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.

#### Web links and Video Lectures (e-Resources):

Laser:[https://www.britannica.com/technology/laser\\_k](https://www.britannica.com/technology/laser_k)

Laser:<https://nptel.ac.in/courses/115/102/115102124/>

Quantum mechanics:<https://nptel.ac.in/courses/115/104/115104096/>

Physics:<http://hyperphysics.phy-astr.gsu.edu/hbase/iframe.html>

Numerical Aperture of fiber:<https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement>

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**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**<http://nptel.ac.in><https://swayam.gov.in><https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham><https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>[https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)<https://phet.colorado.edu><https://www.myphysicslab.com>**Laboratory Component:**

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended

Based on the convenience classify the following experiments into above categories selecting at least three experiments for each type. Select at least one simulation/spreadsheet activity.

**List of Experiments**

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Plank's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive

Simulations(<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html.prototype>)

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	1	-	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

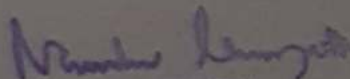
Note : The CO-PO mapping values are indicative. The course coordinator can alter the mapping using Competency and Performance Indicators mentioned in the AICTE Exam reforms.

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Elements of Electrical Engineering			
Course Title:	Elements of Electrical Engineering		
Course Code:	BEEE103	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b>			
<ul style="list-style-type: none"> <li>To explain the basic laws used in the analysis of DC circuits, electromagnetism.</li> <li>To explain the behavior of circuit elements in single-phase circuits.</li> <li>To explain three phase circuits, balanced loads and measurement of three phase power.</li> <li>To explain the measuring techniques, measuring instruments and domestic wiring.</li> <li>To explain electricity billing, equipment and personal safety measures.</li> </ul>			
<b>Teaching-Learning Process</b>			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective			
<ol style="list-style-type: none"> <li>Chalk and talk</li> <li>Animated/NPTEL videos</li> <li>Cut sections</li> <li>PPTs</li> </ol>			
<b>Module-1 (08 Hrs)</b>			
<b>DC circuits:</b> Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. <b>Electromagnetism:</b> Faraday's Laws of Electromagnetic Induction, Lenz's Law, Flemings rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling. Energy stored in magnetic field. Simple Numerical.			
<b>Module-2 (08 Hrs)</b>			
<b>Single-phase AC circuits:</b> Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phasor representation of alternating quantities. Analysis of R, L, C, R-L, R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor. Series, Parallel and Series-Parallel circuits. Simple Numerical.			
<b>Module-3 (08 Hrs)</b>			
<b>Three-phase AC circuits:</b> Necessity and advantage of 3-phase system. Generation of 3-phase power. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits. Measurement of 3-phase power by 2-wattmeter method. Simple Numerical.			
<b>Module-4 (08 Hrs)</b>			
<b>Measuring instruments:</b> construction and working principle of whetstone's bridge, Kelvin's double bridge, Megger, Maxwell's bridge for inductance, Schering's bridge for capacitance, concepts of current transformer and potential transformer. (Only balance equations and Excluding Vector diagram approach) <b>Domestic Wiring:</b> Requirements, Types of wiring: casing, capping, Two way and three way control of load.			
<b>Module-5 (08 Hrs)</b>			
<b>Electricity bill:</b> Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. <b>Equipment Safety measures:</b> Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. <b>Personal safety measures:</b> Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB).			

  
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**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Understand the concepts of DC circuits and Electromagnetism.
CO2	Understand the concepts of single phase and Three phase AC circuits.
CO3	Apply the basic Electrical laws to solve circuits.
CO4	Understand the concepts of measurements and measuring Instruments
CO5	Explain the concepts of domestic wiring, electricity billing, circuit protective devices and personal safety measures.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>. and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

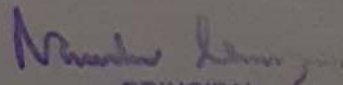
If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

  
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**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books:**

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

**Reference Books:**

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.
4. Electrical and electronic measurements and instrumentation by A K Sawhney, Dhanapat Rai and Co. edition, January 2015

**Web links and Video Lectures (e-Resources):**

- [www.nptel.ac.in](http://www.nptel.ac.in)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Wherever required, faculty shall demonstrate the concepts through laboratory experiments.

**COs and POs Mapping (Individual teacher has to fill up)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	0	1	1	1	1	0	0	0	1
CO2	3	3	2	1	1	1	0	0	0	0	0	1
CO3	3	2	1	1	1	1	1	1	0	0	0	1
CO4	3	2	2	1	0	1	1	1	0	0	0	1
CO5	3	1	2	0	1	2	1	1	0	0	1	1

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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Course Title:	ENGINEERING MECHANICS		
Course Code:	BCIVC103/203	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Total Marks	100
Total Hours of Pedagogy	25 hrs Lecture+25 hrs Tutorial = 50 hrs	Exam Hours	03
		Credits	03

**Course objectives**

- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To analyse the member forces in trusses
- To make students to learn the effect of friction on different planes
- To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

**Teaching-Learning Process**

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can devise innovative pedagogy to improve teaching-learning.

**Module-1 (10)**

**Resultant of coplanar force system:** Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

**Module-2 (10)**

**Equilibrium of coplanar force system:** Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads. Numerical examples.

**Module-3(10)**

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**Analysis of Trusses:** Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.

**Friction:** Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.

**Module-4(10)**

**Centroid of Plane areas:** Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples.

**Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections,, Numerical examples.

**Module-5 (10)**

**Kinematics:**

Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion

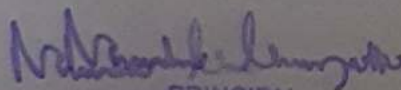
Projectiles: Introduction, numerical examples on projectiles.

**Kinetics:** Introduction, D'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

C01	Compute the resultant of a force system and resolution of a force
C02	Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces
C03	Analyse the frictional resistance offered by different planes
C04	Locate the centroid and compute the moment of inertia of sections
C05	Analyze the bodies in motion

  
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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assessment depending on the requirement of the course and plan to attain the COs and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

**Suggested Learning Resources:****Text Books**

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics. 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

**Reference Books:**

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Bhavikatti S S. Engineering Mechanics, 2019, New Age International
6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

**Web links and Video Lectures (e-Resources):**

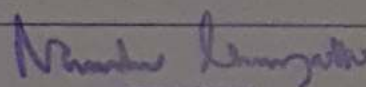
- <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
- <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
- <https://www.youtube.com/watch?v=ljDIIMvxeq&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5>
- <https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18>
- <https://www.youtube.com/watch?v=3YBXteL-qY4>
- <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
- <https://www.youtube.com/watch?v=lheoBL2QaQU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
- [https://www.youtube.com/watch?v=atoP5\\_DeTPE](https://www.youtube.com/watch?v=atoP5_DeTPE)
- <https://www.youtube.com/watch?v=kmsmp9OzAsI>
- <https://www.youtube.com/watch?v=x1ef048b3CE>
- [https://www.youtube.com/watch?v=l\\_Nck-X49qc](https://www.youtube.com/watch?v=l_Nck-X49qc)
- [https://play.google.com/store/apps/details?id=appinventor.ai\\_jgarc322.Resultant\\_Force](https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force)
- <https://www.youtube.com/watch?v=RIBeeW1DSZg>
- <https://www.youtube.com/watch?v=R8wKV0UQtlo>
- [https://www.youtube.com/watch?v=0RZHHgL8m\\_A](https://www.youtube.com/watch?v=0RZHHgL8m_A)
- <https://www.youtube.com/watch?v=BlS5KnQOWkY>

**Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning**

- [https://www.youtube.com/watch?v=Zrc\\_gB1YYS0](https://www.youtube.com/watch?v=Zrc_gB1YYS0)
- <https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bicudonoiluc>
- [https://www.youtube.com/watch?v=Hn\\_ioUo9m4](https://www.youtube.com/watch?v=Hn_ioUo9m4)
- <https://play.google.com/store/apps/details?id=com.teobou>
- <https://www.youtube.com/watch?v=WOHRp3V-QA0>

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Course Title:	<b>Principles of Programming using C</b>	
Course Code:	<b>BPOPS103/203</b>	CIE Marks 50
Course Type (Theory/Practical /Integrated )	Integrated	SEE Marks 50
		Total Marks 100
Teaching Hours/Week (L:T:P: S)	2:0:2	Exam Hours 3+2
Total Hours of Pedagogy	40 hours	Credits 03
	<b>Course Objectives:</b>  CLO 1. Elucidate the basic architecture and functionalities of a Computer CLO 2. Apply programming constructs of C language to solve the real-world problems CLO 3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems CLO 4. Design and Develop Solutions to problems using structured programming constructs such as functions and procedures	
	<b>Teaching-Learning Process (General Instructions)</b>  These are sample strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>Use of Video/Animation to explain functioning of various concepts.</li> <li>Encourage collaborative (Group Learning) Learning in the class.</li> <li>Ask at least three HOT (Higher order Thinking) questions in the class, which promote critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Introduce Topics in manifold representations.</li> <li>Show the different ways to solve the same problem and encourage the student to come up with their own creative way to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps to improve the students' understanding.</li> <li>Use <a href="https://pythontutor.com/visualize.html#mode=edit">https://pythontutor.com/visualize.html#mode=edit</a> in order to visualize the operations of C Programs</li> </ol>	
	<b>Module-1 (6 Hours of Pedagogy)</b>	
	<b>Introduction to C:</b> Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.	
	<b>Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 - 8.6, 9.1-9.14</b>	
Teaching-Learning Process	Chalk and talk method/PowerPoint Presentation/ Web Content: <a href="https://tinyurl.com/4xmrexre">https://tinyurl.com/4xmrexre</a>	

  
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<b>Module-2 (6 Hours of Pedagogy)</b>	
	<p>Operators in C, Type conversion and typecasting.</p> <p><b>Decision control and Looping statements:</b> Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.</p> <p><b>Textbook: Chapter 9.15-9.16, 10.1-10.6</b></p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>Module-3 (8 Hours of Pedagogy)</b>	
	<p>Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.</p> <p>Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions, two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays, applications of arrays.</p> <p>Textbook: Chapter 11.1-11.10, 12.1-12.10,12.12</p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>Module-4 (6 Hours of Pedagogy)</b>	
	<p><b>Strings and Pointers:</b> Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. <b>Pointers:</b> Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers</p> <p><b>Textbook: Chapter 13.1-13.6, 14-14.7</b></p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>Module-5 (6 Hours of Pedagogy)</b>	
	<p><b>Structure, Union, and Enumerated Data Type:</b> Introduction, structures and functions, Unions, unions inside structures, Enumerated data type.</p> <p><b>Files:</b> Introduction to files, using files in C, reading and writing data files. , Detecting end of file</p> <p><b>Textbook: Chapter 15.1 – 15.10, 16.1-16.5</b></p>
<b>Teaching-LearningProcess</b>	Chalkandtalkmethod/PowerPointPresentation
<b>CourseOutcomes(CourseSkillSet)</b>	
Attheendofthecoursethestudentwillbeableto:	
CO1. Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.	
CO 2. Apply programming constructs of C language to solve the real world problem	
CO 3. Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting	
CO 4. Explore user-defined data structures like structures, unions and pointers in implementing solutions	

CO5.Design and Develop Solutions to problems using modular programming constructs using functions

### Programming Assignments

- 1 Simulation of a SimpleCalculator.
- 2 Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
- 3 An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4. Write a C Program to display the following by reading the number of rows as input,
 

```

          1
        1 2 1
      1 2 3 2 1
    1 2 3 4 3 2 1
    -----
    nth row
```
- 5 Implement Binary Search on Integers.
- 6 Implement Matrix multiplication and validate the rules of multiplication.
- 7 Compute  $\sin(x)/\cos(x)$  using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
- 8 Sort the given set of N numbers using Bubble sort.
- 9 Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
- 10 Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
- 11 Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
12. Write a C program to copy a text file to another, read both the input file name and target file name.

Note:

SEE marks for the practical course is 50 Marks.

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SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. OR based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Students can pick one experiment from the questions lot with equal choice to all the students in a batch. - Student should develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem.

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

**The duration of SEE is 02 hours**

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

#### **CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the

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continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.

- The laboratory test (duration 03 hours) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for 20 marks.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module

#### Suggested Learning Resources:

##### Textbooks

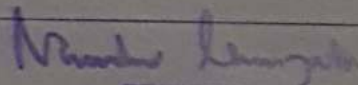
1. Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.

##### Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

#### Web links and Video Lectures (e-Resources):

1. [elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html](http://elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html)
2. <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.

  
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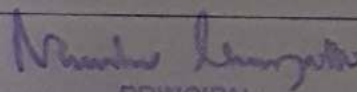
3. <https://tinyurl.com/4xmrcxr>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

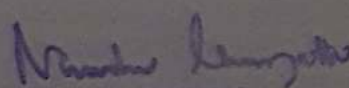
- Quizzes
- Assignments
- Seminars

## I Semester

INNOVATION and DESIGN THINKING			
Course Code	BIDTK158/258	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01
<p><b>Course Category:</b> Foundation</p> <p><b>Preamble:</b> This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.</p> <p><b>Course objectives:</b></p> <ul style="list-style-type: none"> <li>To explain the concept of design thinking for product and service development</li> <li>To explain the fundamental concept of innovation and design thinking</li> <li>To discuss the methods of implementing design thinking in the real world.</li> </ul>			
<p><b>Teaching-Learning Process (General Instructions)</b></p> <p>These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.</li> <li>Show Video/animation films to explain concepts</li> <li>Encourage collaborative (Group Learning) Learning in the class</li> <li>Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Topics will be introduced in multiple representations.</li> <li>Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1</b>			
<b>PROCESS OF DESIGN</b>			
<b>Understanding Design thinking</b>			
Shared model in team-based design - Theory and practice in Design thinking - Explore presentation signers across globe - MVP or Prototyping			
<b>Teaching-Learning Process</b>	Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos		
<b>Module-2</b>			
<b>Tools for Design Thinking</b>			
Real-Time design interaction capture and analysis - Enabling efficient collaboration in digital space - Empathy for design - Collaboration in distributed Design			
<b>Teaching-Learning</b>	Case studies on design thinking for real-time interaction and analysis		

  
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<b>Process</b>	Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking	
<b>Module-3</b>		
<b>Design Thinking in IT</b> Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping		
<b>Teaching-Learning Process</b>	Case studies on design thinking and business acceptance of the design Simulation on the role of virtual eco-system for collaborated prototyping	
<b>Module-4</b>		
<b>DT For strategic innovations</b> Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.		
<b>Teaching-Learning Process</b>	Business model examples of successful designs Presentation by the students on the success of design Live project on design thinking in a group of 4 students	
<b>Module-5</b>		
Design thinking workshop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test		
<b>Teaching-Learning Process</b>	8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop	
<b>Course Outcomes:</b> Upon the successful completion of the course, students will be able to:		
CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Appreciate various design process procedure	K2
CO2	Generate and develop design ideas through different technique	K2
CO3	Identify the significance of reverse Engineering to Understand products	K2
CO4	Draw technical drawing for design ideas	K3

  
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### Assessment Details (both CIE and SEE)

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#### Continuous Internal Evaluation (CIE):

- Two Tests (preferably in MCQ pattern ) each of **30 Marks**; The first test after the completion of the 40 -50% syllabus of the course. A second test after the completion of 90-100% of the syllabus of the course.
- Two Assignments/two quizzes/two seminars/one field survey and report presentation/one-course project totaling **40 marks**

Total Marks scored (test + assignments) out of 100 shall be scaled down to **50 marks**

At the beginning of the semester, the instructor/faculty teaching the course has to announce the methods of CIE for the course.

The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

#### Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for subject

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hour**

#### Suggested Learning Resources:

##### Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

#### References:

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5. Yousef Haik and Tamer M. Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
6. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover - 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

**Web links and Video Lectures (e-Resources):**

1. [www.tutor2u.net/business/presentations/. /productlifecycle/default.html](http://www.tutor2u.net/business/presentations/. /productlifecycle/default.html)
2. [https://docs.oracle.com/cd/E11108\\_02/otn/pdf/. /E11087\\_01.pdf](https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf)
3. [www.bizfilings.com](http://www.bizfilings.com) > Home > Marketing > Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit>
6. [www.vertabelo.com/blog/documentation/reverse-engineering](http://www.vertabelo.com/blog/documentation/reverse-engineering)  
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM>  
[thevirtualinstructor.com/foreshortening.html](http://thevirtualinstructor.com/foreshortening.html)  
<https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>  
<https://dschool.stanford.edu/use-our-methods/> 6. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process> 7.  
<http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49 8.  
<https://www.nngroup.com/articles/design-thinking/> 9.  
<https://designthinkingforeducators.com/design-thinking/> 10.  
[www.designthinkingformobility.org/wp-content/.../10/NapkinPitch\\_Worksheet.pdf](http://www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf)

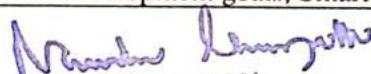
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- <http://dschool.stanford.edu/dgift/>

[https://onlinecourses.nptel.ac.in/noc19\\_mg60/preview](https://onlinecourses.nptel.ac.in/noc19_mg60/preview)

*Nandha Kumar*  
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<b>Introduction to Civil Engineering</b>			
Course Title:			
Course Code:	BESCK104A/204	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	25 hrs Lecture+25 hrs Tutorial = 50 hrs	Credits	03
<p><b>Course objectives</b></p> <ul style="list-style-type: none"> <li>To make students learn the scope of various specializations of civil engineering.</li> <li>To make students learn the concepts of sustainable infrastructure</li> <li>To develop students' ability to analyse the problems involving forces, moments with their applications.</li> <li>To develop the student's ability to find out the center of gravity and moment of inertia and their applications.</li> <li>To make the students learn about kinematics</li> </ul>			
<p><b>Teaching-Learning Process</b></p> <p>These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.</li> <li>Arrange visits to nearby sites to give brief information about the Civil Engineering structures.</li> <li>Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.</li> <li>Encourage collaborative (Group) Learning in the class.</li> <li>Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.</li> <li>Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>Topics will be introduced in multiple representations.</li> <li>Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> <li>Individual teachers can devise innovative pedagogy to improve teaching-learning.</li> </ol>			
<b>Module-1 (10)</b>			
<p><b>Civil Engineering Disciplines and Building Science</b></p> <p><b>Introduction to Civil Engineering:</b> Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics &amp; Water Resources, Transportation Engineering, Environmental Engineering, Construction planning &amp; Project management.</p> <p><b>Basic Materials of Construction:</b> Bricks, Cement &amp; mortars, Plain, Reinforced &amp; Pre-stressed Concrete, Structural steel, Construction Chemicals.</p> <p><b>Structural elements of a building:</b> foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase</p>			
<b>Module-2 (10)</b>			
<p><b>Societal and Global Impact of Infrastructure</b></p> <p><b>Infrastructure:</b> Introduction to sustainable development goals, Smart city concept, clean city concept,</p>			

  
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Safe city concept

**Environment:** Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control

**Built-environment:** Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.

**Module-3(10)**

**Analysis of force systems:** Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force systems

**Module-4(10)**

**Centroid:** Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples

**Module-5 (10)**

**Moment of inertia:** Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up sections, Numerical Examples.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Understand the various disciplines of civil engineering
CO2	Understand the infrastructure requirement for sustainable development
CO3	Compute the resultant and equilibrium of force systems.
CO4	Locate the centroid of plane and built-up sections
CO5	Compute the moment of inertia of plane and built-up sections.

*N. Srinivas Reddy*  
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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

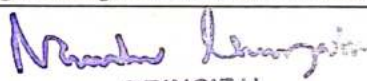
- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

**Suggested Learning Resources:****Text Books**

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB

**Reference Books:**

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.

  
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5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International

6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

**Web links and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
- <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
- <https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5>
- <https://www.youtube.com/watch?v=VORcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18>
- <https://www.youtube.com/watch?v=3YBXteL-qY4>
- <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
- <https://www.youtube.com/watch?v=lheoBL2QaQ&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
- [https://www.youtube.com/watch?v=atoP5\\_DeTPE](https://www.youtube.com/watch?v=atoP5_DeTPE)
- <https://www.youtube.com/watch?v=kmsmp9OzAsI>
- <https://www.youtube.com/watch?v=x1ef048b3CE>
- <https://www.youtube.com/watch?v=lNck-X49qc>
- [https://play.google.com/store/apps/details?id=appinventor.ai\\_jgarc322.Resultant Force](https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant+Force)
- <https://www.youtube.com/watch?v=RIBeeW1DSZg>
- <https://www.youtube.com/watch?v=R8wKV0UQtlo>
- [https://www.youtube.com/watch?v=0RZHHgL8m\\_A](https://www.youtube.com/watch?v=0RZHHgL8m_A)
- <https://www.youtube.com/watch?v=Bl5KnQOWkY>

**Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning**

- [https://www.youtube.com/watch?v=Zrc\\_gB1YYS0](https://www.youtube.com/watch?v=Zrc_gB1YYS0)
- <https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc>
- [https://www.youtube.com/watch?v=Hn\\_iozUo9m4](https://www.youtube.com/watch?v=Hn_iozUo9m4)
- <https://play.google.com/store/apps/details?id=com.teobou>
- <https://www.youtube.com/watch?v=WOHRp3V-QA0>

**COs and POs Mapping (Individual teacher has to fill up)**

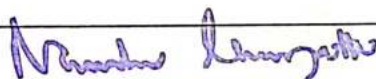
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
C01	1					1						
C02	1					1	1					
C03	2	3										
C04	2	3										
C05	2	3										

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

**Note:** Depending on the assessment tool used, higher order POs can be identified by the concerned course instructor.

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Introduction to Electrical Engineering			
Course Code:	BESCK104B	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Total Marks	100
Total Hours of Pedagogy	40 hours	Exam Hours	03
		Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To explain the laws used in the analysis of DC and AC circuits.</li> <li>To explain the behavior of circuit elements in single-phase circuits.</li> <li>To explain the construction and operation of transformers, DC generators and motors and induction motors.</li> <li>To introduce concepts of circuit protecting devices and earthing.</li> <li>To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective <ol style="list-style-type: none"> <li>Chalk and talk</li> <li>Animated/NPTEL videos</li> <li>Cut sections</li> <li>PPTs</li> </ol>			
<b>Module-1 (08 Hrs)</b>			
<b>Introduction:</b> Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach. <b>Power Generation:</b> Hydel, Nuclear, Solar & wind power generation (Block Diagram approach). <b>DC Circuits:</b> Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.			
<b>Module-2 (08 Hrs)</b>			
<b>A.C. Fundamentals:</b> Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions) Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical). <b>Three Phase Circuits:</b> Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities (excluding proof)			
<b>Module-3(08 Hrs)</b>			
<b>DC Machines:</b> <b>DC Generator:</b> Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical. <b>DC Motor:</b> Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC motors. Simple numerical.			

  
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<b>Module-4(08 Hrs)</b>	
<p><b>Transformers:</b> Necessity of transformer, principle of operation, Types and construction of single-phase transformers, EMF equation. losses, variation of losses with respect to load. Efficiency and simple numerical.</p> <p><b>Three-phase induction Motors:</b> Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.</p>	
<b>Module-5 (08 Hrs)</b>	
<p><b>Domestic Wiring:</b> Requirements, Types of wiring: casing, capping. Two way and three way control of load.</p> <p><b>Electricity Bill:</b> Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of “unit” used for consumption of electrical energy. two-part electricity tariff, calculation of electricity bill for domestic consumers.</p> <p><b>Equipment Safety measures:</b> Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.</p> <p><b>Personal safety measures:</b> Electric Shock, Earthing and its types, Safety Precautions to avoid shock.</p>	
<b>Course outcome (Course Skill Set)</b>	
At the end of the course the student will be able to:	
CO1	Understand the concepts of various energy sources and Electric circuits.
CO2	Apply the basic Electrical laws to solve circuits.
CO3	Discuss the construction and operation of various Electrical Machines.
CO4	Identify suitable Electrical machine for practical implementation.
CO5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

  
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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

#### Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:


**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

##### Text Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.


##### Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3<sup>rd</sup> edition, 2014.

  
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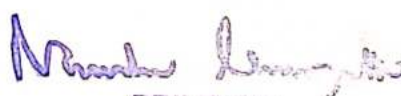
<b>Web links and Video Lectures (e-Resources):</b>												
<ul style="list-style-type: none"> <li>• <a href="http://www.nptel.ac.in">www.nptel.ac.in</a></li> </ul>												
<b>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</b>												
<ul style="list-style-type: none"> <li>•</li> </ul>												
<b>COs and POs Mapping (Individual teacher has to fill up)</b>												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	0	1	1	1	1	0	0	0	1
CO2	3	3	2	1	1	1	0	0	0	0	0	1
CO3	3	2	1	1	1	1	1	1	0	0	0	1
CO4	3	2	2	1	0	1	1	1	0	0	0	1
CO5	3	1	2	0	1	2	1	1	0	0	1	1
<b>Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped</b>												

  
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Course Title:	Introduction to Electronics & Communication		
Course Code:	BESCK104C/204C	CIE Marks	50
Course Type (Theory/Practical/Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<p><b>Course objectives</b></p> <ol style="list-style-type: none"> <li>1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.</li> <li>2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits. logic design, embedded systems, and communication systems.</li> <li>3. Professionalism &amp; Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.</li> </ol>			
<p><b>Teaching-Learning Process</b></p> <p>These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.</li> <li>2. Arrange visits to nearby PSUs such as BHEL, BEL, ISRO, etc., and small-scale hardware Industries to give brief information about the electronics manufacturing industry.</li> <li>3. Show Video/animation films to explain the functioning of various analog and digital circuits.</li> <li>4. Encourage collaborative (Group) Learning in the class</li> <li>5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking</li> <li>6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.</li> <li>7. Topics will be introduced in multiple representations.</li> <li>8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.</li> </ol>			
<b>Module-1 (8 hours )</b>			
<p><b>Power Supplies</b> –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.</p> <p><b>Amplifiers</b> – Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, multi-stage amplifiers (Text 1)</p>			
<b>Module-2(8 hours )</b>			

  
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<p><b>Oscillators</b> – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts, working, and waveforms. No mathematical derivations)</p> <p><b>Operational amplifiers</b> -Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits. Text 1)</p>
<b>Module-3 ( 8 hours)</b>
<p><b>Boolean Algebra and Logic Circuits:</b> Binary numbers, Number Base Conversion, octal &amp; Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5.2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7)</p> <p><b>Combinational logic:</b> Introduction, Design procedure, Adders- Half adder, Full adder (Text 2:4.1, 4.2, 4.3)</p>
<b>Module-4 ( 8 hours)</b>
<p><b>Embedded Systems</b> – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC</p> <p><b>Sensors and Interfacing</b> – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)</p>
<b>Module-5 ( 8 hours)</b>
<p><b>Analog Communication Schemes</b> – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM , FM. Concept of Radio wave propagation (Ground, space, sky)</p> <p><b>Digital Modulation Schemes:</b> Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques. ( Text 4)</p>

  
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**Assessment Details (both CIE and SEE)**

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Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
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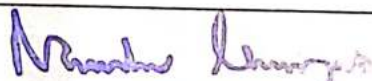
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- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

  
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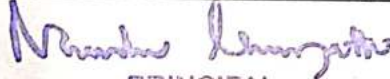
Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015.  
DOI <https://doi.org/10.4324/9781315737980>. eBook ISBN 9781315737980
2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-84.
3. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016
4. S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017.

  
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<b>Course Title</b>		<b>Introduction to C Programming</b>	
<b>Course Code:</b>	BESCK104E/204E	<b>CIE Marks</b>	50
<b>Course Type (Theory/Practical /Integrated )</b>	Integrated	<b>SEE Marks</b>	50
		<b>Total Marks</b>	100
<b>Teaching Hours/Week (L:T:P: S)</b>	2:0:2:0	<b>Exam Hours</b>	03
<b>Total Hours of Pedagogy</b>	40 hours	<b>Credits</b>	03
<b>Course Objectives:</b>			
<p>CLO 1. Elucidate the basic architecture and functionalities of a Computer</p> <p>CLO 2. Apply programming constructs of C language to solve the real-world problems</p> <p>CLO 3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems</p> <p>CLO 4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures</p>			
<b>Teaching-Learning Process (General Instructions)</b>			
<p>These are sample strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world-and when that's possible, it helps to improve the students' understanding.</li> <li>9. Use <a href="https://pythontutor.com/visualize.html#mode=edit">https://pythontutor.com/visualize.html#mode=edit</a> in order to visualize the operations of C Programs</li> </ol>			
<b>Module-1 (6 Hours of Pedagogy)</b>			
<p><b>Introduction to C:</b> Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C,  <b>Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 – 8.6, 9.1-9.14</b></p>			
<b>Teaching-Learning Process</b>		Chalk and talk method/PowerPoint Presentation	
<b>Module-2 (6 Hours of Pedagogy)</b>			
<p>Operators in C, Type conversion and typecasting.</p> <p><b>Decision control and Looping statements:</b> Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.  <b>Textbook: Chapter 9.15-9.16, 10.1-10.6</b></p>			
<b>Teaching-Learning Process</b>		Chalk and talk method/PowerPoint Presentation	
<b>Module-3 (6 Hours of Pedagogy)</b>			
<p><b>Functions:</b> Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.</p> <p><b>Arrays:</b> Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays,</p>			

  
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Passing arrays to functions.

**Textbook: Chapter 11.1-11.13, 12.1-12.6**

Teaching-Learning Process Chalk and talk method/PowerPoint Presentation

**Module-4 (6 Hours of Pedagogy)**

Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays.

**Applications of arrays and introduction to strings:** Applications of arrays, case study with sorting techniques.

**Introduction to strings:** Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.

**Textbook: Chapter 12.7-12.12**

Teaching-Learning Process Chalk and talk method/PowerPoint Presentation

**Module-5 (6 Hours of Pedagogy)**

**Strings:** String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings.

**Pointers:** Understanding the Computers Memory, Introduction to Pointers, Declaring Pointer Variables

**Structures:** Introduction to structures

**Textbook: Chapter 13.1-13.6, 14.1-14.3, 15.1**

Teaching-Learning Process Chalk and talk method/PowerPoint Presentation

**Course Outcomes (Course Skill Set)**

At the end of the course the student will be able to:

CO1. Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.

CO 2. Apply programming constructs of C language to solve the real world problem

CO 3. Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting

CO 4. Explore user-defined data structures like structures, unions and pointers in implementing solutions

CO5. Design and Develop Solutions to problems using modular programming constructs using functions

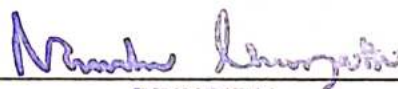
#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### **Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be 30 marks and for the laboratory component 20 Marks.

CIE for the theory component of the IC



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- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to 30 marks

#### CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for 20 marks.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination (SEE):

##### SEE for IC

Theory SEE will be conducted by University as per the scheduled time table, with common question papers for the course (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion**



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will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).

**Passing standard:**

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than 30 marks.
- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.

**Suggested Learning Resources:**

**Textbooks**

- Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.

**Reference Books:**

- E. Balaguruswamy. Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
- Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

**Web links and Video Lectures (e-Resources):**

- [elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html](http://elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html)
- <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods.

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes
- Assignments
- Seminars

**Lab Assignments**

1	C Program to find Mechanical Energy of a particle using $E = mgh + 1/2 mv^2$ .
2	C Program to convert Kilometers into Meters and Centimeters.
3	C Program To Check the Given Character is Lowercase or Uppercase or Special Character.
4	Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants $b_1, b_2, b_3$ such that the equation is balanced on both sides and it must be the reduced form.
5	Implement Matrix multiplication and validate the rules of multiplication.
6	Compute $\sin(x)/\cos(x)$ using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.

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7	Sort the given set of $N$ numbers using Bubble sort.
8	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
9	Implement structures to read, write and compute average marks and the student scoring above and below the average marks for a class of $N$ students.
10	Develop a program using pointer to compute the sum, mean and standard deviation of all elements stored in an array of $N$ real numbers.

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Course Title:	Introduction to Python Programming		
Course Code:	BPLCK105B/205B	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>• Learn the syntax and semantics of the Python programming language.</li> <li>• Illustrate the process of structuring the data using lists, tuples</li> <li>• Appraise the need for working with various documents like Excel, PDF, Word and Others.</li> <li>• Demonstrate the use of built-in functions to navigate the file system.</li> <li>• Implement the Object Oriented Programming concepts in Python.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching -Learning more effective <ol style="list-style-type: none"> <li>1. Use <a href="https://pythontutor.com/visualize.html#mode=edit">https://pythontutor.com/visualize.html#mode=edit</a> in order to visualize the python code</li> <li>2. Demonstrate and visualize basic data types (list, tuple, dictionary).</li> <li>3. Chalk and talk</li> <li>4. online and videos</li> </ol>			
<b>Module-1 (08 hrs)</b>			
<b>Python Basics:</b> Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, <b>Flow control:</b> Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), <b>Functions:</b> def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling. A Short Program: Guess the Number <b>Textbook 1: Chapters 1 – 3</b>			
<b>Module-2 (08 hrs)</b>			
<b>Lists:</b> The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References, <b>Dictionaries and Structuring Data:</b> The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, <b>Textbook 1: Chapters 4 – 5</b>			
<b>Module-3 (08 hrs)</b>			

  
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<p><b>Manipulating Strings:</b> Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup</p> <p><b>Reading and Writing Files:</b> Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print.format() Function, Project: Generating Random Quiz Files, Project: Multiclipboard,</p> <p><b>Textbook 1: Chapters 6 , 8</b></p>
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**Module-4 (08 hrs)**

<p><b>Organizing Files:</b> The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File,</p> <p><b>Debugging:</b> Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger.</p> <p><b>Textbook 1: Chapters 9-10</b></p>
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**Module-5 (08 hrs)**

<p><b>Classes and objects:</b> Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying,</p> <p><b>Classes and functions:</b> Time, Pure functions, Modifiers, Prototyping versus planning,</p> <p><b>Classes and methods:</b> Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,</p> <p><b>Textbook 2: Chapters 15 – 17</b></p>
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**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

C01	Demonstrate proficiency in handling loops and creation of functions.
C02	Identify the methods to create and manipulate lists, tuples and dictionaries.
C03	Develop programs for string processing and file organization
C04	Interpret the concepts of Object-Oriented Programming as used in Python.

**Programming Exercises:**

- Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
  - Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
- Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
  - Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
- Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
- Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
- Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary]

with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]

6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].
7. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
8. Write a function named DivExp which takes TWO parameters a, b and returns a value c ( $c=a/b$ ). Write suitable assertion for  $a>0$  in function DivExp and raise an exception for when  $b=0$ . Develop a suitable program which reads two values from the console and calls a function DivExp.
9. Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N ( $N \geq 2$ ) complex numbers and to compute the addition of N complex numbers.
10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use \_\_init\_\_() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.]

#### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation (CIE):

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

#### CIE for the theory component of the IC

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totaling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be

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evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination (SEE): SEE for IC**

Theory SEE will be conducted by University as per the scheduled time table, with common question papers for the course (duration 03 hours)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the Integrated Course shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).**

#### **Passing standard:**

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than 30 marks.

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- SEE will be conducted for 100 marks and students shall secure 35% of the maximum marks to qualify for the SEE. Marks secured will be scaled down to 50.

**Suggested Learning Resources:****Text Books**

1. Al Sweigart, "Automate the Boring Stuff with Python", 1<sup>st</sup> Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)  
(Chapters 1 to 18, except 12) for lambda functions use this link:  
<https://www.learnbyexample.org/python-lambda-function/>
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2<sup>nd</sup> Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)  
(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

**Web links and Video Lectures (e-Resources):**

- <https://www.learnbyexample.org/python/>
- <https://www.learnpython.org/>
- <https://pythontutor.com/visualize.html#mode=edit>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Quizzes for list, tuple, string dictionary slicing operations using below link  
<https://github.com/sushantkhara/Data-Structures-And-Algorithms-with-Python/raw/main/Python%203%20%20400%20exercises%20and%20solutions%20for%20beginners.pdf>

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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Course Title:	Introduction to Cyber Security		
Course Code:	BETCK105I/205I	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To familiarize cybercrime terminologies and perspectives</li> <li>To understand Cyber Offenses and Botnets</li> <li>To gain knowledge on tools and methods used in cybercrimes</li> <li>To understand phishing and computer forensics</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective <ol style="list-style-type: none"> <li>Chalk and Board</li> <li>Demonstration</li> <li>Interactive learning</li> <li>Videos and online material</li> </ol>			
<b>Module-1 (8 hours of pedagogy)</b>			
<b>Introduction to Cybercrime:</b>  <b>Cybercrime:</b> Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws., Global Perspectives  Textbook:1 Chapter 1 (1.1 to 1.5, 1.7-1.9)			
<b>Module-2 (8 hours of pedagogy)</b>			
<b>Cyber Offenses:</b>  <b>How Criminals Plan Them:</b> Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercafe & cybercrimes.  <b>Botnets:</b> The fuel for cybercrime, Attack Vector.  Textbook:1 Chapter 2 (2.1 to 2.7)			
<b>Module-3 (8 hours of pedagogy)</b>			

  
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**Tools and Methods used in Cybercrime:** Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attackes, Attacks on Wireless networks.

Textbook:1 Chapter 4 (4.1 to 4.9, 4.12)

**Module-4 ( 8 ours of pedagogy)**

**Phishing and Identity Theft:** Introduction, methods of phishing, phishing,phising techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft

Textbook:1 Chapter 5 (5.1. to 5.3)

**Module-5 (8 hours of pedagogy)**

**Understnading Computer Forensics:** Introdcution, Historical Background of Cyberforensics, Digital Foresics Science, Need for Computer Foresics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics.

Textbook:1 Chapter 7 (7.1. to 7.5, 7.7 to 7.9)

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Explain the cybercrime terminologies
CO2	Describe Cyber offenses and Botnets
CO3	Illustrate Tools and Methods used on Cybercrime
CO4	Explain Phishing and Identity Theft
CO5	Justify the need of computer forensics

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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation(CIE):

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

#### Semester End Examination (SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions) **should have a mix of topics** under that module

#### Suggested Learning Resources:

##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)

##### Web links and Video Lectures (e-Resources):

- [https://www.youtube.com/watch?v=yC\\_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS\\_rt9swsu](https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu)
- [https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJkztzIO4DtI4\\_](https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJkztzIO4DtI4_)
- [https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL\\_uaeekrhGzJlB8XQBxU3z\\_hDwT95xlk](https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3z_hDwT95xlk)
- <https://www.youtube.com/watch?v=KqSqyKwVuAB>

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**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Illustration of standard case study of cyber crime
- Setup a cyber court at Institute level

**COs and POs Mapping (Individual teacher has to fill up)**

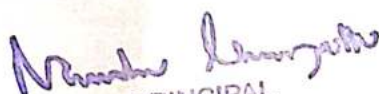
COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1												
CO2												
CO3												
CO4												
CO5												

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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Course Title:	Introduction to Internet of Things (IOT)		
Course Code:	BETCK105H/205H	CIE Marks	50
Course Type (Theory/Practical /Integrated )	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3-0-0-0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03
<b>Course objectives</b> <ul style="list-style-type: none"> <li>• Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.</li> <li>• Understand the recent application domains of IoT in everyday life.</li> <li>• Gain insights about the current trends of Associated IOT technologies and IOT Analytics.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. <ol style="list-style-type: none"> <li>1. Lecturer method (L) need not to be only a traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.</li> <li>2. Use of Video/Animation to explain functioning of various concepts.</li> <li>3. Encourage collaborative (Group Learning) Learning in the class.</li> <li>4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.</li> <li>5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.</li> <li>6. Introduce Topics in manifold representations.</li> <li>7. Show the different ways to solve the same problem with different circuits/logic and encourage the students to come up with their own creative ways to solve them.</li> <li>8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding</li> <li>9. Use any of these methods: Chalk and board, Active Learning, Case Studies</li> </ol>			
<b>Module-1 (8 hours of pedagogy)</b>			
<b>Basics of Networking:</b> Introduction, Network Types, Layered network models  <b>Emergence of IoT:</b> Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components  Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4			
<b>Module-2 (8 hours of pedagogy)</b>			
<b>IoT Sensing and Actuation:</b> Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.  Textbook 1: Chapter 5 – 5.1 to 5.9			
<b>Module-3 (8 hours of pedagogy)</b>			

  
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IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.

Textbook 1: Chapter 6 – 6.1 to 6.5

**Module-4 ( 8 ours of pedagogy)**

**ASSOCIATED IOT TECHNOLOGIES**

Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.

**IOT CASE STUDIES**

Agricultural IoT – Introduction and Case Studies

Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2

**Module-5 (8 hours of pedagogy)**

**IOT CASE STUDIES AND FUTURE TRENDS**

Vehicular IoT – Introduction

Healthcare IoT – Introduction, Case Studies

IoT Analytics – Introduction

Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2	Classify various sensing devices and actuator types.
CO3	Demonstrate the processing in IoT.
CO4	Explain Associated IOT Technologoes
CO5	Illustrate architecture of IOT Applications

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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation(CIE):

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions) **should have a mix of topics** under that module

#### Suggested Learning Resources:


##### Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.

##### Reference:

2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
3. Vijay Madiseti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

#### Web links and Video Lectures (e-Resources):

  
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- 1. <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/>


**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Demonstrate a sensor based application
- 

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

  
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26.10.2022

Theory - 01 Credit Course

BICOK107-207

**Indian Constitution**

Course Title:	Indian Constitution		
Course Code:		CIE Marks	50
Course Type (Theory/Practical /Integrated)	BICOK107-207	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

**Course objectives :**

The course INDIAN CONSTITUTION (22ICO17 / 27) will enable the students,

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

**Teaching-Learning Process**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching - Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

- (i) Direct instructional method ( Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion.
- (vii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.

**Module-1****(03 hours of pedagogy)**

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.

**Module-2****(03 hours of pedagogy)**

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.

**Module-3****(03 hours of pedagogy)**

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.

**Module-4****(03 hours of pedagogy)**

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

**Module-5****(03 hours of pedagogy)**

State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

**Course outcome (Course Skill Set)**

At the end of the course 22ICO17/27 the student will be able to:

C01	Analyse the basic structure of Indian Constitution.
C02	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
C03	know about our Union Government, political structure & codes, procedures.
C04	Understand our State Executive & Elections system of India.
C05	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

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### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

#### Continuous Internal Evaluation(CIE):

##### Two Unit Tests each of 30 Marks (duration 01 hour)

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

##### Two assignments each of 20 Marks

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others.. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

#### Semester End Examinations (SEE)

SEE paper shall be set for **50 questions, each of the 01 mark**. The pattern of the **question paper is MCQ** (multiple choice questions). The time allotted for SEE is **01 hour**. The student must secure a minimum of 35% of the maximum marks for SEE.

#### Suggested Learning Resources:

##### Textbook:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions. Bengaluru. - 2022.
2. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice -Hall, 2008.

##### Reference Books:

1. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles L. Haries, and et al: published by Cengage Learning India, Latest Edition - 2019.
2. "The Constitution of India" by Merunandan K B: published by Merugu Publication, Second Edition. Bengaluru.
3. "Samvidhana Odu" - for Students & Youths by Justice HIN Nagamohan Dhas, Sahayana, kerekon.
4. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engineering Ethics", Prentice -Hall, 2004.

#### Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions
- ✓ Seminars and assignments

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Theory - 01 Credit Course

**ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)**

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	BKBKK107-207	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

**Course objectives : ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:**

The course (22KBK17/27) will enable the students,

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conversation.
5. To know about Karnataka state and its language, literature and General information about this state.

**ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

**Module - 1**

(03 hours of pedagogy)

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities, Key to Transcription
3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

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<b>Module - 2</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns</li> <li>2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals</li> <li>3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರಕೃತಿಗಳು -ಸಪ್ರಮಿ ವಿಭಕ್ತಿ ಪ್ರಕೃತಿ - (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) - Predictive Forms, Locative Case</li> </ol>	
<b>Module - 3</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರಕೃತಿಯ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು - Dative Cases, and Numerals</li> <li>2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು -Ordinal numerals and Plural markers</li> <li>3. ನ್ಯೂನ/ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು &amp; ವರ್ಣ ಗುಣವಾಚಕಗಳು - Defective/Negative Verbs &amp; Colour Adjectives</li> </ol>	
<b>Module- 4</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಆರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)</li> <li>2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication</li> <li>3. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು - Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs</li> <li>4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ-Comparative, Relationship, Identification and Negation Words</li> </ol>	
<b>Module - 5</b>	<b>(03 hours of pedagogy)</b>
<ol style="list-style-type: none"> <li>1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು -Different types of Tense, Time and Verbs</li> <li>2. ದ್, -ತ್, -ತು, - ಇತು, - ಆಗಿ, - ಅಲ್ಲ, - ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms</li> <li>3. Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು -Kannada Words in Conversation</li> </ol>	

### Course outcome (Course Skill Set)

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

At the end of the course the student will be able to:

C01	To understand the necessity of learning of local language for comfortable life.
C02	To speak, read and write Kannada language as per requirement.
C03	To communicate (converse) in Kannada language in their daily life with kannada speakers.
C04	To Listen and understand the Kannada language properly.
C05	To speak in polite conversation.

### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than

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35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

**Two Unit Tests each of 30 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others.. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**University Prescribed Textbook :**

**ಬಳಕೆ ಕನ್ನಡ**

**ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ**

**ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,**

**ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.**

**ಸೂಚನೆ :**

1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
2. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

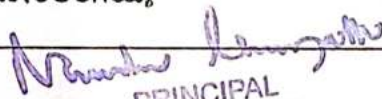
- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions,
- ✓ Seminars and assignments

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## Theory - 01 Credit Course

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:		CIE Marks	50
Course Type (Theory/Practical /Integrated)	BKSKK107-207	SEE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Total Marks	100
Total Hours of Pedagogy	15 hours	Exam Hours	01 Theory
		Credits	01
<b>Course objectives :</b> ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು: The course (22KSK17/27) will enable the students,			
<ol style="list-style-type: none"> <li>1. ವ್ಯಕ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.</li> <li>2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು.</li> <li>3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.</li> <li>4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.</li> <li>5. ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.</li> </ol>			
<b>ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :</b> These are sample Strategies, which teacher can use to accelerate the attainment of the course outcomes.			
<ol style="list-style-type: none"> <li>1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಯಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.</li> <li>2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.</li> <li>3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.</li> </ol>			
<b>ಘಟಕ -1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ</li> <li>2. ಕರ್ನಾಟಕದ ಐತಿಹಾಸಿಕ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ</li> <li>3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ</li> </ol>			
<b>ಘಟಕ - 2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ಯಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ಯಕ್ಕಿ ಲಕ್ಕಮ್ಮ.</li> <li>2. ಕೀರ್ತನೆಗಳು : ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸಿದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು</li> <li>3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ</li> </ol>			
<b>ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಅಯ್ಯ ಕೆಲವು ಭಾಗಗಳು</li> <li>2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ</li> <li>3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು</li> </ol>			
<b>ಘಟಕ - 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ. ಎನ್. ಮೂರ್ತಿರಾವ್</li> <li>2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರಿಗೌಡ ಬೀಚನಹಳ್ಳಿ</li> </ol>			
<b>ಘಟಕ - 5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ (03 hours of pedagogy)</b>			
<ol style="list-style-type: none"> <li>1. ಯುಗಾದಿ : ವಸುಧೇಂದ್ರ</li> <li>2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ : ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ</li> </ol>			

  
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**Course outcome (Course Skill Set)**

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (22KSK17/27) ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ :

At the end of the course the student will be able to:

CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಿಸುತ್ತದೆ.
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಿಸುತ್ತದೆ.
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):****Two Unit Tests each of 30 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**University Prescribed Textbook :****ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**

ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,  
ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,  
ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

**ಸೂಚನೆ :**

1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
2. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments.

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**Professional Writing Skills in English**

Course Title:	Professional Writing Skills in English		
Course Code:	BPWSK206-106	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

**Course objectives:**

The course Professional Writing Skills in English (22PWS26) will enable the students,

1. To Identify the Common Errors in Writing and Speaking of English.
2. To Achieve better Technical writing and Presentation skills for employment.
3. To read Technical proposals properly and make them to write good technical reports.
4. To Acquire Employment and Workplace communication skills.
5. To learn about Techniques of Information Transfer through presentation in different level.

**Teaching-Learning Process**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching - Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.

(i) Direct instructional method ( Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning.

(v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills.

Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.

**Language Lab :** To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.

**Module-1****(03 hours of pedagogy)**

**Identifying Common Errors in Writing and Speaking English :** Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.

**Module-2****(03 hours of pedagogy)**

**Nature and Style of sensible writing: Organizing** Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.

**Module-3****(03 hours of pedagogy)**

**Technical Reading and Writing Practices:** Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.

**Module-4****(03 hours of pedagogy)**

**Professional Communication for Employment:** Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos.

**Module-5****(03 hours of pedagogy)**

**Professional Communication at Workplace:** Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.

*M. S. Lakshmi*  
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**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	To understand and identify the Common Errors in Writing and Speaking.
CO2	To Achieve better Technical writing and Presentation skills.
CO3	To read Technical proposals properly and make them to Write good technical reports.
CO4	Acquire Employment and Workplace communication skills.
CO5	To learn about Techniques of Information Transfer through presentation in different level.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):****Two Unit Tests each of 30 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (To have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**Suggested Learning Resources:****Textbook:**

- 1) "Professional Writing Skills in English" published by Phillip Learning – Education (ILS), Bangalore – 2022.
- 2) "Functional English" (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].

**Reference Books:**

- 1) English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
- 2) Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
- 3) Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
- 4) High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
- 5) Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments

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26.10.2022

Theory - 01 Credit Course

BENGGK106-206

**Communicative English**

Course Title:	Communicative English		
Course Code:	BENGGK106-206	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
<p><b>Course objectives:</b> The course Communicative English (22ENG16) will enable the students.</p> <ol style="list-style-type: none"> <li>To know about Fundamentals of Communicative English and Communication Skills in general.</li> <li>To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.</li> <li>To impart basic English grammar and essentials of important language skills.</li> <li>To enhance with English vocabulary and language proficiency for better communication skills.</li> <li>To learn about Techniques of Information Transfer through presentation.</li> </ol>			
<p><b>Teaching-Learning Process :</b> These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching -Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market. (i) Direct instructional method ( Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.</p>			
<p><b>Language Lab :</b> To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.</p>			
<b>Module-1</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Introduction to Communicative English :</b> Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.</p>			
<b>Module-2</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Introduction to Phonetics :</b> Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.</p>			
<b>Module-3</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Basic English Communicative Grammar and Vocabulary PART - I :</b> Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.</p>			
<b>Module-4</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Basic English Communicative Grammar and Vocabulary PART - II:</b> Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.</p>			
<b>Module-5</b>		<b>(03 hours of pedagogy)</b>	
<p><b>Communication Skills for Employment :</b> Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.</p>			

  
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**Course outcome (Course Skill Set)**

At the end of the course Communicative English (22ENG16) the student will be able to:

CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
CO3	To impart basic English grammar and essentials of language skills as per present requirement.
CO4	Understand and use all types of English vocabulary and language proficiency.
CO5	Adopt the Techniques of Information Transfer through presentation.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):****Two Unit Tests each of 30 Marks (duration 01 hour)**

- First test after the completion of 30-40 % of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration

**Two assignments each of 20 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others.. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks**

**Semester End Examinations (SEE)**

SEE paper shall be set for 50 questions, each of the 01 mark. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student must secure a minimum of 35% of the maximum marks for SEE.

**Suggested Learning Resources:****Textbook:**

- 1) **Communication Skills** by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
- 2) **A Textbook of English Language Communication Skills**, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.

**Reference Books:**

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
3. **English Language Communication Skills – Lab Manual cum Workbook**, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. **A Course in Technical English – D Praveen Sam, KN Shoba**, Cambridge University Press – 2020.
5. **Practical English Usage** by Michael Swan, Oxford University Press – 2016.

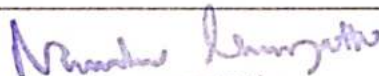
**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions. Seminars and assignments

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**II Semester**

Course Title:	<b>Mathematics-II for Civil Engineering stream</b>		
Course Code:	<b>BMATC201</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04
<p><b>Course objectives:</b>The goal of the course <b>Mathematics-II for Civil Engineering stream (22MATC21)</b> is to</p> <ul style="list-style-type: none"> <li>• <b>Familiarize</b> the importance of Integral calculus and Vector calculus essential for civil engineering.</li> <li>• <b>Analyze</b> Civil engineering problems by applying Partial Differential Equations.</li> <li>• <b>Develop</b> the knowledge of solving civil engineering problems numerically.</li> </ul>			
<p><b>Teaching-Learning Process</b>  <b>Pedagogy (General Instructions):</b>  These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.</p> <ol style="list-style-type: none"> <li>1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.</li> <li>2. State the need for Mathematics with Engineering Studies and Provide real-life examples.</li> <li>3. Support and guide the students for self-study.</li> <li>4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.</li> <li>5. Encourage the students to group learning to improve their creative and analytical skills.</li> <li>6. Show short related video lectures in the following ways: <ul style="list-style-type: none"> <li>• As an introduction to new topics (pre-lecture activity).</li> <li>• As a revision of topics (post-lecture activity).</li> <li>• As additional examples (post-lecture activity).</li> <li>• As an additional material of challenging topics (pre-and post-lecture activity).</li> <li>• As a model solution of some exercises (post-lecture activity).</li> </ul> </li> </ol>			
<b>Module-1: Integral Calculus (8 hours)</b>			
<p><b>Introduction to Integral Calculus in Civil Engineering applications.</b>  <b>Multiple Integrals:</b> Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.  <b>Beta and Gamma functions:</b> Definitions, properties, relation between Beta and Gamma functions. Problems.  <b>Self-Study:</b> Volume by triple integration, Center of gravity.  <b>Applications:</b> Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.  <b>(RBT Levels: L1, L2 and L3)</b></p>			

  
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**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)****10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	Program to compute surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
4	Verification of Green's theorem
5	Solution of one-dimensional heat equation and wave equation
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{th}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta $4^{th}$ order and Milne's predictor-corrector method

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Apply the knowledge of multiple integrals to compute area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO3	Demonstrate partial differential equations and their solutions for physical interpretations.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/PYTHON/SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

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Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

*Narash Channappa*  
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**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers. 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

**Reference Books**

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C.Bhunia: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup>Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup>Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication, 3<sup>rd</sup> Ed.,2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.

**Web links and Video Lectures (e-Resources):**

- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

*N. Srinivas*  
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16-2-2022

## II Semester

Course Title:	Mathematics-II for Computer Science and Engineering stream		
Course Code:	BMATS201	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

**Course objectives:** The goal of the course **Mathematics-II for Computer Science and Engineering stream (22MATS21)** is to

- **Familiarize** the importance of Integral calculus and Vector calculus.
- **Learn** vector spaces and linear transformations.
- **Develop** the knowledge of numerical methods and apply them to solve transcendental and differential equations.

### Teaching-Learning Process

#### Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

### Module-1 Integral Calculus (8 hours)

#### Introduction to Integral Calculus in Computer Science & Engineering.

**Multiple Integrals:** Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. Problems.

**Self-Study:** Center of gravity, Duplication formula.

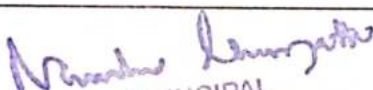
**Applications:** Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.

**(RBT Levels: L1, L2 and L3)**

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<b>Module-2 Vector Calculus(8 hours)</b>
<p><b>Introduction to Vector Calculus in Computer Science &amp; Engineering.</b>            Scalar and vector fields. Gradient, directional derivative. curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.</p> <p><b>Curvilinear coordinates:</b>Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality. Problems.</p> <p><b>Self-Study:</b> Vector integration and Vector line integral.</p> <p><b>Applications:</b> Conservation of laws, Electrostatics, Analysis of streamlines.</p>
<b>Module-3 Vector Space and Linear Transformations(8 hours)</b>
<p><b>Importance of Vector Space and Linear Transformations in the field of Computer Science &amp; Engineering.</b></p> <p><b>Vector spaces:</b> Definition and examples. subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Problems.</p> <p><b>Linear transformations:</b> Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality. Problems.</p> <p><b>Self-study:</b> Angles and Projections. Rotation, Reflection, Contraction and Expansion.</p> <p><b>Applications:</b> Image processing, AI &amp; ML, Graphs and networks, Computer graphics.</p> <p><b>(RBT Levels: L1, L2 and L3)</b></p>
<b>Module-4 Numerical Methods -1(8 hours)</b>
<p><b>Importance of numerical methods for discrete data in the field of computer science &amp; engineering.</b></p> <p>Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson methods (only formulae). Problems.</p> <p>Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.</p> <p><b>Numerical integration:</b> Trapezoidal, Simpson's <math>(1/3)^{rd}</math> and <math>(3/8)^{th}</math> rules(without proof). Problems.</p> <p><b>Self-Study:</b> Bisection method, Lagrange's inverse Interpolation.</p> <p><b>Applications:</b> Estimating the approximate roots, extremum values, Area, volume, and surface area. Errors in finite precision.</p> <p><b>(RBT Levels: L1, L2 and L3)</b></p>
<b>Module-5 Numerical Methods -2(8 hours)</b>
<p><b>Introduction to various numerical techniques for handling Computer Science &amp; Engineering applications.</b></p> <p><b>Numerical Solution of Ordinary Differential Equations (ODE's):</b> Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.</p> <p><b>Self-Study:</b> Adam-Bashforth method.</p> <p><b>Applications:</b> Estimating the approximate solutions of ODE.</p> <p><b>(RBT Levels: L1, L2 and L3).</b></p>

  
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**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)****10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	Program to compute area, surface area, volume and centre of gravity
2	Evaluation of improper integrals
3	Finding gradient, divergent, curl and their geometrical interpretation
4	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
5	Computing the inner product and orthogonality
6	Solution of algebraic and transcendental equations by Ramanujan's, Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's (1/3) <sup>rd</sup> and (3/8) <sup>th</sup> rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4 <sup>th</sup> order and Milne's predictor-corrector method

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.
CO2	Understand the applications of vector calculus refer to solenoidal, and irrotational vectors. Orthogonal curvilinear coordinates.
CO3	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO4	Apply the knowledge of numerical methods in analysing the discrete data and solving the physical and engineering problems.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.

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- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

#### **CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### **Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

*Nanda Lakshmi*  
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SIET. TUMKUR.

**Suggested Learning Resources:****Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)****Text Books**

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

**Reference Books**

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C.Bhunia: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup> Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup> Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3<sup>rd</sup> Ed., 2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.
8. David C Lay: "Linear Algebra and its Applications", Pearson Publishers, 4<sup>th</sup> Ed.. 2018.
9. Gareth Williams: "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6<sup>th</sup> Ed., 2017.
10. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed., 2022.

**Web links and Video Lectures (e-Resources):**

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- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
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- VTU e-Shikshana Program
- VTU EDUSAT Program

**Activity-Based Learning (Suggested Activities in Class)/ Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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**II Semester**

Course Title:	<b>Mathematics-II for Electrical &amp; Electronics Engineering Stream</b>		
Course Code:	<b>BMATE201</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 to 12 Lab slots	Credits	04

**Course objectives:**The goal of the course **Mathematics-II for Electrical & Electronics Engineering Stream(22MATE21)** is to


- **Familiarize** the importance of Vector calculus, Vector Space and Linear transformation for electronics and electrical engineering.
- **Have an insight** into solving ordinary differential equations by using Laplace transform techniques.
- **Develop** the knowledge of solving electronics and electrical engineering problems numerically.

**Teaching-Learning Process****Pedagogy (General Instructions):**

These are sample Strategies. which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students to group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
  - As an introduction to new topics (pre-lecture activity).
  - As a revision of topics (post-lecture activity).
  - As additional examples (post-lecture activity).
  - As an additional material of challenging topics (pre-and post-lecture activity).
  - As a model solution of some exercises (post-lecture activity).

**Module-1:Vector Calculus (8 hours)**

  
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**Introduction to Vector Calculus in EC & EE engineering applications.**  
**Vector Differentiation:** Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.  
**Vector Integration:** Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems.

**Self-Study:** Volume integral and Gauss divergence theorem.  
**Applications:** Conservation of laws, Electrostatics, Analysis of streamlines and electric potentials.

(RBT Levels: L1, L2 and L3)

#### Module-2: Vector Space and Linear Transformations(8 hours)

**Importance of Vector Space and Linear Transformations in the field of EC & EE engineering applications.**  
**Vector spaces:** Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension.  
**Linear transformations:** Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem. Inner product spaces and orthogonality.

**Self-study:** Angles and Projections. Rotation, reflection, contraction and expansion.  
**Applications:** Image processing, AI & ML, Graphs and networks, Computer graphics.

(RBT Levels: L1, L2 and L3)

#### Module-3:Laplace Transform(8 hours)

**Importance of Laplace Transform for EC & EE engineering applications.**  
 Existence and Uniqueness of Laplace transform (LT), transform of elementary functions, region of convergence. Properties–Linearity, Scaling, t-shift property, s-domain shift, differentiation in the s-domain, division by t, differentiation and integration in the time domain. LT of special functions-periodic functions (square wave, saw-tooth wave, triangular wave, full & half wave rectifier), Heaviside Unit step function, Unit impulse function.

**Inverse Laplace Transforms:**  
 Definition, properties, evaluation using different methods, convolution theorem (without proof), problems, and applications to solve ordinary differential equations.  
**Self-Study:** Verification of convolution theorem.  
**Applications:** Signals and systems, Control systems, LR, CR & LCR circuits.

(RBT Levels: L1, L2 and L3)

#### Module-4:Numerical Methods -1(8 hours)

**Importance of numerical methods for discrete data in the field of EC & EE engineering applications.**  
 Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems.  
 Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.  
**Numerical integration:** Trapezoidal, Simpson's  $(1/3)^{th}$  and  $(3/8)^{th}$  rules(without proof). Problems.

**Self-Study:** Bisection method, Lagrange's inverse Interpolation, Weddle's rule.

**Applications:** Estimating the approximate roots, extremum values, area, volume, and surface area.  
(RBT Levels: L1, L2 and L3)

**Module-5: Numerical Methods -2(8 hours)**

**Introduction to various numerical techniques for handling EC & EE applications.**

**Numerical Solution of Ordinary Differential Equations (ODEs):**

Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method. Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems.

**Self-Study:** Adam-Bashforth method.

**Applications:** Estimating the approximate solutions of ODE for electric circuits.

(RBT Levels: L1, L2 and L3)

**List of Laboratory experiments (2 hours/week per batch/ batch strength 15)**

**10 lab sessions + 1 repetition class + 1 Lab Assessment**

1	Finding gradient, divergent, curl and their geometrical interpretation and Verification of Green's theorem
2	Computation of basis and dimension for a vector space and Graphical representation of linear transformation
3	Visualization in time and frequency domain of standard functions
4	Computing inverse Laplace transform of standard functions
5	Laplace transform of convolution of two functions
6	Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method
7	Interpolation/Extrapolation using Newton's forward and backward difference formula
8	Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
10	Solution of ODE of first order and first degree by Runge-Kutta 4 <sup>th</sup> order and Milne's predictor-corrector method

**Suggested software's:** Mathematica/MatLab/Python/Scilab

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, lineintegral and surface integral.
CO2	Demonstrate the idea of Linear dependence and independence of sets in the vector space, and linear transformation
CO3	To understand the concept of Laplace transform and to solve initial value problems.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/PYTHON/ SCILAB

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**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation(CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.


Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is

  
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to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CBE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada. The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 50 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

#### Suggested Learning Resources:

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**


##### Text Books

1. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44<sup>th</sup>Ed., 2021.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10<sup>th</sup>Ed., 2018.

##### Reference Books

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11<sup>th</sup> Ed., 2017
2. Srimanta Pal & Subodh C.Bhunja: "Engineering Mathematics" Oxford University Press, 3<sup>rd</sup>Ed., 2016.
3. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" Laxmi Publications, 10<sup>th</sup>Ed., 2022.
4. C. Ray Wylie, Louis C. Barrett: "Advanced Engineering Mathematics" McGraw – Hill Book Co., New York, 6<sup>th</sup> Ed., 2017.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S.Chand Publication, 3<sup>rd</sup> Ed.,2014.
7. James Stewart: "Calculus" Cengage Publications, 7<sup>th</sup>Ed., 2019.
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10. Gilbert Strang: "Linear Algebra and its Applications", Cengage Publications, 4<sup>th</sup> Ed., 2022.

#### Web links and Video Lectures (e-Resources):

  
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- <http://nptel.ac.in/courses.php?disciplineID=111>
- [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
- <http://academicearth.org/>
- VTU e-Shikshana Program
- VTU EDUSAT Program


**Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning**

- Quizzes
- Assignments
- Seminar

**COs and POs Mapping (Individual teacher has to fill up)**

COs	POs						
	1	2	3	4	5	6	7
CO1							
CO2							
CO3							
CO4							
CO5							

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

  
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### Civil Engineering and Allied branches(Chemistry group)

<b>Course Title:</b>	<b>Applied Chemistry for Civil Engineering stream</b>		
<b>Course Code:</b>	<b>BCHEC202 /202</b>	CIE Marks	50
<b>Course Type</b> (Theory/Practical/Integrated )	Integrated	SEE Marks	50
		Total Marks	100
<b>Teaching Hours/Week</b> (L:T :P:S) <sup>1</sup>	2:2:2:0	Exam Hours	03
<b>Total Hoursof Pedagogy</b>	40hours Theory+10to12L abslots	Credits	04
<b>Course objectives</b> <ul style="list-style-type: none"> <li>To enable students to acquire knowledge on principles of chemistry for engineering applications.</li> <li>To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.</li> <li>To provide students with a solid foundation in analytical reasoning required to solve societal problems.</li> </ul>			
<b>Teaching-Learning Process</b> These are sample strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching-Learning more effective <ul style="list-style-type: none"> <li>Tutorial &amp; remedial classes for needy students (not regular T/R)</li> <li>Conducting Makeup classes/Bridge courses for needy students</li> <li>Demonstration of concept either by building models or by industry visit</li> <li>Experiments in laboratories shall be executed in blended mode (conventional or non-conventional methods)</li> <li>Use of ICT-Online videos, online courses</li> <li>Use of online platforms for assignments/Notes/Quizzes (Ex. Google classroom)</li> </ul>			
<b>Module-1: Structural Materials (8hr)</b>			
<b>Metals and Alloys:</b> Introduction, Properties and application of Iron and its alloys, Aluminium and its alloys <b>Cement:</b> Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement. <b>Refractories:</b> Introduction, classification based on chemical composition, properties and application of refractory materials. <b>Glass:</b> Introduction, Composition, Types, Preparation of Soda-lime glass, properties and application of glass. <b>Self-learning:</b> Chemistry of reinforced concrete from various sources of water (seawater, groundwater, treated water).			
<b>Module-2: Energy Conversion and Storage, Corrosion (8hr)</b>			
<b>Energy conversion:</b> Introduction, construction, working, and applications of Photovoltaic cells, methanol-oxygen fuel cell. <b>Storage devices:</b> Introduction, construction and working of Li-ion battery.			

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

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**Corrosion:** Introduction, electrochemical corrosion of steel in concrete, types (differential metal and aeration), Stress corrosion in civil structures, corrosion control (design and selection of materials, galvanization, anodization and sacrificial anode method).

**Self-learning:** Corrosion inhibitors

#### Module-3: Water Technology and Nanotechnology (8hr)

**Water technology:** Introduction, water parameters, hardness of water, determination of temporary, permanent and total hardness by EDTA method, numerical problems, softening of water by ion exchange method, desalination of water by electrodialysis, determination of COD, numerical problems. Forward osmosis: Introduction, Process and applications.

**Nanotechnology:** Introduction, size dependent properties of nanomaterial (surface area and catalytic), Synthesis of nanomaterial by sol-gel method and co-precipitation method.

**Nanomaterials:** Introduction, properties and engineering applications of carbon nanotubes, graphene and nanomaterials for water treatment (Metal oxide).

**Self-learning:** Sewage treatment (Primary, secondary and tertiary)

#### Module-4: Polymer and Composites (8hr)

**Polymer:** Introduction, methods of polymerization, molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and Chloropolyvinyl chloride (CPVC).

**Fibers:** Synthesis, properties and applications of nylon fibers.

**Polymer composites:** Introduction, properties and applications of fiber reinforced polymer composites (FRPC).

**Geopolymer concrete:** Introduction, synthesis, constituents, properties and applications.

**Adhesives:** Introduction, properties and applications of epoxy resin.

**Biodegradable polymers:** Synthesis of polylactic acid (PLA) and their applications.

**Self-**

**learning: Biopolymer:** Introduction, structural properties, and applications of cellulose and lignin.

#### Module-5: Phase Rule and Analytical Techniques (8hr)

**Phase rule:** Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: Two component-lead-silver system.

**Analytical techniques:** Introduction, principle, instrumentation of potentiometric sensors and its application in the estimation of iron, conductometric sensors and its application in the estimation of acid mixture, pH-sensors and its application in the determination of soil sample.

**Self-learning:** Chromatographic technique, application of chromatography (column and thin-layered chromatography) in the separation of components.

#### PRACTICAL MODULE

##### A-Demonstration (any two) offline/virtual:

A1. Synthesis of polyurethane

A2. Quantitative estimation of Aluminium by precipitation method

A3. Synthesis of iron oxide nanoparticles

A4. Determination of chloride content in the given water sample by Argentometric method

##### B-Exercise (compulsorily any 4 to be conducted):

B1. Conductometric estimation of acid mixture

B2. Potentiometric estimation of FAS using  $K_2Cr_2O_7$

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B3. Determination of pKa of vinegar using pH sensor (Glass electrode)  
 B4. Determination of rate of corrosion of mild steel by weight loss method  
 B5. Estimation of total hardness of water by EDTA method

**C-Structured Enquiry (compulsorily 4 to be conducted):**

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)  
 C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)  
 C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method  
 C4. Estimation of Sodium present in soil/effluents sample using flame photometry  
 C5. Determination of Chemical Oxygen Demand (COD) of industrial wastewater sample

**D-Open Ended Experiments (any two):**

D1. Gravimetric estimation of gypsum in Portland cement  
 D2. Electroplating of desired metal on substrate  
 D3. Estimation of manganese dioxide in pyrolusite  
 D4. Analysis of cement for its components

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1.	Identify the terms processes involved in scientific and engineering and applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5.	Analyze processes associated with chemical substances in properties and multidisciplinary situations

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks** shall be for the test conducted at the end of the semester.

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- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

#### Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

#### Suggested Learning Resources:

##### Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)

1. WileyEngineeringChemistry,WileyIndiaPvt.Ltd.NewDelhi,2013-2<sup>nd</sup>Edition.
2. EngineeringChemistry,Satyaprakash&ManishaAgrawal,KhannaBookPublishing,Delhi
3. ATextBookofEngg.Chemistry,ShashiChawla,DhanpatRai&Co.(P)Ltd.
4. EssentialsOfPhysicalChemistry,Bahl&Tuli,S.ChandPublishing
5. AppliedChemistry,SunitaRattan,Kataria5.EngineeringChemistry,Baskar,Wiley
6. EngineeringChemistry-I,D.Groukrishana,VikasPublishing
7. ATextbookofEngineeringChemistry,SSDara&Dr.SSUmare,SChand&CompanyLtd.,12<sup>th</sup>Edition,2011.
8. ATextBookofEngineeringChemistry,R.V.GadagandNityanandaShetty,I.K.International Publishinghouse.2<sup>nd</sup>Edition,2016.
9. TextBookofPolymerScience,F.W.Billmeyer,JohnWiley&Sons,4<sup>th</sup>Edition,1999.
10. NanotechnologyAChemicalApproachtoNanomaterials,G.A.Ozin&A.C.Arsenault,RSCPublishing,2005.
11. CorrosionEngineering,M.G.Fontana,N.D.Greene,McGrawHillPublications,NewYork,3<sup>rd</sup>Edition, 1996.
12. Linden'sHandbookofBatteries,KirbyW.Beard,FifthEdition,McGrawHill,2019.
13. OLEDDisplayFundamentalsandApplications,Takatoshi Tsujimura,Wiley-Blackwell,2012
14. Supercapacitors: Materials, Systems,andApplications, MaxLu, Francois Beguin,Elzbieta Frackowiak,Wiley-VCH;1st edition,2013.
15. "HandbookonElectroplatingwithManufactureofElectrochemicals",ASIAPACIFICBUSINESSPRESS Inc.,2017.Dr. H.Panda.
16. ExpandingtheVisionofSensorMaterials.NationalResearchCouncil1995,Washington,DC:TheNationalAcademies Press. doi:10.17226/4782.
17. EngineeringChemistry,EditedbyDr.MaheshBandDr.RoopashreeB,SunstarPublisher,Bengaluru.

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ISBN978-93-85155-70-3, 2022.

18. High Performance Metallic Materials for Cost Sensitive Applications, F.H. Froes, et al. John Wiley & Sons, 2010.
19. Instrumental Methods of Analysis, Dr. K.R. Mahadik and Dr. L. Sathiyarayanan, Nirali Prakashan, 2020.
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020.
21. Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, New Age Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication, 2015-16<sup>th</sup> Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1<sup>st</sup> Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3<sup>rd</sup> Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2<sup>nd</sup> Edition, 2010.
26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpalyengar, Subash Publications, 5<sup>th</sup> Edition, 2014
27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

**Web links and Video Lectures (e-Resources):**

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWH>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEJk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

**Activity Based Learning (Suggested Activities in Class) / Practical Based learning**

- <https://www.vlab.co.in/broad-area-chemical-sciences>
- <https://demonstrations.wolfram.com/topics.php>
- <https://interestingengineering.com/science>

**COs and POs Mapping (Individual teacher has to fill up)**

PO												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

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## Electrical & Electronics Engineering and Allied branches(Chemistry group)

<b>CourseTitle:</b>	<b>Chemistry for Electrical and Electronics Engineering stream</b>		
<b>CourseCode:</b>	<b>BCHEE202/202</b>	CIEMarks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEEMarks	50
		Total Marks	100
TeachingHours/Week(L:T:P:S) <sup>1</sup>	2:2:2:0	Exam Hours	03
TotalHoursofPedagogy	40hoursTheory+10to 12Lab slots	Credits	04
<b>Courseobjectives</b>			
<ul style="list-style-type: none"> <li>• Toenablestudentstoacquireknowledgeonprinciplesofchemistryforengineeringapplications.</li> <li>• Todevelopanintuitiveunderstandingofchemistrybyemphasizingtherelatedbranchesofengineering.</li> <li>• Toprovidestudentswithasolidfoundationinanalyticalreasoningrequiredtosolvesocietal problems.</li> </ul>			
<b>Teaching-LearningProcess</b>			
<p>Thesearesamplestrategies,whichteachercanusetoacceleratetheattainmentofthevariouscourseoutcomesandmakeTeaching-Learningmoreeffective</p> <ul style="list-style-type: none"> <li>• Tutorial&amp;remedialclassesforneedystudents(notregularT/R)</li> <li>• ConductingMakeupclasses/Bridgecoursesforneedystudents</li> <li>• Demonstrationofconceptseitherbybuildingmodelsorbyindustryvisit</li> <li>• Experimentsinlaboratoriesshallbeexecutedinblendedmode(conventionalornon-conventionalmethods)</li> <li>• UseofICT-Onlinevideos,onlinecourses</li> <li>• Useofonlineplatformsforassignments/Notes/Quizzes(Ex.Googleclassroom)</li> </ul>			
<b>MODULE1:ChemistryofElectronicMaterials(8hr)</b>			
<p><b>ConductorsandInsulators:</b>Introduction,principlewithexamples.</p> <p><b>Semiconductors:</b> Introduction, production of electronic grade silicon-Czochralski process(CZ) andFloatZone(FZ)methods.</p> <p><b>Polymers:</b>Introduction,Molecularweight-Numberaverage,Weightaverageandnumericalproblems.Cconductingpolymers-synthesisandconductingmechanismofpolyacetylene.Preparation, propertiesandcommercialapplicationsofgrapheneoxide.</p> <p><b>PCB:</b> Electroless plating - Introduction, Electroless plating of copper in the manufacture ofdouble-sidedPCB.</p> <p><b>Self-learning:</b>Technologicalimportanceofmetalfinishinganddistinctionbetween electroplatingandelectrolessplating.</p>			
<b>MODULE2:EnergyConversionandStorage(8hr)</b>			
<p><b>Batteries:</b> Introduction, classification of batteries. Components, construction, working andapplications of modern batteries; Na-ion battery, solid state battery (Li-polymer battery)andflowbattery(Vanadiumredoxflowbattery).</p> <p><b>FuelCells:</b>Introduction,construction,workingandapplicationsofmethanol-oxygenand</p>			

1.NOTE:Whereverthecontact hoursisnotsufficient,tutorialhourcanbeconvertedto theoryhours



polymer electrolyte membrane (PEM) fuel cell.

**Solar Energy:** Introduction, importance of solar PV cell, construction and working of solar PV cell, advantages and disadvantages.

**Self-learning:** Electrodes for electrostatic double layer capacitors, pseudocapacitors, and hybrid capacitor.

### MODULE 3: Corrosion Science and E-waste Management (8hr)

**Corrosion Chemistry:** Introduction, electrochemical theory of corrosion, types of corrosion - differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

**E-waste Management:** Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling. Extraction of copper and gold from e-waste.

**Self-learning:** Recycling of PCB and battery components

### MODULE 4: Nanomaterials and Display Systems (8hr)

**Nanomaterials:** Introduction, size dependent properties of nanomaterials (Surface area, Catalytic, Conducting), preparation of nanomaterials by sol-gel and co-precipitation method with example. Introduction, properties and applications - Nanofibers, Nanophotonics, Nanosensors.

**Display Systems:** Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light emitting diodes (QLED's).

**Perovskite Materials:** Introduction, properties and applications in optoelectronic devices.

**Self-learning:** Properties & electrochemical applications of carbon nanotubes and graphene.

### MODULE 5: Sensors in Analytical Techniques (8hr)

**Electrode System:** Introduction, types of electrodes. Ion selective electrode - definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode - construction, working and applications of calomel electrode. Concentration cell - Definition, construction and Numerical problems.

**Sensors:** Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors.

**Analytical Techniques:** Introduction, principle and instrumentation of Colorimetric sensors; its application in the estimation of copper, principle and instrumentation of Potentiometric sensors; principle and instrumentation of its application in the estimation of iron, Conductometric sensors; its application in the estimation of weak acid.

**Self-learning:** IR and UV-Visible spectroscopy.

### PRACTICAL MODULE

**A-Demonstration (any two) offline/virtual:**

A1. Synthesis of polyurethane

A2. Determination of strength of an acid in Pb-acid battery

A3. Synthesis of iron oxide nanoparticles

A4. Electroplating of copper on metallic objects

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**B-Exercise(compulsorilyany4tobeconducted):**

- B1. Conductometric estimation of acid mixture  
 B2. Potentiometric estimation of FAS using  $K_2Cr_2O_7$   
 B3. Determination of  $pK_a$  of vinegar using pH sensor (Glass electrode)  
 B4. Determination of rate of corrosion of mild steel by weight loss method  
 B5. Estimation of total hardness of water by EDTA method

**C-Structured Enquiry (compulsorilyany4tobeconducted):**

- C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)  
 C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)  
 C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method  
 C4. Estimation of Sodium present in soil/effluents sample using flame photometry  
 C5. Determination of Chemical Oxygen Demand (COD) of industrial wastewater sample

**D-Open Ended Experiments (any two):**

- D1. Estimation of metal in e-waste by optical sensors  
 D2. Electroless plating of Nickel on Copper  
 D3. Determination of glucose by electrochemical sensors  
 D4. Synthesis of polyaniline and its conductivity measurement

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

CO1.	Identify the terms and processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering processes
CO3.	Solve the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO5.	Analyze properties and multi processes associated with chemical substances in disciplinary situations

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

**CIE for the theory component of the IC**

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

**CIE for the practical component of the IC**

- On completion of every experiment/program in the laboratory, the students shall be

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evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.

- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test (**duration 03 hours**) at the end of the 15<sup>th</sup> week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks**.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks**.

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

**Suggested Learning Resources:**

**Books (Title of the Book / Name of the author / Name of the publisher / Edition and Year)**

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013-2<sup>nd</sup> Edition.
2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl & Tuli, S. Chand Publishing
5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
6. Engineering Chemistry-I, D. Grouir Krishana, Vikas Publishing
7. A Textbook of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12<sup>th</sup> Edition, 2011
8. A Textbook of Engineering Chemistry, R.V. Gadagand Nityananda Shetty, I.K. International Publishing house. 2<sup>nd</sup> Edition, 2016.
9. Textbook of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4<sup>th</sup> Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin & A.C. Arsenault, RSC Publishing, 2005.
11. Corrosion Engineering, M.G. Fontana, N.D. Greene, McGraw Hill Publications, New York, 3<sup>rd</sup> Edition, 1996.
12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley-Blackwell, 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH; 1st edition, 2013.

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15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIAPACIFIC BUSINESS PRESS Inc., 2017. Dr.H. Panda,
16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi:10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh Band Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F.H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyarayanan, Nirali Prakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, PC Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition, 2002.
24. Nanotechnology Principles and Practices, Sulabha Kulkarni, Capital Publishing Company, 3rd Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpal Yangar., Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S, KS Anantha Raju, CBS publishers Pvt Ltd.
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

**Weblinks and Video Lectures (e-Resources):**

- <http://libgen.rs/>
- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWH>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEjk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

**Activity Based Learning (Suggested Activities in Class) / Practical Based learning**

- <https://www.vlab.co.in/broad-area-chemical-sciences>
- <https://demonstrations.wolfram.com/topics.php>
- <https://interestingengineering.com/science>

COs and POs Mapping (Individual teacher has to fill up)												
	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

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Course Title:	Computer Aided Engineering Drawing (Common to All)		
Course Code	BCEDK203/203	CIE Marks	50
Teaching Hour/Week (L:T:P:S)	2:0:2:0	SEE Marks	50
Total Hours of Teaching - Learning	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning Objectives:</b>			
CLO1: To understand the basic principles and conventions of engineering drawing			
CLO2: To use drawing as a communication mode			
CLO3: To generate pictorial views using CAD software			
CLO4: To understand the development of surfaces			
CLO5: To visualize engineering components			
<b>Teaching-Learning (General Instructions):</b>			
<ul style="list-style-type: none"> <li>• Students should be made aware of powerful engineering communication tool –Drawing.</li> <li>• Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.</li> <li>• Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.</li> <li>• For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for others shapes)</li> <li>• Use any CAD software for generating orthographic and pictorial views.</li> <li>• Make use of sketch book with graph sheets for manual / preparatory sketching</li> </ul>			
<b>Module-1</b>			
<b>Introduction: for CIE only</b>			
Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.			
<b>Orthographic Projections of Points, Lines and Planes:</b>			
Introduction to Orthographic projections: Orthographic projections of points in 1 <sup>st</sup> and 3 <sup>rd</sup> quadrants.			
Orthographic projections of lines (Placed in First quadrant only).			
Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).			
<i>Application on projections of Lines &amp; Planes (For CIE only)</i>			
<b>Module-2</b>			
<b>Orthographic Projection of Solids:</b>			
Orthographic projection of right regular solids ( <b>Solids Resting on HP only</b> ): Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes & Tetrahedron.			
<i>Projections of Frustum of cone and pyramids (For practice only, not for CIE and SEE).</i>			

<b>Module-3</b>
<p><b>Isometric Projections:</b> Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. <b>Conversion of simple isometric drawings into orthographic views.</b> Problems on applications of Isometric projections of simple objects / engineering components. <i>Introduction to drawing views using 3D environment (For CIE only).</i></p>
<b>Module-4</b>
<p><b>Development of Lateral Surfaces of Solids:</b> Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays. <i>Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only)</i></p>
<b>Module-5</b>
<p><b>Multidisciplinary Applications &amp; Practice (For CIE Only):</b> <b>Free hand Sketching;</b> True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools &amp; Furniture's etc <b>Drawing Simple Mechanisms;</b> Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart &amp; Four-wheeler carts to dimensions etc <b>Electric Wiring and lighting diagrams;</b> Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software <b>Basic Building Drawing;</b> Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software, <b>Electronics Engineering Drawings-</b> Like, Simple Electronics Circuit Drawings, practice on layers concept. <b>Graphs &amp; Charts:</b> Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.</p>
<p><b>Course Outcomes</b> At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>CO 1. Draw and communicate the objects with definite shape and dimensions</li> <li>CO 2. Recognize and Draw the shape and size of objects through different views</li> <li>CO 3. Develop the lateral surfaces of the object</li> <li>CO 4. Create a Drawing views using CAD software.</li> <li>CO 5. Identify the interdisciplinary engineering components or systems through its graphical representation.</li> </ul>

  
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**Assessment Details (both CIE and SEE):**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks) and that for SEE minimum passing marks is 35% of the maximum marks (18 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE)**

- CIE shall be evaluated for max. marks of 100 and later the same shall be scaled-down to 50 marks as detailed below:
- CIE component should comprise of Continuous evaluation of Drawing work of students as and when the Modules are covered based on below detailed weightage.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Sketching (b)
Module 1	15	10	05
Module 2	20	15	05
Module 3	20	20	00
Module 4	20	20	00
Module 5	25	15	10
<b>Total</b>	<b>100</b>	<b>80</b>	<b>20</b>
<b>Consideration of Class work</b>		<b>Total of [(a) + (b)] = 100 Scaled down to 30 Marks</b>	

- At least one Test covering all the modules is to be conducted for 100 marks and evaluation to be based SEE pattern, and the same is to be scaled down to 20 Marks.
- The final CIE = Class work marks + Test marks

**Semester End Examination (SEE)**

- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it by 50%
- Question paper shall be set jointly by both Internal and External Examiner and made available for each batch as per schedule. *Questions are to be set preferably from TextBooks.*
- **Related to Module-1:** One full question can be set either from "points & lines" or "planes".
- Evaluation shall be carried jointly by both the examiners.
- Scheme of Evaluation: *To be defined by the examiners jointly and the same shall be submitted to the university along with question paper.*
- One full question shall be set from each of the Module from Modules 1,2,3 and 4 as per the below table weightage details. However, the student may be awarded full marks, if she completes solution on computer display without sketch.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Preparatory sketching (b)
Module 1	20	15	05
Module 2	30	25	05
Module 3	25	20	05
Module 4	25	20	05
<b>Total</b>	<b>100</b>	<b>80</b>	<b>20</b>
<b>Consideration of SEE Marks</b>		<b>Total of (a) + (b) ÷ 2 = Final SEE marks</b>	

**Suggested Learning Resources:****Text Books**

- *S.N. Lal, & T Madhusudhan*., Engineering Visulisation, 1<sup>st</sup> Edition, Cengage,Publication
- *Parthasarathy N. S., Vela Murali*, Engineering Drawing, Oxford University Press,2015.

**Reference Books**

- *Bhattacharya S. K.*, Electrical Engineering Drawing, New Age International publishers, second edition 1998. reprint2005.
- *Chris Schroder*, Printed Circuit Board Design using AutoCAD, Newnes,1997.
- *K S Sai Ram* Design of steel structures, , Third Edition by Pearson
- *Nainan p kurian* Design of foundation systems, Narosapublications
- *A S Pabla*, Electrical power distribution, 6th edition, Tata Mcgrawhill
- *Bhatt, N.D.*, *Engineering Drawing: Plane and Solid Geometry*, 53<sup>rd</sup> edition, Charotar Publishing House Pvt. Limited. 2019.
- *K. R. Gopalakrishna, & Sudhir Gopalakrishna*: Textbook Of Computer Aided Engineering Drawing, 39<sup>th</sup> Edition, Subash Stores, Bangalore,2017

**COs and POs Mapping (CO-PO mappings are only Indicative)**

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2			3	1		1	1	3		2
CO2	3	2			3	1		1	1	3		2
CO3	3	2			3	1		1	1	3		2
CO4	3	3			3	1	1		1	3		1
CO5	3	2			3				1	3		2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

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Course Title:	<b>Basic Electronics (For ECE and Allied Branches)</b>		
Course Code:	<b>BBEE103/203</b>	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

**Course objectives:** Students will be taught

- Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.
- Biasing circuits for transistor (BJT) as an amplifier.
- Study of linear Op-amps and its applications.
- Logic circuits and their optimization.
- Principles of Transducers and Communication.

### Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the functioning of various analog and digital circuits.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

### Module-1 (8 Hours)

**Semiconductor Diodes:** Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis (Text 1: 2.1,2.2,2.3,2.4)

**Diode Applications:** Introduction, Half Wave Rectification, Full Wave Rectification, Full Wave Rectifier Power Supply: Capacitor Filter Circuit, RC  $\pi$  Filter (includes numerical)  
(Text 1: 3.1,3.2,3.4,3.5)

**Zener Diodes:** Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulator. (Text1:2.9, 3.7)

### Module-2(8 Hours)

**Bipolar Junction Transistors:** Introduction BJT Voltages & Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, DC Load line and Bias point

(Text 1: 4.2, 4.3, 4.5,4.6, 5.1)

**Field Effect Transistor:** Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion Enhancement MOSFETs (Text 1: 9.1,9.2,9.5)

### Module-3(8 Hours)

**Operational Amplifiers:** Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol, Op-Amp parameters - Gain, input resistance, Output resistance, CMRR, Slew rate, Bandwidth, input offset voltage, Input bias Current and Input offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp configurations, Differential Amplifier, Inverting & Non Inverting Amplifier

**Op-Amp Applications:** Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator (Text 2: 1.1, 1.2, 1.3, 1.5, 2.2, 2.3, 2.4, 2.6, 6.5.1, 6.5.2, 6.5.3, 6.12, 6.13).

### Module-4(8 Hours)

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**Boolean Algebra and Logic Circuits:** Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 3: 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7)

**Combinational logic:** Introduction, Design procedure, Adders- Half adder, Full adder (Text 3: 4.1, 4.2, 4.3)

**Module-5(8 Hours)**

**Introduction to Transducers:** Introduction, Resistive Transducers, Inductive Transducers, Capacitive Transducers, Thermal transducers, Optoelectronic transducer, and Piezoelectric transducers (Text 4: Chapter 18: 18.1, 18.2, 18.3, 18.4, 18.5)

**Communications:** Introduction to communication, Communication System, Modulation (Text book 5: 1.1, 1.2, 1.3)

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to:

**CO1:** Develop the basic knowledge on construction, operation and characteristics of semiconductor devices. (Level: C3)

**CO2:** Apply the acquired knowledge to construct small scale circuits consisting of semiconductor devices (Level: C3)

**CO3:** Develop competence knowledge to construct basic digital circuit by make use of basic gate and its function. (Level: C3)

**CO4:** Construct the conceptual blocks for basic communication system. (Level: C3)

**CO5:** Apply the knowledge of various transducers principle in sensor system. (Level: C3)

**A. CO v/s PO Mapping Table**

Cos/P Os	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	3	3	2	-	2	2						
CO2	3	2	3	-	2	1						
CO3	3	2	3	-	3				1			
CO4	2	1	1	-	2	1			1			1
CO5	2	1	1	-	2	1			1			1

  
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**Assessment Details (both CIE and SEE)**

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**Continuous Internal Evaluation(CIE):**

Three Tests each of 20 Marks;

- 1<sup>st</sup>, 2<sup>nd</sup>. and 3<sup>rd</sup> tests shall be conducted after completion of the syllabus of 30-35%, 70-75%, and 90-100% of the course/s respectively.
- Assignments/Seminar/quiz/group discussion /field survey & report presentation/ course project/Skill development activities, suitably planned to attain the COs and POs for a total of 40 Marks.

If the nature of the courses requires assignments/Seminars/Quizzes/group discussion two evaluation components shall be conducted. If course project/field survey/skill development activities etc then the evaluation method shall be one.

Total CIE marks (out of 100 marks) shall be scaled down to 50 marks

**Semester End Examination(SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.


**Suggested Learning Resources:**

**Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)**

1. Electronic Devices and Circuits, David A Bell, 5<sup>th</sup> Edition, Oxford, 2016
2. Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4<sup>th</sup> Edition
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8
4. Electronic Instrumentation and Measurements (3rd Edition) – David A. Bell, Oxford University Press, 2013
5. Electronic Communication Systems, George Kennedy, 4<sup>th</sup> Edition, TMH

**Web links and Video Lectures (e-Resources):**

- <https://nptel.ac.in/courses/122106025>
- <https://nptel.ac.in/courses/108105132>
- <https://nptel.ac.in/courses/117104072>

  
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**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

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