Zeal Education Society's

ZEAL COLLEGE OF ENGINEERING & RESEARCH, PUNE – 41

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

NBA Accredited, NAAC Accredited with A+ Grade, ISO 21001:2018

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Curriculum Structure and Syllabus of

S.Y. B. Tech. – Electronics and Computer Engineering

(With effect from - Academic Year 2025 - 26)
(2024 Pattern)

VISION OF THE INSTITUTE

To be a premier institute in technical education by imparting academic excellence, research, social and entrepreneurial attitude.

MISSION OF THE INSTITUTE

- To achieve academic excellence through innovative teaching and learning process.
- To imbibe the research culture for addressing industry and societal needs.
- To inculcate social attitude through community engagement initiatives.
- To provide conducive environment for building the entrepreneurial skills.

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

VISION:

To emerge as a leading department in Electronics and Computer Engineering by imparting academic excellence, fostering innovation and research, and nurturing socially responsible and entrepreneurial professionals for sustainable technological growth.

MISSION:

M1: To facilitate quality education in Electronics and Computer Engineering through innovative pedagogy and hands-on learning.
M2: To foster research and development addressing real-world industrial and societal challenges.
M3: To instill ethical values and social responsibility through active community engagement.
M4: To create a conducive ecosystem for developing entrepreneurial skills and leadership Qualities using Industry-Academia Collaboration.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1: Graduates will establish themselves as professionals by applying core concepts of electronics and computer engineering to solve real-world problems.
PEO2: Graduates will adapt to emerging technologies through lifelong learning and pursue higher education, certifications, or entrepreneurship.
PEO3: Graduates will demonstrate ethical values, communication skills, and leadership qualities while working in multidisciplinary teams.

PROGRAM OUTCOMES (POs):

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3: **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Apply principles of electronics, signal processing, and embedded systems to develop hardware/software-based solutions.

PSO2: Design and implement computer engineering solutions involving databases, networking, and algorithms for real-time and data-centric applications.

PSO3: Integrate domain knowledge with modern tools and technologies to solve interdisciplinary engineering problems in IoT, automation, and intelligent systems.

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

LIST OF ABBREVIATIONS

Abbreviation	Description
BSC	Basic Science Course
ESC	Engineering Science Course
PCC	Program Core Course
PEC	Program Elective Course
MDM	Multidisciplinary Minor
OE	Open Elective - Other than a particular program
VSEC	Vocational and Skill Enhancement Course
AEC	Ability Enhancement Course
ENTR	Entrepreneurship
EC	Economics
MC	Management Courses
IKS	Indian Knowledge System
VEC	Value Education Courses
RM	Research Methodology
CEP	Community Engagement Project
FP	Field Project
PROJ	Project
INT	Internship
OJT	On Job Training
CC	Co-curricular Courses
HSSM	Humanities Social Science and Management
ELC	Experiential Learning Course
B. Tech	Bachelor of Technology
L	Lecture
P	Practical
T	Tutorial
H	Hours
CR	Credits
CIE	Continuous Internal Evaluation
ETE	End Term Evaluation
TW	Term Work
OR	Oral
PR	Project

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Second Year B. Tech. – Electronics and Computer Engineering: Semester - III

Course Code	Course Type	Course Name	Teaching Scheme (hrs/Week)							Evaluation Scheme					
			L	P	T	H	CR			CIE	ETE	TW	PR	OR	Total
							TH	PR/Tut	Total						
ECPC302	PCC	Digital Systems Design & Applications	3	2	-	5	3	1	4	40	60	-	50	-	150
ECPC303	PCC	Data Structure and Algorithms	3	2	-	5	3	1	4	40	60	-	-	25	125
ECPC304	PCC	Computer Organization and Architecture	3	-	-	3	3	-	3	40	60	-	-	-	100
ECMD301	MDM	Engineering Mathematics III	3	-	-	3	3	-	3	40	60	-	-	-	100
ALOE301	OE	Open Elective – I#	2	-	-	2	2	-	2	40	60	-	-	-	100
ECMC301	HSSM-MC	Project Management System – I	-	2	-	2	-	1	1	-	-	25	-	-	25
ECVS303	VSEC	Problem Solving Technique – I	-	2	-	2	-	1	1	-	-	25	-	-	25
ECCE301	CEP	Project Based Learning	-	2	-	2	-	1	1	-	-	25	-	-	25
ECVS304	VSEC	Electronics Workshop	-	2	-	2	-	1	1	-	-	25	-	-	25
ECIN302	ELC - INT	Internship – II	4 Weeks				-	2	2	-	-	25	-	-	25
Total			**14**	**12**	**-**	**26**	**14**	**8**	**22**	**200**	**300**	**125**	**50**	**25**	**700**

# - Select any one course from the given Open Elective Courses		
Course Code	**Course Type**	**Open Elective - I**
ALOE301A	OEC	Digital Literacy and Applications
ALOE301B		Environmental Studies
ALOE301C		Green Energy and Sustainability
ALOE301D		Basics of Consumer Electronics
ALOE301E		Renewable Energy Systems

BoS Chairman

ZES's Zeal College of Engineering & Research PU/PN/Engg./285/2007 Narhe, Pune-41

Director
ZES's Zeal College of Engineering & Research Narhe, Pune - 411041.

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Second Year B. Tech. – Electronics and Computer Engineering: Semester - IV

Course Code	Course Type	Course Name	Teaching Scheme (hrs/Week)							Evaluation Scheme					
			L	P	T	H	CR			CIE	ETE	TW	PR	OR	Total
							TH	PR/Tut	Total						
ECPC405	PCC	Database Management	3	2	-	5	3	1	4	40	60	-	-	25	125
ECPC406	PCC	Communication Systems	3	2	-	5	3	1	4	40	60	-	-	25	125
ECPC407	PCC	Object Oriented Programming	3	2	-	5	3	1	4	40	60	-	25	-	125
ECMD402	MDM	Sensors and Applications	3	-	-	3	3	-	3	40	60	-	-	-	100
ALOE402	OE	Open Elective – II#	2	-	-	2	2	-	2	40	60	-	-	-	100
ECMC402	HSSM-MC	Quality Management System – II	-	2	-	2	-	1	1	-	-	25	-	-	25
ECAE402	AEC	Problem Solving Technique – II	-	2	-	2	-	1	1	-	-	25	-	-	25
ECVS405	VSEC	Python Programming	-	2	-	2	-	1	1	-	-	-	-	50	50
ECIN403	ELC - INT	Internship – III	4 Weeks				-	2	2	-	-	25	-	-	25
Total			**14**	**12**	**-**	**26**	**14**	**08**	**22**	**200**	**300**	**75**	**25**	**100**	**700**

# - Select any one course from the given Open Elective Courses		
Course Code	**Course Type**	**Open Elective - II**
ALOE402A	OEC	Cyber Security and Laws
ALOE402B		Sustainability and Climate Change
ALOE402C		Energy Audit and Electrical Safety
ALOE402D		Digital Marketing
ALOE402E		Entrepreneurship and Innovations

BoS Chairman

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

INDEX

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

SYLLABUS

SEMESTER - III

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Digital Systems Design & Applications								**Code:** ECPC302	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	02	-	04	40	60	-	-	50	150

Prerequisites:

Number systems (binary, decimal), basic concepts of electricity and circuits, Boolean algebra for logic operations, and fundamental knowledge of electronic components.

Course Objectives:

1. To provide foundational knowledge in combinational and sequential digital logic circuit design.
2. To enable students to analyze, design, and implement state machines and programmable logic devices.
3. To introduce modern digital design techniques using PLDs, FPGAs, and hardware description languages like Verilog.

Course Outcomes: After completion of this course, students will able to -

CO1	Design and implement combinational circuits using digital components.
CO2	Explain flip-flops, shift registers, and counters in circuits.
CO3	Analyze and design FSMs, implement sequence detectors.
CO4	Design circuits using ROM, PLA, PAL and understand applications.
CO5	Apply digital logic using ROMs, CPLDs, and FPGAs.
CO6	Gain VLSI knowledge, understand Verilog and FPGA architecture.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Combinational Circuit Design:** Digital Codes: Binary, BCD, Grey, Excess-3. Code Conversions: Binary to Grey, BCD to Excess-3 and its applications. Half and Full Adder, Half & Full Subtractor, Digital Comparator, Digital Comparator with multiple inputs, Realization of Boolean functions using Multiplexer/ demultiplexer, Parity generator and checker (Even & Odd).	07
2.	**Sequential Circuit Design:** Flip-Flops: SR, JK, D, T flip-flops, Preset & Clear operations, Truth Tables and Excitation Tables. Conversion of flip flops, Typical data sheet specifications of Flip flop, application of Flip flops. Registers: Buffer registers, Shift registers (SISO, SIPO, PISO, PIPO) Counters: Asynchronous and Synchronous Counters, Ring counter, Johnson counter, Modulus counter (IC 7490), Pulse train generator.	07

3.	**State Machines:** Basic design steps- State diagram, State table, State reduction, State assignment, Mealy and Moore machines representation, Implementation, finite state machine implementation, Sequence detector. Introduction to Algorithmic state machines- construction of ASM chart and realization for sequential circuit.	07
4.	**Programmable Logic Devices:** Programmable Logic Devices (PLD): Introduction to PLDs: ROM, PLA, PAL, Designing Combinational Circuits using PLDs, Applications of PLDs in digital circuit design.	07
5.	**Applications of Digital Circuits:** Introduction to Digital Circuits - Design of Sequence Detector, Design of Iterative circuit (Comparator), Design of sequential circuits using ROM & PLAs, CPLDs & FPGAs, Serial adder with Accumulator.	07
6.	**Introduction VLSI:** Introduction to VLSI, Introduction to Hardware description languages (Verilog), Verilog Concepts, Basic concepts-Modules & ports & Functions, useful modeling techniques, Introduction to FPGA Architecture.	07
	TOTAL	**42**

List of Experiments:

Perform a total of 8 experiments out of the 12 listed below:

- **Select any 6 experiments from Group A**
- **Select any 2 experiments from Group B**

Group A

1. Design and implement code converters- Binary to Gray and BCD to Excess-3
2. Design and implement of Half Adder/ Full Adder using a) Basic Gates b) Universal Gates
3. Realization of Boolean function using Multiplexer 74151/74153, Demultiplexer 74154 / 74138.
4. Design and implementation of 1-bit comparator and 2-bit comparator
5. Design and implementation of parity generator
6. Verify characteristic tables of SR, JK, D & T Flip-flop
7. Design and implementation of Asynchronous/synchronous 3-bit counter using D flip-flop
8. Design and implement of Sequence generator/ detector using JK flip-flop
9. Design and implement MOD-10 counter using IC7490

Group B

1. Implement a digital circuit using FPGA (Blinking LED using Simple Timer Circuit or 4-bit Binary Counter)
2. Building Combinatorial Circuit Using Data Flow Modeling Lab (https://download.ni.com/pub/gdc/tut/dataflow_lab.pdf)
3. Study modeling techniques for efficient circuit design in Verilog.

Text Books :

1. M. Morris Mano, Michael D. Ciletti, "Digital Logic and Computer Design" , Pearson Education / Prentice Hall
2. R. P. Jain , "Modern Digital Electronics" , McGraw Hill Education

Reference Books:

1. Donald P. Leach, Albert Paul Malvino, and Goutam Saha, "Digital Principles and Applications", Tata McGraw-Hill.
2. Ramesh Gaonkar, "Microprocessor Architecture, Programming, and Applications with the 8085", Pearson Prentice Hall.
3. Muhammad Ali Mazidi, Janice Mazidi, and Rolin McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson India / Prentice Hall PTR.
4. M. Morris Mano and Michael D. Ciletti, "Digital Design: With an Introduction to the Verilog HDL", Pearson / Pearson Prentice Hall.

E-Resources:

1. **Combinational Circuit Design,** [Neso Academy – Combinational Logic Playlist (YouTube)] https://www.youtube.com/playlist?list=PLBlnK6fEyqRhX6r2uhhlubuF5QextdCSM
2. **Sequential Circuit Design,** [NPTEL Course: Digital Circuits – IIT Madras] https://nptel.ac.in/courses/117/106/117106086/
3. **FSM and ASM Design,** [GeeksforGeeks – Finite State Machines Explained] https://www.geeksforgeeks.org/finite-state-machine-types-design-working-and-applications/
4. **Programmable Logic Devices (PLDs),** [TutorialsPoint – Programmable Logic Devices (ROM, PLA, PAL)] https://www.tutorialspoint.com/digital_circuits/digital_circuits_programmable_logic_devices.htm
5. **Applications of Digital Circuits,** YouTube – Sequence Detector using Verilog
6. **Introduction to VLSI & Verilog,** HDLBits – Verilog Practice Problems (Beginner to Advanced)] https://hdlbits.01xz.net/wiki/Main_Page

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Data Structures and Algorithms								**Code:** ECPC303	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	02	-	04	40	60	-	25	-	125

Prerequisites: Fundamental knowledge of C programming.

Course Objectives:

1. To introduce fundamental concepts, types, and operations of data structures with attention to time and space complexity.
2. To develop the ability to design and implement various data structures like arrays, linked lists, stacks, queues, trees, and graphs.
3. To enhance problem-solving skills using efficient algorithms for searching, sorting, and graph traversal techniques

Course Outcomes: After completion of this course, students will be able to -

CO1	Explain data structures, classifications, operations, and analyze algorithm complexity.
CO2	Compare sorting and searching algorithms based on time complexity.
CO3	Design and perform operations on arrays and linked lists.
CO4	Implement stack, queue using arrays, lists in applications.
CO5	Construct and manipulate binary and AVL trees with traversals.
CO6	Apply graph techniques and algorithms for graph-based problems.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Data Structure:** Concept, Types of data structures, Common operations on data structures, Complexities, Time Complexity, order of Growth, Asymptotic Notation.	07
2.	**Sorting and Searching Techniques:** Sorting and Searching techniques: Introduction, Sorting, Insertion Sort, Selection Sort, Bubble Sort, Merge-Sort, Linear search and Binary Search.	07
3.	**Linear Array and Linked List:** **Linear Arrays:** Introduction, Linear Arrays, Representation of Linear array in Memory, Traversing Linear Arrays, Insertion and deletion, 2D & Multi-dimensional Array, Sparse matrix. **Linked List:** Introduction to Linked Lists, Representation of Linked Lists in Memory, Traversing a Linked List, Searching a Linked List, Insertion into a Linked List, Deletion from a Linked List, Circularly Linked Lists, Doubly Linked Lists.	07

4.	**Stacks, and Queues in Data Structures:** **Stacks:** Introduction, Stacks, Array Representation of Stacks, Linked Representation of Stacks, Arithmetic Expression; Polish Notation, Recursion, Towers of Hanoi, **Queue:** Introduction, Linked Representation of Queues, Circular Queues, De-queue, Priority Queues	07
5.	**Trees in Data Structures:** **Trees:** Basic terminology. Binary Tree: Properties of a Binary Tree, ADT Binary trees and its representations. **Operations:** Insert, Delete & **Traversal:** Preorder, In order, Post order, **Binary Search Trees:** Searching and Inserting in Binary Search Trees, Deleting in a Binary Search Tree, Balanced Binary Trees, **AVL Search Trees:** Insertion in an AVL Search Tree, Deletion in an AVL Search Tree.	07
6.	**Graphs Theory in Data Structures:** **Graphs:** Introduction to graphs, Graph Theory Terminology, Sequential Representation of Graphs, Adjacency Matrix; Path Matrix, Linked Representation of a Graph, Operations on Graphs, Traversing a Graph, BFS and DFS, Spanning Trees, Minimum Spanning Trees Kruskal's and Prim's algorithm, Dijkstra's algorithm.	07
	TOTAL	**42**

List of Experiments:

Perform any 08 experiment out of 10:

1. Write a C program to implement a linear search and Binary Search for a given array.
2. Write a C program to arrange the list of students according to roll numbers in ascending order using 1) Bubble Sort 2) Insertion sort
3. Write a C program to implement a sparse matrix with operations like initialize empty sparse matrix, insert an element, sort a sparse matrix on row-column, transpose a matrix, etc.
4. Write a C program to develop a hash table to implement hashing. **(Content Beyond Syllabus)**
5. Write a C program to write functions to 1) Add and delete the nodes in a linked list. 2) Compute total number of nodes in the linked list 3) Display list in reverse order using recursion.
6. Write a C program to implement stack using a linked list and perform evaluation of a postfix expression using stack.
7. Write a C program to implement queue operations.
8. Write a C program to implement tower of hanoi using recursion.
9. Write a C program to implement tree traversal.
10. Write a C program to implement graph traversal.
11. **Perform at least one practical using virtual lab (VLab). (Compulsory)**

Text Books:

1. Seymour Lipschutz, "Schaum's Outline of Data Structures", McGraw-Hill Companies Incorporated.
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Addison-Wesley, 1983.
3. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", University Press, Second Edition, 2008.

Reference Books:

1. Alfred V. Aho, Jeffrey D. Ullman, "Data Structures & Algorithms", 1st Edition, Pearson.
2. Michael T. Goodrich, Roberto Tamassia, David M. Mount, "Data Structures and Algorithms in Java", 5th Edition, Wiley, 2010.

E-Resources:

NPTEL Course:

1. https://nptel.ac.in/courses/106/102/106102064/
2. http://cse01-iiith.vlabs.ac.in/
3. https://ds2-iiith.vlabs.ac.in/data-structures-2/

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Computer Organization and Architecture								**Code:** ECPC304	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites: Basics of computer systems

Course Objectives:

1. Understand computer evolution, components, interconnections, buses, and apply binary arithmetic on signed and unsigned numbers.
2. Understand CPU operations and compare RISC and CISC architectures.
3. Analyze hardwired control unit design and control unit functions.
4. Design memory systems considering trade-offs and performance.
5. Analyze pipelining for efficient instruction execution with minimal hazards.
6. Explain I/O transfer techniques and the operation of various I/O peripherals.

Course Outcomes: After completion of this course, students will able to -

CO1	Understand the structure, function, and characteristics of computer systems.
CO2	Describe the function of the Central Processing Unit and RISC and CISC Architecture.
CO3	Explore the knowledge about Control Unit Design.
CO4	Analyze trade-offs and performance issues.
CO5	Apply a pipeline for consistent execution of instructions.
CO6	Discuss the working mechanisms of various I/O peripherals

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Computer Evolution & Arithmetic:** Organization & Architecture, Structure & Function, Integer Representation: Fixed point & Signed numbers. Integer Arithmetic: 2's Complement arithmetic, multiplication, Booth's Algorithm, Division Restoring Algorithm, Non-Restoring algorithm.	07
2.	**Processor Design:** CPU Architecture, Register Organization, Instruction types, Types of operands, Types of operation, Instruction formats, Addressing modes and address translation. Instruction cycles. RISC Processors: RISC- Features, CISC Features, Comparison of RISC & CISC Processors. Comparison between Harvard and Von Neumann Architecture Case study of Processor: Von Neumann Architecture.	07

3.	**Control Unit:** Fundamental Concepts: Single Bus CPU organization, register transfers, performing an arithmetic/ logic operation, fetching a word from memory, storing a word in memory, Execution of a complete instruction. Micro-operations, Types of Control Unit, Hardwired Control, Micro-programmed Control: Microinstructions.	07
4.	**Memory Organization:** Need, Hierarchical memory system, Characteristics, Size, Access time, Read Cycle time and address space. Main Memory Organization: ROM, RAM, EPROM, E2PROM, DRAM, Cache memory Organization, Cache Mapping techniques: Direct, Set Associative, Fully Associative.	07
5.	**Pipelining:** Data hazards: operand forwarding, handling data hazards in software, side effects. Instruction hazards: unconditional branches, conditional branches, and branch prediction. Performance considerations: effect of instruction hazards, number of pipeline stages.	07
6.	**I/O Organization:** Input/output systems, I/O Transfer Techniques: Program-controlled, Interrupt-Driven, DMA controlled synchronous, asynchronous, working mechanisms of peripherals: keyboard, video displays, touch screen panel, printers	07
	TOTAL	**42**

Text Books :

1. William Stallings, "Computer Organization and Architecture: Designing for Performance", 7th Edition, Pearson Prentice Hall Publication.
2. C. Hamacher, V. Zvonko, S. Zaky, "Computer Organization", 5th Edition, Tata McGraw Hill Publication.
3. Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill.

Reference Books:

1. Hwang and Briggs, "Computer Architecture and Parallel Processing", Tata McGraw Hill Publication.
2. A. Tanenbaum, "Structured Computer Organization", Prentice Hall Publication, 4th Edition.

E-Resources:

1. www.nptelvideos.in
2. www.geeksforgeeks.org
3. www.udemy.com

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Engineering Mathematics – III								**Code:** ECMD301	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites:

First order and first degree differential equations, calculus and vector differentiation.

Course Objectives:

1. To familiarize students with higher-order differential equations, transforms, statistics, probability, and vector calculus concepts.
2. To equip students with mathematical techniques to enhance analytical thinking and solve discipline-specific problems.

Course Outcomes: After completion of this course, students will able to -

CO1	Solve higher-order differential equations and model electrical circuits.
CO2	Analyze data using statistical and probability concepts.
CO3	Apply Z-transform concepts in digital signal processing.
CO4	Understand Laplace transform and use it in applications.
CO5	Evaluate Fourier transforms and apply in signal processing.
CO6	Apply vector integral calculus in electromagnetic field problems.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Linear Differential Equations:** Linear Differential Equations (LDE) of nth order with constant coefficients, Method of variation of parameters, Cauchy's and Legendre's D.E., Simultaneous DE and applications of differential equations to electric circuits.	07
2.	**Statistics and Probability:** Measures of central tendency, Measures of dispersion, Moments, Skewness and Kurtosis, Correlation and Regression. Definition and theorems on Probability, Probability Distributions: Binomial distribution Poisson distribution, Normal distribution, Test of Hypothesis: Chi-Square test.	07
3.	**Z- Transforms:** Definition, Properties of Z-transform, Z- transform of Standard Sequences. Inverse, Z-transform, Solution of difference equation by Z-transform.	07
4.	**Laplace Transform:** Definition and properties of Laplace transform, Inverse Laplace transform,	07

	Applications of Laplace transform to solve differential equation.	
5.	**Fourier Transforms:** Fourier Transform (FT): Complex Exponential Form of Fourier Series, Fourier Transform, Inverse Fourier Transform, Fourier Sine transform, Fourier Cosine transform, Inverse Fourier Sine Transform, Inverse Fourier Cosine Transform.	07
6.	**Vector Integral Calculus & Applications:** Line integral, Work done, Green's Lemma, Gauss's Divergence Theorem, Stroke's theorem. Applications of vector integral calculus in Electro-magnetic field.	07
	TOTAL	**42**

Text Books :

1. B.S. Grewal, "Higher Engineering Mathematics", 40th Edition, Khanna Publishers, Delhi, 2008.
2. P. N. Wartikar, J.N. Wartikar, "Applied Mathematics, Volumes I and II", Pune Vidyarthi Griha Prakashan, Pune.
3. H.K. Das, "Higher Engineering Mathematics", S. Chand Publication.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley Publications, 2015.
2. Sheldon M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 5th Edition, Elsevier Academic Press.
3. B.V. Raman, "Engineering Mathematics", Tata McGraw-Hill.
4. C.R. Wylie, L.C. Barrett, "Advanced Engineering Mathematics", McGraw-Hill, Inc.
5. Thomas L. Harman, James Dabney, Norman Richert, "Advanced Engineering Mathematics with MATLAB", 2nd Edition, Brooks/Cole, Thomson Learning.
6. Joel Hass, Christopher Heil, "Calculus", 11th Edition, Pearson, 2016. (Assumed based on partial information—please confirm if it's "Calculus, 11th Edition").

E-Resources:

1. NPTEL Course "Transform Calculus and its Applications in Differential Equations" https://nptel.ac.in/courses/111/105/111105123/
2. NPTEL Course "Probability Theory and Applications" https://nptel.ac.in/courses/111/104/111104079/

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)						**Semester:** III			
Course: Project Management System – I						**Code:** ECMC301			
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Interactive mind-set for practical.

Course Objectives:

1. To acquire basic knowledge of Problem-solving techniques.
2. To understand the structured way of solving problems with the right tools.

Course Outcomes: After completion of this course, students will be able to -

CO1	Know the project and its importance.
CO2	Understand the structured way of project execution process.
CO3	Understand on how to project, goals and timeline.
CO4	Know the key principles of project management.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Project & Management System:** What is a project, What is Project Management, Types, Importance and its benefits.	06
2.	**Project Management Process:** Planning, Execution, Monitoring & Control, Deliverables, Stakeholders.	06
3.	**Principles:** 12 Principles of Project Management.	16
	TOTAL	**28**

Text Books:

1. K. Nagarajan, "Project Management", New Age International Publishers.
2. Joseph Heagney**,** "Fundamentals of Project Management", AMACOM.
3. Harold Kerzner**,** "Project Management: A Systems Approach to Planning, Scheduling, and Controlling", Wiley.

Reference Books:

1. "A Guide to the Project Management Body of Knowledge (PMBOK Guide)", Project Management Institute.
2. BB Goel, "Project Management: Principles and Techniques", Deep & Deep Publications Pvt. Ltd.

E-Resources:

1. Dr. Nimisha Singh, "Introduction to Project Management: Principles & Practices", NPTEL Course - https://onlinecourses.swayam2.ac.in/imb25_mg167/preview
2. Prof. Raghu Nandan Sengupta, "Project Management", NPTEL Course - https://onlinecourses.nptel.ac.in/noc25_mg78/preview

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Problem Solving Techniques – I								**Code:** ECVS304	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Interactive mind-set for practical.

Course Objectives:

1. To acquire basic knowledge of Problem-solving techniques.
2. To understand the structured way of solving problems with the right tools.

Course Outcomes: After completion of this course, students will be able to -

CO1	Know the problem and types of problem.
CO2	Understand the structured way of solving a problem.
CO3	Understand the basic tools and its application.
CO4	Apply the learning to solve simple problem cases as a team.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Problem Understanding:** Define problem, Types of Problem, What is problem solving? Structured way of Problem solving – Step by Step.	06
2.	**Problem Solving Approach:** Structured step by step working model, Principles to think and apply.	06
3.	**Basic Tools for Problem Solving:** Knowing the tools and applying the right tools at the right step of problem solving, Problem solving case study.	16
	TOTAL	**28**

Text Books:

1. M.T. Somashekara, "Problem Solving and Programming Concepts", PHI Learning.
2. Dheeraj Sharma, "Problem Solving and Decision Making", McGraw-Hill Education.

Reference Books:

1. Willian Henderson, "Master Critical Thinking, Creative, Logic & Problem solving skills", Peak Publish LLC.
2. Sharma Narender, "Handbook 7 QC tools", Shakehand with Life.

E-Resources:

1. Coursera: "Creative Problem Solving" - https://www.coursera.org/learn/creative-problem-solving.
2. MindTools – "Problem Solving Techniques", https://www.mindtools.com/cx4ems0/problem-solving.

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Project Based Learning								**Code:** ECCE301	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Basic idea of report writing, fundamental knowledge of electronics and software languages is required

Course Objectives:

1. To highlight long-term, multidisciplinary, and student-centered project-based learning activities.
2. To foster both individual and group learning by using the tools at hand to solve real-world problems.
3. To be able to create applications based on the principles of telecommunication and electronics engineering, sometimes using previously learned material.
4. To gain hands-on experience in all phases of the electrical system development life cycle, including design, implementation, testing, and specification.
5. To be able to develop and assess the suggested system using the right hardware and software tools.
6. To provide each student the chance to participate, either alone or in a group, in orders to foster professionalism and teamwork.

Course Outcomes: After completion of this course, students will able to -

CO1	Recognize a significant real-world issue, potentially involving multiple disciplines, by conducting a comprehensive literature review, and design appropriate aims and objectives to guide the project.
CO2	Use of ethical practices and safety standards consistently while implementing a solution that offers meaningful societal benefits.
CO3	Develop an innovative solution rooted in electronics and telecommunication engineering by combining foundational concepts with existing knowledge and practical experience.
CO4	Implement appropriate technologies in the project and present your understanding and learning through both verbal explanations and written reports.
CO5	Develop both independent working skills and effective teamwork capabilities to contribute meaningfully in various collaborative settings.
CO6	Differentiate between individual and group roles by examining responsibilities in collaborative tasks, and organize personal contributions to enhance overall team performance.

Group Structure:

Working in supervisor/mentor –monitored groups. The students plan, manage and complete a task/project/activity which addresses the stated problem.

1. **Create groups of 5 (five) to 6 (six) students in each class**.

Project Selection:

Analyse the problem, design, and determine the values of the components. Survey through journals, patents, or field visits (a problem can be theoretical, practical, social, technical, symbolic, cultural, and/or scientific). There are no widely accepted standards for what makes a project acceptable. Projects differ substantially in terms of the activity's substance and structure, the clarity of the learning objectives, and the depth of the questions examined. It is advised to use the problem-based, project-oriented learning methodology. The concept starts with the identification of an issue, which frequently develops from a query or "wondering." The learning process then begins with this problem formulation.

A dilemma arises from students' curiosity in various academic fields and professional settings and might be theoretical, practical, social, technical, symbolic, cultural, and/or scientific. The project topic may be interdisciplinary in view, as indicated in the preamble, since electronics serves as a crucial foundation for other fields (computer science, signal processing, and communications). Although, the selected challenge needs to use the principles of electronics and telecommunication engineering. Electronic components must make up at least 40% of the project's overall established system setup. However, in an actual instance, a project topic that is entirely software-based might be permitted.

Effective Documentation:

Effective writing skills must be taught to students in order for our engineering graduates to be able to provide documentation that works. The literature review, problem statement, aim and objectives, system block diagram, system implementation details, discussion and analysis of the results, conclusion, system limitations, and future scope are all intended to be included in the DSP final report. The creation of the DSP synopsis and final report is anticipated to involve the usage of numerous publicly accessible software tools, such as Medley (Elsevier) and Grammerly. It is anticipated that DSP mentors and guides will instruct students on how to use reliable sources of knowledge on their DSP topic, including books, magazines, and reference papers.

Evaluation & Continuous Assessment:

The organization, leader, or mentor is dedicated to analysing and evaluating program efficacy as well as student success. Course progress is routinely tracked every week. The work needs to be reviewed once a week. Individual and team performance must be measured throughout the monitoring, ongoing assessment, and evaluation process. Authorities and supervisors/mentors oversee the course content and do ongoing evaluations. Students are required to uphold an institutional culture that values genuine teamwork, self-motivation, think, learn and share peer learning processes, and individual accountability. Through guidance and orientation programs, as well as the provision of suitable resources and services, the department or institution should assist students in this respect. Students and their supervisors/mentors must actively engage in the assessment and evaluation procedures. It is advised that all activities be routinely and legally documented.

Recommended parameters for assessment, evaluation and weightage:

1. Idea Inception (kind of survey). (10%)
2. Outcome (Participation/ publication, copyright, patent, product in market). (50%)
3. Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents). (15%)

4. Attended reviews, poster presentation and model exhibition. (10%)
5. Demonstration (Poster Presentation, Model Exhibition etc.) (10%).
6. Awareness /Consideration of - Environment/ Social /Ethics/ Safety measures/Legal aspects. (5%)

Reference Books and Research Articles :

1. John Larmer, John R. Mergendoller, and Suzie Boss, "Setting the Standard for Project Based Learning".
2. John Larmer and Suzie Boss, "Project Based Teaching: How to Create Rigorous and Engaging Learning Experiences".
3. Erin M. Murphy and Ross Cooper, "Hacking Project Based Learning: 10 Easy Steps to PBL and Inquiry".
4. M. Krašna, "Project based learning (PBL) in the teachers' education," 39th International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO), Opatija, 2016, pp. 852-856, doi: 10.1109/MIPRO.2016.7522258.
5. J. Macias- Guarasa, J.M. Montero, R. San-Segundo, A. Araujo and O. Nieto-Taladriz, "A project based learning approach to design electronic systems curricula", IEEE transactions on Education, vol.49, no. 3, pp. 389-397, Aug. 2006, doi: 10.1109/TE.2006.879784.

E-Resources:

1. Project-Based Learning, Edutopia, March 14, 2016. https://www.edutopia.org/project-based-learning
2. www.howstuffworks.com.
3. Condliffe, Barbara. "Project-Based Learning: A Literature Review. Working Paper." MDRC (2017). https://eric.ed.gov/?id=ED578933
4. Activity-Based Learning. https://genevaglobal.com/wp-content/uploads/2021/10/Activity-Based-Learning.GenevaGlobal.2021-07.pdf

NPTEL Resources:

1. Problem Based Learning by Dr. Indrajit Saha, National Institute of Technical Teachers Training and Research, Kolkata**.**

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Electronics Workshop								**Code:** ECVS304	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	02	-	-	25	-	-	25

Prerequisites: Basics Electronics and Electrical Engineering

Course Objectives:

1. Familiarize students with electronic simulator tools.
2. Enable practical understanding of error analysis, bridge circuits, and waveform measurements.
3. Introduce sensors and transducers used in automation systems.

Course Outcomes: After completion of this course, students will able to -

CO1	Apply basic MATLAB commands for matrix operations and plotting.
CO2	Implement fundamental electronic circuit components using Multisim.
CO3	Understand microcontroller architecture and basic programming.
CO4	Create and edit PCB layouts.
CO5	Develop and modify PCBs.

Course Contents:

List of Experiments:

Perform any 02 experiment from each group. :

Group A :

1. Introduction to Matlab
2. Operations on Matrix using Matlab
3. Generation of sine, square, triangular, and sawtooth waveforms using Matlab
4. Time Domain Convolution of two signals using Matlab

Group B :

5. Introduction to Multisim
6. RC, RL, RLC Transient Analysis using Multisim
7. Common Emitter AMPLIFIER design using Multisim
8. Op amp applications using Multisim

Group C :

9. Introduction to Proteus
10. Basic Microcontroller Applications such as LED blinking
11. Sensor Interfacing

Group D :

12. Introduction to PCB software
13. Schematic and PCB layout Design
14. To study PCB Etching Process

Text Books :

1. H. Moore, "MATLAB for Engineers", Pearson, 2018.
2. H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 2010.
3. D. Báez-López and F. Guerrero-Castro, "Circuit Analysis with Multisim", Wiley, 2016.
4. C. Schroeder, "PCB Design for Real-World Design Engineers", Springer International Publishing AG, 2011.

Reference Books:

1. R. L. Boylestad, "Introductory Circuit Analysis", Pearson, 2016.
2. S. R. Gundala, "Microcontroller Programming and Interfacing Using Proteus", Laxmi Publications, 2019.
3. B. R. Hunt, R. Lipsman, and J. M. Rosenberg, "A Guide to MATLAB", 6th ed., Cambridge University Press, 2014..

E-Resources:

1. Multisim Download - NI
2. PCB Tutorial Videos - Learn how to use Proteus EDA Tools
3. MATLAB Onramp (Free introductory course) https://matlabacademy.mathworks.com/

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** III	
Course: Internship – II								**Code:** ECIN302	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	-	-	02	-	-	25	-	-	25

Preamble:

Internships serve as vital educational and career development experiences, offering practical exposure in a specific field. Employers seek individuals who possess the necessary skills and an understanding of industry environments, practices, and cultures. This internship is designed as a structured, short-term, supervised training program, often centered on specific tasks or projects with clear timelines. The primary goal is to immerse technical students in an industrial setting, providing experiences that cannot be replicated in the classroom. This exposure aims to develop competent professionals who understand the social, economic, and administrative factors influencing the operations of industrial organizations.

Course Objectives:

1. Exposure to students to the industrial environment, which cannot be provided in the classroom and hence creating deployable professionals for the industry.
2. Learn to implement the technical knowledge in real industrial situations.

Course Outcomes: After completion of this course, students will be able to -

CO1	Gain exposure to industry practices and understand how academic concepts are applied in professional settings.
CO2	Develop and demonstrate effective communication and teamwork skills within a work environment.
CO3	Improve your problem-solving and time management skills by working in real-world industry settings.

Internship Requirements

1. **Internship Duration:** It is mandatory for all students to undergo an internship after every semester during vacations for the duration of 4 weeks. Internships completed during this period will be considered for the assessment of Term Work (TW).
2. **Internship Opportunities:** Students can explore various opportunities for internships at:
    a. Industries
    b. Research labs or organizations
    c. Collegiate clubs
    d. In-house research projects
    e. Online internships
3. **Support and Assistance:** Students can seek assistance for securing internships from:
    a. The Training and Placement cell, along with departmental coordinators
    b. Department or institute faculty members
    c. Personal contacts
    d. Directly connecting with industries or organizations

4. **Request Letter:** Once an industry, research organization, or collegiate club is identified, students must obtain a request letter from the concerned department or placement office. This letter, in the standard format must be duly signed by the authority, should be addressed to the HR manager or relevant authority.
5. **Confirmation Letter:** Students must submit the confirmation letter from the industry, research organization, or collegiate club to the Internship Coordinator and the Head of Department (HOD) office.
6. **Joining Report:** Upon commencing the internship, students must submit the joining report, joining letter, or a copy of the confirmation email to the Internship Coordinator and the HOD office.
7. **Faculty Mentor:** A faculty member will be assigned as a mentor to a group of students. The mentor will be responsible for monitoring, evaluating, and assessing student internship activities. The faculty mentor is also required to visit the internship location and submit formal feedback to the Internship Coordinator.
8. **Faculty Visits:** Faculty members are advised to visit the internship site once or twice during the internship period to monitor progress.
9. **Progress Report:** Students must submit progress report fortnightly to their faculty guide and the final internship report to the Internship Coordinator and department office.
10. **Evaluation Report:** After the completion of the internship, the mentor, along with the assessment panel members, should submit the evaluation report of the students to the department office and the Internship Coordinator.
11. **Internship Certificate:** Students must receive the Internship Certificate from the industry and submit it to the Internship Coordinator and department office.
12. **Presentation and Assessment:** Students are required to give a presentation on their internship work as part of the term work. The internship diary and report will also be verified and assessed.

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

SYLLABUS

SEMESTER - IV

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** IV	
Course: Database Management								**Code:** ECPC405	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	02	-	04	40	60	-	25	-	125

Prerequisites:

Basic knowledge of data structures, computer programming and digital logic

Course Objectives:

1. To introduce the fundamentals of database systems and relational data models.
2. To explore database design through ER models and normalization techniques.
3. To develop skills in SQL for data definition and manipulation.
4. To understand database management concepts such as transactions, concurrency, and recovery.
5. To integrate electronics engineering data (like sensor data, embedded logs) into databases and manage real-time data effectively.

Course Outcomes: After completion of this course, students will able to -

CO1	Understand basic database concepts, architecture, and data models.
CO2	Design an ER model and convert it into relational schema.
CO3	Apply SQL for data definition, manipulation, and querying.
CO4	Apply database schemas to eliminate redundancy.
CO5	Understand transaction management, concurrency control, and recovery techniques.
CO6	Design and implement applications related to electronics data processing.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Databases and Data Models:** Characteristics of Database Approach, Advantages over file systems, Database users and DBMS architecture, Data models: Hierarchical, Network, Relational, Object-oriented, Applications of DBMS.	07
2.	**Entity-Relationship (ER) , Enhanced ER Model:** ER model concepts: Entities, attributes, relationships, ER diagrams and their symbols, Generalization, Specialization, Aggregation, Mapping ER to Relational Model, Extended E-R Features, Converting ER and EER diagram into tables Case study: Data modeling for smart home monitoring system	07
3.	**Relational Model and Relational Algebra:** Structure of relational databases, Keys: Primary, Foreign, Candidate, Super key, Integrity constraints, Relational Algebra: Select, Project, Join, Union, Set difference, Cartesian product, Division, Use cases in electronics: Data logs from microcontrollers	07

4.	**Structured Query Language (SQL):** SQL: Characteristics and Advantages, DDL, DML, DCL, TCL commands, SQL Operators, Basic SQL queries: SELECT, WHERE, ORDER BY, GROUP BY, HAVING, Joins: Inner, Left, Right, Full. Subqueries, Views, Indexes, Stored Procedures (basic), PL/SQL: Concept of Stored Procedures and Functions, Cursors, Triggers, Assertions, Roles and Privileges. Case Study : Creating a database for sensor data management	07
5.	**Database Design and Normalization:** Functional Dependencies, Normal Forms: 1NF, 2NF, 3NF, BCNF, Lossless decomposition, Dependency preservation, Case study: Designing normalized database for electronic inventory system	07
6.	**Transactions, Concurrency and Recovery:** Concept of transaction and ACID properties, Serializability and Schedules, Concurrency control techniques: Lock-based, Timestamp-based, Recovery: Log-based, Checkpointing, Shadow paging, Introduction to distributed databases and NoSQL (MongoDB basics)	07
	TOTAL	**42**

Text Books :

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGraw Hill.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson.

Reference Books:

1. Ivan Bayross, "SQL, PL/SQL: The Programming Language of Oracle", BPB Publications.
2. Jeffrey A. Hoffer, "Modern Database Management", Pearson.
3. Pramod J. Sadalage, Martin Fowler, "NoSQL Distilled", Addison-Wesley.

E-Resources:

1. NPTEL Course "Database Management System: https://nptel.ac.in/courses/106105175 2.
2. NPTEL Course "Database Management System https://nptel.ac.in/courses/106104135

List of Experiments :

Group A- Database Programming Languages – SQL

1. Design and develop SQL DDL statements which demonstrate the use of SQL objects such as Table, View, Index, Sequence and Synonym
2. Design and develop SQL queries for suitable database application using SQL DML statements: Insert, Select, Update and Delete with operators and functions
3. Design and develop at least 5 SQL queries for suitable database application using SQL DML statements: all types of Join and Sub-Query

Group B - Group B- Database Programming Languages – PL / SQL

1. Write a Stored Procedure namely calculate_fine for the following requirements:-
   Schema:
   Borrower (Roll no., Name, Date of Issue, Name of Book, Status)
   Fine (Roll no, Date, Amt.)
   a. Accept roll no. & name of book from user.
   b. Check the number of days (from date of issue), if days are between 15 and 30, then fine amount will be Rs 5 per day.
   c. If no. of days>30, per day fine will be Rs 50 per day & for days less than 30, Rs. 5 per day.
   d. After submitting the book, status will change from I to R.
   e. If condition of fine is true, then details will be stored into fine table. Write a PL/SQL block for using procedure created with above requirement.

2. Write a PL/SQL block of code using parameterized Cursor that will merge the data available in the newly created table N_RollCall with the data available in the table O_RollCall. If the data in the first table already exist in the second table then that data should be skipped.

3. Database Trigger: Write a database trigger on Library table. The System should keep track of the records that are being updated or deleted. The old value of updated or deleted records should be added in Library_Audit table.

Group C- Database Programming Languages – No SQL

1. Mongo DB queries: Design and Develop Mango DB Queries using CRUD operations.(use CRUD operations, SAVE Method and logical operators)
2. Mango DB – Aggregation and Indexing: Design and Develop Mango DB Queries using Aggregation and Indexing with suitable example.
3. Mango DB Map reduces operations: Implement Map reduces operation with suitable example using Mango DB

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)							**Semester:** IV		
Course: Communication Systems							**Code:** ECPC406		
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	02	-	04	40	60	-	25	-	125

Prerequisites:

Electronic Devices and Circuits, Time domain and frequency domain analysis

Course Objectives:

1. To provide foundational knowledge of analog and digital communication principles and systems.
2. To explore modulation techniques, noise analysis, and system design elements in both analog and digital domains.
3. To develop an understanding of baseband transmission, signal representation, and pulse modulation for efficient communication.

Course Outcomes: After completion of this course, students will able to -

CO1	Explain communication elements, spectrum, noise types, and perform calculations.
CO2	Analyze AM principles, design modulators/demodulators, explain transmitter architectures.
CO3	Explain FM/PM theory, analyze bandwidth, design modulators/demodulators.
CO4	Apply sampling theory, distinguish types, explain PAM, PWM, PPM, TDM, FDM.
CO5	Explain quantization, PCM, delta modulation, evaluate digital schemes.
CO6	Analyze baseband signaling, interpret eye diagrams, understand ISI reduction techniques.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Communication Systems:** Introduction to Analog Communication System. The Electromagnetic & Optical Spectrum and its usage; Radio spectrum and frequency allocation. Elements of communication systems, need for modulation, Types of noise, External noise, Internal Noise, Noise calculations, signal to noise ratio, noise figure, and noise temperature	07
2.	**Amplitude Modulation and Demodulation:** Amplitude Modulation principles, AM envelope, Modulation Index, frequency spectrum & BW, phase representation of AM wave, AM modulating circuits: Low level AM modulation, medium power, AM modulation, method Vestigial sideband (VSB). AM transmitters: Block of low level DSBFC, High Level DSBFC, SSB suppression techniques. TRF and Super heterodyne receiver.	07

3.	**Angle Modulation:** Basic concept, mathematical analysis, frequency spectrum of FM wave, sensitivity, phase deviation and modulation index, frequency deviation and percent modulated waves, bandwidth requirement, deviation ratio, Narrow Band FM, and Wide Band FM. Varactor diode modulator, FET reactance modulator, stabilized reactance modulator- AFC, Direct FM transmitter, indirect FM Transmitter, pre-emphasis and de-emphasis. Amplitude limiting, FM demodulators	07
4.	**Pulse Analog Modulation:** Need of analog to digital conversion, sampling theorem for low pass signal in time domain, and Nyquist criteria, Types of sampling- natural and flat top. Sampling techniques, aliasing error, and aperture effect. PAM, PWM, PPM generation and detection. TDM and FDM	07
5.	**Digital Representation of Analog Signals:** Quantization of Signals: Quantization error, Uniform & Non-Uniform types of Quantization, Mid-rise &Mid-tread Quantizer, Companding: A-law & μ-law. **Pulse Code Modulation system**: Generation & Reconstruction, Differential Pulse code modulation, Delta Modulation, Adaptive Delta Modulation.	07
6.	**Baseband transmission & reception:** Line codes: Unipolar, Bipolar, NRZ, RZ, RZ-AMI, Manchester Baseband Pulse Shaping, M-ray Signaling, ISI, eye diagram, scrambler, Unscramble	07
	TOTAL	**42**

List of Experiments:

Minimum 10 Experiments should be performed:

1. Experiment on practical implementation of Amplitude Modulation
2. Frequency modulator & demodulator using Varicap/Varactor Diode and NE 566 VCO, IC565 (PLL based detection), calculation of modulation index & BW of FM.
3. Experiment on practical implementation of Amplitude Demodulation
4. Experiment on practical implementation of Sampling and reconstruction and also observe aliasing effect by varying sampling frequency.
5. Experiment on practical implementation of PAM system.
6. Experiment on practical implementation of PWM system.
7. Experiment on practical implementation of Pre-emphasis and De-emphasis
8. Study of PCM
9. Study of Companded PCM
10. Study of DM: Generation and detection
11. Study of ADM: Generation and detection
12. Study of line codes (NRZ, RZ, POLAR RZ, BIPOLAR (AMI), MANCHESTER) & their spectral analysis.
13. Verify Sampling Theorem using simulation
14. Simulation program to calculate Signal to noise ratio for PCM system & DM system.

15. Simulation of AM modulation and demodulation using MATLAB

Note: Visit to AIR station/telephone exchange is compulsory. Students are supposed to attach report of visit to journal

Text Books :

1. George Kennedy, "Electronic Communications", McGraw Hill.
2. Wayne Tomasi, "Electronics Communication Systems: Fundamentals through Advanced", 5th Edition, Pearson Education.
3. J.S. Chitode, "Analog and Digital Communication", Technical Publications, 2009.
4. B.P. Lathi, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press.

Reference Books:

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons.
2. Taub, Schilling, "Principles of Communication Systems", Tata McGraw-Hill.
3. R.P. Singh, S.D. Sapre, "Communication Systems – Analog & Digital", 2nd Edition, Tata McGraw-Hill.
4. Bernard Sklar, Prabitra Kumar Ray, "Digital Communications: Fundamentals and Applications", 2nd Edition, Pearson Education.

E-Resources:

1. NPTEL Course "Analog communication", by Prof. Goutam Das (IIT Kharagpur) https://onlinecourses.nptel.ac.in/noc21_ee74/preview
2. NPTEL Course "Principles of Communication Systems-I", by Prof. Aditya.K. Jagannath https://nptel.ac.in/courses/108/104/108104091/

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)							**Semester:** IV		
Course: Object Oriented Programming							**Code:** ECPC407		
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	02	-	04	40	60	-	-	25	125

Prerequisites:

Programming and Problem Solving

Course Objectives:

1. To explore programming skills of students, using object oriented programming concepts.
2. To learn the syntax and semantics of the C++ programming language.
3. To use the object-oriented paradigm in program development.

Course Outcomes: After completion of this course, students will able to -

CO1	Understand different OOP features and types of functions.
CO2	Apply the concept of inheritance to write a program.
CO3	Compare polymorphism techniques and develop a solution for particular problem
CO4	Apply generic programming and exceptional handling concepts to write a program.
CO5	Apply appropriate file operations and modes to write a program.
CO6	Illustrate STL Components and write a program using STL components.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Fundamental Concepts of OOPs :** Introduction: Introduction to Object Oriented Programming, Object Oriented Paradigm, Features of OOP, benefits of OOP. Data Types: variables and constants, Class – Data members, Member Functions, and class as abstract data type, Object Visibility Modes, Constructor & Types of Constructors, Destructor, Binding – static & dynamic, Inline Function, Static Members, Static Function, Friend Function, Friend Class, Array of Objects. Case Study: Demonstrate Class Animal/Car using object, constructor, destructor and functions	07
2.	**Inheritance in C++ :** Derived class & base class, Types of inheritance: Public, Protected and Private Inheritance, Ambiguity in multiple inheritance & multipath inheritance, Constructor & Destructor in Inheritance, Order of Constructor and Destructor Call. Case Study: Demonstrate Inheritance and its types using Vehicle Hire Company	07
3.	**C++ Polymorphism:** Introduction: Polymorphism – Compile time and Run time Polymorphism, Type conversion, Pointer, Pointers to object, this pointer, Virtual function, Pure virtual	07

	function, Abstract class. Case Study: Demonstrate Online Payment system using function overloading. Demonstrate final amount calculation to be given to fruit Vendor on fruit purchase.	
4.	**Generic Programming & Exception** Handling **using C++ :** Generic Programming – Introduction to Template, Types- Function Template, Class Templates Template with multiple parameters. Exception Handling - Exception Handling: Definition and Types of exceptions, Exception handling using try-catch-throw. Catching mechanism, Exception handling in inheritance. Separating interfaces and implementation using C++ constructs - class, functions, polymorphism and error handling Case Study : Demonstrate exception handling in Login Page to any mail sever Like Gmail Demonstrate Ticket Reservation in Railway Reservation system for Adult/Child Passenger	07
5.	**C++ File Handling:** File Handling: Classes for file stream operation, Opening and closing a file - File mode, Error Handling functions in file, File Pointers and Their Manipulation, File Operations on Characters, File Operations on Binary Files – Variables, Class Objects, Sequential File Organization. Case Study: Demonstrate C++ program to redirect output to file using C++ File handling functions	07
6.	**Standard Template Library:** Standard Template Library: Standard Template Library (STL), components of STL: Containers, algorithms and iterators, Containers- Sequence container, associative containers, container adapters, Iterators- input, output, forward, bidirectional and random access, Algorithms- basic searching and sorting algorithms, min-max algorithm, set operations. Tokenizer using file handling and STL stack. Case Study: Demonstrate an application for Chair arrangement in a seminar hall using STL Container Vector OR Demonstrate an application for students Mark list management using STL map.	07
	TOTAL	**42**

List of Experiments:

Perform any 08 experiment out of 13:

1. Write a C++ program to implement simple Arithmetic Calculator
2. Write a C++ Program
    a. Even/ODD number Check
    b. Check the character is Vowel or not
    c. Check Leap Year
    d. Create Pyramid and Pattern
    e. Find the largest of 3 entered nos
3. Write a C++ program to perform following operations on an Array
    a. Display ODD Indexed Nos.
    b. Calculate Sum array elements,

c. Calculate Average of Array Elements
d. Add Or Delete the no. from an array

4. Given an array A of positive integers. Your task is to find the leaders in the array. An element of array is leader if it is greater than or equal to all the elements to its right side. The rightmost element is always a leader
5. Write a C++ program to display Month Name if month no is entered by User using
   a. If- else
   b. Switch case
   c. Compare above 2 conditional control structure
6. Write a CPP to create class Student with appropriate member variable and member functions and make use of following
   a. Constructors
   b. Destructors
   c. Inline, static, friend function
   d. Dynamic memory allocation-deallocation
7. Write a CPP to implement following inheritances using car rental system.
   a. Single Inheritance
   b. Multilevel inheritance
   c. Multiple Inheritance
   d. Hierarchical Inheritance
8. Write a CPP to implement Online Payment system using function overloading for Online Shop.
9. Implement a class Complex which represents the Complex Number data type. Implement the following operations:
   a. Constructor (including a default constructor which creates the complex number 0+0i).
   b. Overloaded operator +, - to add and subtract two complex numbers
   c. Overloaded operator * , /to multiply and divide two complex numbers.
   d. Overloaded << and >> to print and read Complex Numbers.
10. Write C++ program to calculate monthly and yearly expenses done on Education, Travel, Medical, Misc.
11. Implement CPP to demonstrate Exception Handling for Gmail Account Login OR ATM Pin Verification.
12. Write a C++ program to implement stack of characters and integers using function template.
13. Write a C++ program to generate Country-Currency chart of all countries across the globe using MAP Container

Text Books :

1. E. Balagurusamy, "Object-Oriented Programming with C++",7th edition, Graw-Hill Publication.
2. Deitel, "C++ How to Program", 4th Edition, Pearson Education.

Reference Books:

1. Herbert Scheldt, "C++-The complete reference", Eighth Edition, McGraw Hill Professional.

E-Resources:
1. MOOC/ Video Lectures available at: NPTEL Lecture Link 1. Programming in C++ By Prof. Partha Pratim Das | IIT Kharagpur https://onlinecourses.nptel.ac.in/noc19_cs38/preview

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** IV	
Course: Sensors and Applications								**Code:** ECMD402	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	-	-	03	40	60	-	-	-	100

Prerequisites:

Basic Electronics Engineering.

Course Objectives:

1. To explain the operation/working principle of different sensors.
2. To compare various sensors and select appropriate sensor for a particular application.
3. To impart interdisciplinary knowledge regarding sensors and actuators.
4. To explain the advanced sensor fabrication techniques like MEMS.
5. To explain industrial applications of sensors and transducers.

Course Outcomes: After completion of this course, students will able to -

CO1	Describe performance measures, terminology of sensors and Calibration of instrumentation systems.
CO2	Explain working principle of temperature and chemical sensors.
CO3	Compare various flow and level sensing techniques and select appropriate technique for a specific application.
CO4	Explain working principles of motion, light and radiation detectors.
CO5	Describe construction and working principle of MEMS and SMART sensors.
CO6	Understand appropriate Actuators and final control elements for a specific application.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Fundamentals of Sensors & Transducer:** Definitions sensors & transducer, Classification of sensors and transducers, Performance and Terminology: Accuracy, precision, resolution, threshold, sensitivity, linearity, hysteresis, drift, range, span, speed of response, measuring lag, fidelity, dynamic error. Advantages, disadvantages & applications of sensors and transducers, Block diagram and description of Instrumentation system, Instrument Calibration	07
2.	**Temperature & Chemical Sensors:** **Temperature:** RTD, thermistors, thermocouples, noncontact temperature measurement- pyrometers. Semiconductor temperature sensing (LM75), Acoustics sensors for sound level measurement, Humidity Sensors.	07

	Chemical sensors: classes of chemical sensors, Characteristics of chemical sensors, biochemical sensors.	
3.	**Flow and Level Sensing:** **Flow:** Bernoulli Equation, Differential head type flow meters (Orifice, Venturi tube and Flow Nozzle), Pitot static tube and Variable area type flow meter – Rotameter, Electromagnetic and ultrasonic flow meters. **Level:** Float, DP Cell, Ultrasonic and Capacitance probe type level detection techniques.	07
4.	**Weight, Motion, Light & Radiation Detectors:** **Weight-** Load Cell and strain gauges, strain gauge signal conditioning. **Displacement-** LVDT, Ultrasonic, capacitive detectors, Proximity sensors (inductive and optical). **Acceleration–** Accelerometer characteristics, capacitive accelerometers, Piezoelectric Accelerometer, Piezo-resistive accelerometer, thermal accelerometer. **Light & Radiation detectors:** Photo diodes, photo transistor, CCD, CMOS image sensors, gas flame detectors, Radiation detectors.	07
5.	**MEMS & Smart Sensors:** **Magnetic field sensors –** Hall effect and magneto-resistive elements (MRE), magneto-transistors, piezoelectric (PZT) sensors and actuators. **Micro Electro Mechanical Systems (MEMS) –** Bulk micromachining, micro-machined absolute pressure sensor, Surface Micromachining-Hot wire anemometer micro-miniature temperature sensor, surface micromachined accelerometer and SMART sensors.	07
6.	**Actuators and Final Control Elements:** **Pneumatic and hydraulic actuators-** Directional control valves, Pressure control valves, Cylinders, Process control valves - Electrical actuators- Solenoids, DC motors, AC motors and Stepper motors.	07
	TOTAL	**42**

Text Books :

1. W. Bolton, "Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering", 3rd Edition, Pearson Education.
2. William C. Dunn, "Introduction to Instrumentation, Sensors, and Process Control", Artech House, Sensors Library.

Reference Books:

1. Curtis Johnson, "Process Control Instrumentation Technology", 7th Edition, Prentice Hall of India Pvt. Ltd.
2. Ernest O. Doebelin, "Measurement Systems: Application and Design", 5th Edition, McGraw-Hill.
3. David G. Alciatore, Michael B. Histand, "Introduction to Mechatronics and Measurement Systems", Tata McGraw-Hill.

4. C.S. Rangan, G.R. Sarma, V.S.V. Mani, "Instrumentation Devices and Systems", 2nd Edition, Tata McGraw-Hill.

E-Resources:

1. Industrial Instrumentation, https://nptel.ac.in/courses/108105064
2. NOC: Sensors and Actuators, https://nptel.ac.in/courses/108108147

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** IV	
Course: Quality Management System – II								**Code:** ECMC402	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Interactive mind-set for practical and quality thinking.

Course Objectives:

Understanding the QMS clauses and its PDCA way of working in an organization.

Course Outcomes: After completion of this course, students will be able to -

CO1	Understand the organization and its functional alignment for QMS.
CO2	Understand the quality management system and processes.
CO3	Know the leadership drive and involvement in building quality culture.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	Scope, Normative References, Terms & Definition	04
2.	**Context of the Organization:** Understanding the organization and its context, Needs and expectations of interested parties, Determine the scope of the quality management system, Quality management system and its processes.	10
3.	**Leadership:** Accountability, Responsibilities and Commitment for QMS culture, Quality policy.	14
	TOTAL	**28**

Text Books:

1. Kanishka Bedi, "Quality Management", Oxford University Press.
2. Subburaj Ramasamy, "Total Quality Management", McGraw Hill Education.
3. Dale H. Besterfield, "Total Quality Management", Pearson Education.

Reference Books:

1. QMS ISO 9001:2015 Standards

E-Resources:

1. Dr. N.Venkateshwarlu, "Quality Engineering & Management", NPTEL Course, https://onlinecourses.swayam2.ac.in/nou25_me09/preview

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** IV	
Course: Problem Solving Techniques – II								**Code:** ECAE402	
Teaching Scheme (Hr/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	25	-	-	25

Prerequisites:

Interactive mind-set for practical.

Course Objectives:

1. To acquire basic knowledge of Problem-solving planning.
2. To understand the effectiveness check and sustenance.

Course Outcomes: After completion of this course, students will be able to -

CO1	Know how to plan and execute the problem solving.
CO2	Understand the measure and monitoring of problem-solving plan and execution.
CO3	Understand the effectiveness measures of problem solving.
CO4	Understand the sustenance working plan and execution.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Planning & Execution:** What is planning? PDCA way of thinking and planning, Inputs requirement mapping.	08
2.	**Measure of Planning & Execution:** Key measures, How to measure and monitor? Reviews & Reporting with documentation.	08
3.	**Effectiveness measures & Sustenance:** Define effectiveness measures, How to measure and monitor? Importance of Sustenance, How to plan and execute sustenance activities.	12
	TOTAL	**28**

Text Books:

1. B. Mahadevan, "Operations Management: Theory and Practice", Pearson Education India.
2. L.M. Prasad, "Principles and Practices of Management", Sultan Chand & Sons.

Reference Books:

1. The PDCA Cycle for Industrial Improvement: Applied Case Studies (Synthesis Lectures on Engineering, Science, and Technology), Springer.

E-Resources:

1. Coursera, "Initiating and Planning Projects" - https://www.coursera.org/learn/project-planning

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)							**Semester:** IV		
Course: Python Programming							**Code:** CEVS405		
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	02	-	01	-	-	-	50	-	50

Prerequisites:

1. Basic knowledge of computer operations and logical reasoning.
2. Familiarity with programming fundamentals like variables, loops, and conditionals.
3. Understanding of basic mathematics and algorithmic thinking

Course Objectives:

1. To be able to introduce core programming basics and various Operators of Python programming language.
2. To demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries.
3. To understand about Functions, Modules and Regular Expressions in Python Programming

Course Outcomes: After completion of this course, students will able to -

CO1	Understand the basic concepts of Python Programming.
CO2	Demonstrate mathematical and string manipulation functions in Python.
CO3	Apply core python scripting elements such as flow control structures and loops
CO4	Develop essential skills in python programming concepts like data structures and different built in functions.
CO5	Apply a modular programming approach by making use of functions
CO6	Demonstrate the ability to data frames, plots and files in different modes.

List of Experiments:

Perform any Two from each group

Group A - Basic Arithmetic Operations

1. Write a Python program to display "Welcome to Python Programming for ECE" and perform basic arithmetic operations (addition, subtraction, multiplication, and division) on two user-input numbers.
2. Program to Swap two variables.
3. Program to find maximum of two or three numbers
4. Program to check if a number is even or odd, number is positive, negative or 0.
5. Write a Python program to generate the Fibonacci series up to n terms and check whether a given number is prime or not.
6. Write a Python function to calculate the factorial of a number using recursion. Also, define a user function to calculate the square of a number.

Group B - Basic OOPs Operations & Data Types

1. Write a Python program to input three voltages and determine which one is maximum using conditional statements.
2. Perform oops operations using python class object, operator overloading, inherence, polymorphism, encapsulation
3. Write a Python program to input a list of sensor readings and perform operations such as sorting, searching, slicing, and finding maximum/minimum values.
4. Write a Python program to input a string and display the frequency of each character using a dictionary
5. Write a Python program to create two sets of signal IDs and perform union, intersection and difference operations
6. Write a Python program for sensor interface simulator using class with dictionary.

OR

7. Write a Python program for communication system simulator using class, polymorphism, inheritance

Group C - Basic Python Libraries

8. Write Python programs using lambda, map(), filter(), and reduce() to process a list of signal amplitudes (e.g., filter values above threshold).
9. Write a Python program to define a class Electronic Device with attributes like name, power and voltage. Create objects and display their data.
10. Write a Python program to check if a list is Empty or Not.
11. Write a Python program to create and view elements of a list.
12. Write a Python program to access List Index and Values
13. Write a Python program to add two Lists.

Group D - Programming using Python Libraries

14. Write a Python program to read data from a file (text or CSV) and count the number of lines, words and characters. Also, write back processed data to a file.
15. Write a Python program to handle exceptions like divide by zero, file not found and invalid input using try-except blocks.
16. Write a Python program to perform basic array operations, matrix addition, subtraction and multiplication using NumPy.
17. Write a Python program to generate and plot sine, cosine and square wave signals using matplotlib.
18. Write a Python program using Pandas to load sensor data from a CSV file, display basic statistics, filter records based on conditions and visualize data.

19. Write a Python Program to keep record of students data ,manipulate files to store, update and delete students information.
Text Books :
1. Michael T. Goodrich, Roberto Tammassia, Michael H. Goldwasser, "Data structures and algorithm in Python," Willey Publications.
Reference Books:
1. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python", Dreamtech Press. 2. Yashavant Kanetkar, A. Kanetkar, "Let Us Python", BPB Publications. 3. Eric Matthes, "Python Crash Course", No Starch Press. 4. Luciano Ramalho, "Fluent Python", O'Reilly Media. 5. Mark Lutz, "Learning Python", O'Reilly Media.
E-Resources:
1. www.nptelvideos.in 2. https://snakify.org/en/ 3. https://docs.python.org/3/

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester:** IV	
Course: Internship – III								**Code:** ECIN403	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	-	-	02	-	-	25	-	-	25

Preamble:

Internships serve as vital educational and career development experiences, offering practical exposure in a specific field. Employers seek individuals who possess the necessary skills and an understanding of industry environments, practices, and cultures. This internship is designed as a structured, short-term, supervised training program, often centered on specific tasks or projects with clear timelines. The primary goal is to immerse technical students in an industrial setting, providing experiences that cannot be replicated in the classroom. This exposure aims to develop competent professionals who understand the social, economic, and administrative factors influencing the operations of industrial organizations.

Course Objectives:

1. Exposure to students to the industrial environment, which cannot be provided in the classroom and hence creating deployable professionals for the industry.
2. Learn to implement the technical knowledge in real industrial situations.

Course Outcomes: After completion of this course, students will be able to -

CO1	Gain exposure to industry practices and understand how academic concepts are applied in professional settings.
CO2	Develop and demonstrate effective communication and teamwork skills within a work environment.
CO3	Improve your problem-solving and time management skills by working in real-world industry settings.

Internship Requirements

1. **Internship Duration:** It is mandatory for all students to undergo an internship after every semester during vacations for the duration of 3 to 5 weeks. Internships completed during this period will be considered for the assessment of Term Work (TW).
2. **Internship Opportunities:** Students can explore various opportunities for internships at:
    a. Industries
    b. Research labs or organizations
    c. Collegiate clubs
    d. In-house research projects
    e. Online internships
3. **Support and Assistance:** Students can seek assistance for securing internships from:
    a. The Training and Placement cell, along with departmental coordinators
    b. Department or institute faculty members
    c. Personal contacts
    d. Directly connecting with industries or organizations

4. **Request Letter:** Once an industry, research organization, or collegiate club is identified, students must obtain a request letter from the concerned department or placement office. This letter, in the standard format must be duly signed by the authority, should be addressed to the HR manager or relevant authority.
5. **Confirmation Letter:** Students must submit the confirmation letter from the industry, research organization, or collegiate club to the Internship Coordinator and the Head of Department (HOD) office.
6. **Joining Report:** Upon commencing the internship, students must submit the joining report, joining letter, or a copy of the confirmation email to the Internship Coordinator and the HOD office.
7. **Faculty Mentor:** A faculty member will be assigned as a mentor to a group of students. The mentor will be responsible for monitoring, evaluating, and assessing student internship activities. The faculty mentor is also required to visit the internship location and submit formal feedback to the Internship Coordinator.
8. **Faculty Visits:** Faculty members are advised to visit the internship site once or twice during the internship period to monitor progress.
9. **Progress Report:** Students must submit progress report fortnightly to their faculty guide and the final internship report to the Internship Coordinator and department office.
10. **Evaluation Report:** After the completion of the internship, the mentor, along with the assessment panel members, should submit the evaluation report of the students to the department office and the Internship Coordinator.
11. **Internship Certificate:** Students must receive the Internship Certificate from the industry and submit it to the Internship Coordinator and department office.
12. **Presentation and Assessment:** Students are required to give a presentation on their internship work as part of the term work. The internship diary and report will also be verified and assessed.