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

ELECTRONICS AND COMPUTER ENGINEERING DEPARTMENT

Curriculum Structure and Syllabus of

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

(With effect from - Academic Year 2026-2027)

(2025 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.

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

PROGRAM OUTCOMES (POs):

PO1: Engineering Knowledge
Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop the solution of complex engineering problems.

PO2: Problem Analysis
Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions
Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems
Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)

PO5: Engineering Tool Usage
Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).

PO6: The Engineer and The World
Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO7: Ethics
Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9).

PO8: Individual and Collaborative Team Work
Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication

Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

PO10: Project Management and Finance

Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning

Recognize the need for, and have the preparation and ability for:
i) Independent and life-long learning;
ii) Adaptability to new and emerging technologies; and
iii) Critical thinking in the broadest context of technological change. (WK8)

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	Programme Core Course
PEC	Programme 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
IE	Internal Evaluation
MTE	Mid Term 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	Total						
25ECPC302	PCC	Digital Electronics and Microcontroller	4	-	-	4	4	-	4	40	60	-	-	-	100
25ECPC302P	PCC	Digital Electronics and Microcontroller Lab	-	2	-	2	-	1	1	-	-	-	50	-	50
25ECPC303	PCC	Data Structure and Algorithms	3	-	-	3	3	-	3	40	60	-	-	-	100
25ECPC303P	PCC	Data Structure and Algorithms Lab	-	2	-	2	-	1	1	-	-	-	-	25	25
25ECPC304	PCC	Computer Organization and Architecture	3	-	-	3	3	-	3	40	60	-	-	-	100
25ECMD301	MDM	Engineering Mathematics III	3	-	-	3	3	-	3	40	60	-	-	-	100
25ALOE301	OE	Open Elective - I #	2	-	-	2	2	-	2	-	-	50	-	50	100
25ECVS303	VSEC	Problem Solving Technique-I	-	2	-	2	-	1	1	-	-	25	-	-	25
25ECVS304	VSEC	Electronics Workshop	-	2	-	2	-	1	1	-	-	25	-	-	25
25ECCE301	CEP	Project Based Learning	-	2	-	2	-	1	1	-	-	25	-	-	25
25ECCC305	CC	Liberal Learning - III	-	2	-	2	-	1	1	-	-	25	-	-	25
25ECIN302	ELC - INT	Internship - II	4 Week				-	2	2			25		-	25
Total			**15**	**12**	**0**	**27**	**15**	**8**	**23**	**160**	**240**	**175**	**50**	**75**	**700**

BoS Chairman
Dr. Mahesh Navale

Director
Dr. Ajit Kate

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Open Elective - I

# - Select any one course from the given Open Elective Courses		
Course Code	**Course Type**	**Open Elective - I**
25ALOE301A	OEC	Digital Literacy and Applications
25ALOE301B		Environmental Studies
25ALOE301C		Green Energy and Sustainability
25ALOE301D		Basics of Consumer Electronics
25ALOE301E		Renewable Energy Systems

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	Total						
25ECPC405	PCC	Database Management	3	-	-	3	3	-	3	40	60	-	-	-	100
25ECPC405P	PCC	Database Management Lab	-	2	-	2	-	1	1	-	-	-	-	25	25
25ECPC406	PCC	Communication Systems	3	-	-	3	3	-	3	40	60	-	-	-	100
25ECPC406P	PCC	Communication Systems Lab	-	2	-	2	-	1	1	-	-	-	-	25	25
25ECPC407	PCC	Object Oriented Programming	3	-	-	3	3	-	3	40	60	-	-	-	100
25ECPC407P	PCC	Object Oriented Programming Lab	-	2	-	2	-	1	1	-	-	-	25	-	25
25ECMD402	MDM	Sensors and Applications	3	-	-	3	3	-	3	40	60	-	-	-	100
25ALOE402	OE	Open Elective-II #	2	-	-	2	2	-	2	-	-	50	-	50	100
25ECMC402	HSSM-MC	Project Management System - I	-	2	-	2	-	1	1	-	-	25	-	-	25
25ECAE402	AEC	Problem Solving Technique - II	-	2	-	2	-	1	1	-	-	25	-	-	25
25ECVS405	VSEC	Python Programming	-	2	-	2	-	1	1	-	-	25	-	-	25
25MECC306	CC	Liberal Learning - IV	-	2	-	2	-	1	1	-	-	25	-	-	25
25ECIN403	ELC - INT	Internship - III	4 Weeks					2	2			25			25
Total			**14**	**14**	**-**	**28**	**14**	**9**	**23**	**160**	**240**	**175**	**25**	**100**	**700**

BoS Chairman
Dr. Mahesh Navale

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

Director
Dr. Ajit Kate

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Open Elective - II

# - Select any one course from the given Open Elective Courses		
Course Code	**Course Type**	**Open Elective - II**
25ALOE402A	OEC	Cyber Security and Laws
25ALOE402B		Sustainability and Climate Change
25ALOE402C		Energy Audit and Electrical Safety
25ALOE402D		Digital Marketing
25ALOE402E		Entrepreneurship and Innovations

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Semester - III

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Digital Electronics and Microcontroller								**Code: 25ECPC302**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
4	**-**	**-**	**4**	**40**	**60**	**-**	**-**	**-**	**100**

Prerequisites:

- Basic Mathematics
- Basic Electrical and Electronics Engineering
- Programming with C

Course Objectives:

1. To understand number systems, Boolean algebra, and digital logic design.
2. To design combinational and sequential digital circuits.
3. To learn the architecture and programming of the 8051 microcontroller.
4. To interface memory and peripheral devices with the 8051.
5. To develop embedded applications using the 8051 microcontroller.

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

CO1	Explain digital number systems, Boolean algebra and logic simplification techniques.
CO2	Design and analyze combinational logic circuits using standard digital building blocks.
CO3	Design and analyze sequential logic circuits using flip-flops, registers and counters.
CO4	Explain the architecture, memory organization and instruction set of the 8051 microcontroller.
CO5	Develop assembly language programs and interface peripheral devices with the 8051 microcontroller.
CO6	Design and implement simple embedded system applications using the 8051 microcontroller

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Digital Number Systems and Logic Fundamentals** Digital Systems, Binary, Octal, Decimal and Hexadecimal Number Systems, Number System Conversions, Binary Arithmetic, 1's and 2's Complement, Logic Gates, Universal Gates, Boolean Algebra, De Morgan's Theorems, Karnaugh Map (K-Map) Simplification (up to 4 variables)	09
2.	**Combinational Logic Circuits** Design and Analysis of Combinational Circuits, Half Adder, Full Adder, Half Subtractor, Full Subtractor, Encoder, Decoder, Multiplexer, Demultiplexer, Code Converters, Parity Generator.	09
3.	**Sequential Logic Circuits** Flip-Flops (SR, JK, D and T), Master-Slave Flip-Flop, Registers (SISO, SIPO, PISO, PIPO), Shift Registers, Counters (Ripple, Synchronous,	08

	Up/Down, Mod-N), Finite State Machine (Introduction).	
4.	**8051 Microcontroller Architecture and Programming** Introduction to Embedded Systems, Microprocessors Vs Microcontrollers, 8051 Architecture, Pin Diagram, Internal Memory Organization, SFRs, Register Banks, Program Counter, Stack Pointer, PSW, Addressing Modes, Instruction Set, Assembly Language Programming, Embedded C Programming.	09
5.	**8051 Interfacing and Peripheral Programming** I/O Port Programming, Timer and Counter Programming, Interrupt Structure, Serial Communication (UART), Memory Interfacing, LED Interfacing, Switch Interfacing, Seven Segment Display, LCD Interfacing, Keyboard Interfacing, Relay Interfacing.	09
6.	**8051 Applications** ADC and DAC Interfacing, Stepper Motor Interfacing, DC Motor Control, PWM (Introduction), Sensor Interfacing (Temperature and Light Sensors), Embedded Application Development, Case Studies: Traffic Light Controller, Digital Clock, Temperature Monitoring System, Home Automation Controller.	08
	TOTAL	**52**

Text Books:

1. M. Morris Mano and Michael D. Ciletti, Digital Design**,** Pearson.
2. R. P. Jain, Modern Digital Electronics, McGraw-Hill.
3. Muhammad Ali Mazidi, Janice Mazidi and Rolin McKinlay, The 8051 Microcontroller and Embedded Systems**,** Pearson.
4. Kenneth J. Ayala, The 8051 Microcontroller**,** Cengage Learning.

Reference Books:

1. Thomas L. Floyd, Digital Fundamentals, Pearson.
2. Donald D. Givone, Digital Principles and Design, McGraw-Hill.
3. Subrata Ghoshal, 8051 Microcontroller, Pearson.
4. Douglas Hall, Microprocessors and Interfacing, McGraw-Hill.

E-Resources:

1. NPTEL – Digital Electronic Circuits
2. NPTEL – Digital Systems
3. NPTEL – Microprocessors and Microcontrollers

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Digital Electronics and Microcontroller Lab								**Code: 25ECPC302P**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**50**	**50**

Prerequisites:

- Basic Mathematics
- Basic Electrical and Electronics Engineering
- Programming with C

Course Objectives:

1. To develop practical understanding of digital logic fundamentals through verification and implementation of Boolean logic, combinational circuits, and their applications.
2. To develop practical skills in sequential logic circuit implementation using flip-flops, shift registers, and different types of counters.
3. To develop the ability to program the 8051 microcontroller using Embedded C and interface various peripherals for real-time embedded applications.

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

CO1	Verify and implement fundamental combinational digital circuits.
CO2	Verify and implement sequential logic circuits.
CO3	Develop and execute 8051 Embedded C programs for embedded applications.

List of Experiments:

Module I – Digital Logic Fundamentals (Any 3)

1. Verification of logic gates using ICs.
2. Verification of Boolean theorems and De Morgan's theorem.
3. Design and implementation of Half Adder and Full Adder.
4. Design and implementation of Half Subtractor and Full Subtractor.
5. Design of Encoder and Decoder,.
6. Design of Multiplexer and Demultiplexer

Module II – Sequential Logic (Any 1)

7. Verification of SR, JK, D and T Flip-Flops.
8. Design and implementation of Shift Registers.
9. Design of Ripple and Synchronous Counters.
10. Mod-N Counter implementation.

Module III – 8051 Programming using Embedded C (Any 4)

11. LED interfacing.
12. Seven Segment Display interfacing.
13. LCD interfacing.
14. Switch interfacing.
15. Timer programming.
16. Interrupt programming.
17. Serial communication using UART.
18. ADC/DAC interfacing (simulation or hardware).
19. Stepper motor interfacing.
20. Relay interfacing.

Reference Books:

1. Thomas L. Floyd, Digital Fundamentals, Pearson.
2. Donald D. Givone, Digital Principles and Design, McGraw-Hill.
3. Subrata Ghoshal, 8051 Microcontroller, Pearson.
4. Douglas Hall, Microprocessors and Interfacing, McGraw-Hill.

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: S.Y. B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Data Structures and Algorithms								**Code: 25ECPC303**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	**-**	**-**	**03**	**40**	**60**	**-**	**-**	**-**	**100**

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 fundamentals of data structures, their classifications, operations, and analyze algorithm complexity using asymptotic notations.
CO2	Compare basic sorting (bubble, selection, insertion, merge) and searching (linear, binary) algorithms based on time complexity.
CO3	Design and perform operations (insertion, deletion, traversal) on arrays and different types of linked lists including singly, doubly, and circular.
CO4	Implement stack and queue operations using arrays and linked lists, and apply them in expression evaluation, recursion, and real-world scenarios.
CO5	Construct and manipulate various binary trees and AVL trees, and perform operations like insertion, deletion, and different types of traversals.
CO6	Apply graph representations and traversal techniques and use algorithms like BFS, DFS, Kruskal's, Prim's, and Dijkstra's for solving 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.	**6**
2.	**Sorting and Searching techniques:** Sorting and Searching techniques: Introduction, Sorting, Insertion Sort, Selection Sort, Bubble Sort, Merge-Sort, Linear search and Binary Search.	**6**
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	**7**

	Lists.	
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	**6**
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.	**7**
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.	**7**
	TOTAL	**39**

Text Books:

1. "Schaum's Outline of Data Structures", Mcgraw-Hill Companies Incorporated.
2. "Data Structures and Algorithms", AVAho, J Hopcroft, JD Ullman, Addison- Wesley, 1983.
3. "Fundamentals of Data Structures in C", E. Horowitz, S. Sahni, S. Anderson-freed, Second Edition, 2008, University Press, ISBN 978-81-7371-605-8.

Reference Books:

1. "Data Structures & Algorithms", 1e, Alfred V.Aho, Jeffery D. Ullman, Person.
2. "Data Structures and Algorithms in Java", MT Goodrich, R Tamassia, DM Mount, 5th Ed., Wiley, 2010. (Equivalent book in C also exists).

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/

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: S.Y. B. Tech. (Electronics and Computer Engineering)									**Semester: III**
Course: Data Structures and Algorithms Lab									**Code: 25ECPC303P**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**-**	**25**	**-**	**25**

Prerequisites: Fundamental knowledge of C programming.

Course Objectives:

1. To develop programming skills for implementing fundamental searching, sorting, and matrix-based data structures using C.
2. To develop practical skills in implementing linear and non-linear data structures such as linked lists, stacks, queues, trees, and graphs using C.
3. To develop the ability to apply appropriate data structures and algorithms to solve computational problems through recursion, traversal, hashing, and virtual laboratory-based experimentation.

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

CO1	Implement and analyze searching, sorting, sparse matrix, and hashing techniques using C programming.
CO2	Implement and perform operations on linear data structures such as linked lists, stacks, and queues using C programming.
CO3	Apply recursion and traversal techniques to solve problems involving Tower of Hanoi, trees, and graphs, and demonstrate data structure concepts using virtual laboratory tools.

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)

Reference Books:

1. "Data Structures & Algorithms", 1e, Alfred V.Aho, Jeffery D. Ullman, Person.
2. "Data Structures and Algorithms in Java", MT Goodrich, R Tamassia, DM Mount, 5th Ed., Wiley, 2010. (Equivalent book in C also exists).

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: III**
Course: Computer Organization and Architecture									**Code: 25ECPC304**
Teaching Scheme				**Evaluation Scheme**					
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, interconnection structures, bus interconnection and apply various binary arithmetic algorithms on signed as well as unsigned numbers.
2. Understand working of the Central Processing Unit and RISC and CISC Architecture.
3. Analyze the hardwired control unit design methods and control unit.
4. Design memory with due consideration of trade-offs and performance issues.
5. Analyze a pipeline for consistent execution of instructions with minimum hazards
6. Interpret the Input / Output transfer techniques and discuss the working mechanisms 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.	6
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.	6

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.	7
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.	7
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.	7
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	6
	TOTAL	**39**

Text Books :

1. William Stallings, "Computer Organization and Architecture: Designing for Performance", 7th Edition, Pearson Prentice Hall Publication, ISBN 81-7758-9 93-8.
2. C. Hamacher, V. Zvonko, S. Zaky, "Computer Organization", 5th Edition, Tata McGraw Hill Publication, ISBN 007 120411-3.
3. Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill ISBN 0-07-113342-9

Reference Books:

1. Hwang and Briggs, "Computer Architecture and Parallel Processing", Tata McGraw Hill Publication ISBN 13: 9780070315563.
2. A. Tanenbaum, "Structured Computer Organization", Prentice Hall Publication, ISBN 81 – 203 – 1553 – 7, 4th Edition

E-Resources:

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

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: III**
Course: Engineering Mathematics - III									**Code: 25ECMD301**
Teaching Scheme				**Evaluation Scheme**					
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 make the students familiarize with concepts and techniques in higher order differential equations, transforms, Statistical methods, Probability theory and Vector calculus.
2. To equip students with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

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

CO1	Solve higher order linear differential equation using appropriate techniques and modeling of electrical circuits.
CO2	Analyze the data using the concepts of statistics and probability.
CO3	Apply the concepts of Z-transform in digital signal processing.
CO4	Understand the concept of Laplace transform and use it solve problems related to signal processing and control systems.
CO5	Evaluate Fourier Transforms and inverse Fourier Transforms. Apply it in signal processing.
CO6	Apply the knowledge of vector integral calculus to solve the problems in Electro-magnetic fields.

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.	6
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.	7
3.	**Z- Transforms:** Definition, Properties of Z-transform, Z- transform of Standard Sequences. Inverse Z-transform, Solution of difference equation by Z-transform.	6

4.	**Laplace Transform:** Definition and properties of Laplace transform, Inverse Laplace transform, Applications of Laplace transform to solve differential equation.	7
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.	6
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.	7
	TOTAL	**39**

Text Books :

1. B.S. Grewal, 'Higher engineering Mathematics', Khanna publishers, Delhi (40th edition), 2008)
2. P. N. Wartikar & J. N. Wartikar, Applied Mathematics, Volumes I and II, Pune Vidyarthi Griha Prakashan, Pune
3. Higher Engineering Mathematics by H.K. Das, S. Chand Publication.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, Wiley Publications, 2015.
2. Introduction to Probability and Statistics for Engineers and Scientists, 5e, by Sheldon M. Ross (Elsevier Academic Press).
3. Engineering Mathematics by B.V. Raman (Tata McGraw-Hill).
4. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
5. Advanced Engineering Mathematics with MATLAB, 2e, by Thomas L. Harman, James Dabney and Norman Richert (Brooks/Cole, Thomson Learning).
6. Joel Hass, Christopher Heil, Maurice Weir, "Thomas' Calculus", Pearson India, (13thEdition), (2016).).

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/

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)								**Semester: III**	
Course: Open Elective – I (Digital Literacy and Applications)								**Code: 25ALOE301A**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Basic computer knowledge, Familiarity with using internet and mobile devices

Course Objectives:

1. To introduce students to fundamental digital skills and online applications.
2. To enhance understanding of modern information and communication technologies (ICT).
3. To develop practical skills in digital tools, online collaboration, and data management.
4. To promote safe, ethical, and effective use of technology in professional and personal life.

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

CO1	Demonstrate proficiency in using essential digital tools for everyday tasks.
CO2	Apply safe and secure practices while using the internet and online services.
CO3	Utilize online collaboration platforms for communication and teamwork.
CO4	Develop simple digital content (documents, presentations, basic websites).
CO5	Leverage emerging digital applications for academic, professional, and social needs.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Digital Literacy**: Evolution of Digital Technology – Role of ICT in modern life – Hardware and Software basics – Overview of digital devices (Computers, Smartphones, Tablets) – Operating Systems and Applications.	04
2.	**Internet and Web Fundamentals:** Basics of Internet – Web Browsers – Search Engines – Online Communication Tools (Email, Chat, Video Conferencing) – Netiquette – Cloud Storage and File Sharing.	04
3.	**Digital Tools for Productivity:** Word Processing (MS Word/Google Docs) – Spreadsheet Fundamentals (MS Excel/Google Sheets) – Presentation Tools (PowerPoint/Canva) – Templates and Online Collaboration (Google Workspace, MS Teams).	05
4.	**Cyber Safety and Digital Ethics:** Online Security Threats – Password Management – Safe Browsing – Data Privacy	05

	– Cyberbullying – Digital Footprint – Intellectual Property Rights in the digital era.	
5.	**Social media and Online Applications:** Role of social media in Communication – Online Professional Networking (LinkedIn) – Blogging and Content Sharing Platforms – Basics of Digital Marketing – E-Governance and Online Services (Banking, Payments, Education Portals).	04
6.	**Introduction to Web and Mobile Applications**: Creating a Simple Blog/Portfolio Website (Using WordPress/Wix) – Overview of Mobile Apps for Education and Productivity – Emerging Technologies (Cloud Computing, IoT, AI) in everyday life.	04
	TOTAL	**26**

Text Books:

1. Pradeep K. Sinha, Priti Sinha, "Computer Fundamentals", BPB Publications.
2. Rajaraman, "Fundamentals of Computers", PHI Learning.

Reference Books:

1. Alan Evans, Kendall Martin, Mary Anne Poatsy, "Technology in Action", Pearson Education.
2. Daniel Scott, "Digital Literacy Unpacked", Facet Publishing.

E-Resources:

1. NPTEL: https://nptel.ac.in
2. Digital Literacy Course, Google: https://learndigital.withgoogle.com
3. Microsoft Learn: https://learn.microsoft.com
4. W3Schools Basics: https://www.w3schools.com

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)									**Semester: III**
Course: Open Elective – I (Environmental Studies)									**Code: 25ALOE301B**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Course Objectives:

1. To understand the structure and functions of ecosystems and the importance of biodiversity.
2. To study advanced energy systems and their role in sustainable development.
3. To learn concepts of natural resource management and disaster management through case studies.
4. To understand sources, impacts, and control measures of environmental pollution and waste management.
5. To create awareness about global environmental issues and environmental toxicology.
6. To gain knowledge of environmental assessment, management systems, and pollution control tools.

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

CO1	Understand the structure and functions of major ecosystems and the significance of biodiversity conservation
CO2	Evaluate various advanced energy systems in terms of their merits, demerits, and global applications
CO3	Apply concepts of natural resource management and disaster management using relevant case studies.
CO4	Analyse the sources, impacts, and control measures of environmental pollution and waste management practices.
CO5	Assess global environmental concerns and suggest sustainable solutions for issues like climate change and groundwater depletion.
CO6	Utilize environmental management tools and prepare environmental impact assessments following legislative guidelines.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Ecosystems** (Structure and Function): Forest, Desert, Wetlands, River, Oceanic and Lake. Biodiversity: Types, Value, Hot-spots, Threats and Conservation of biodiversity, Forest Wealth and Deforestation.	05
2.	**Advances in Energy Systems** (Merits, Demerits, Global Status and Applications): Hydrogen, Solar, OTEC, Tidal and Wind. Natural Resource Management (Concept and case-studies): Disaster Management, Sustainable mining, case studies, and Carbon Trading.	04

3.	**Environmental Pollution** (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, Case-studies): Surface and Groundwater Pollution, Noise pollution, Soil Pollution and Air Pollution. **Waste Management & Public Health Aspects**: Bio-medical Wastes, Solid waste, Hazardous wastes, E-wastes, Industrial and Municipal Sludge.	04
4.	**Global Environmental Concerns** (Concept, policies and case-studies): Groundwater depletion/recharging, Climate Change, Acid Rain, Ozone Depletion, Radon and Fluoride problem in drinking water, Resettlement and rehabilitation of people, Environmental Toxicology.	03
5.	**Latest Developments in Environmental Pollution Mitigation Tools** (Concept and applications): G.I.S. & Remote Sensing, Environmental Management Systems, ISO14001, Environmental Stewardship- NGOs.	04
6.	**Environmental Assessment, Management and Legislation** Aims and objectives of Environmental Impact Assessment (EIA), Environmental Impact Statement (EIS). EIA Guidelines, Impact Assessment Methodologies, Procedure for reviewing EIA of developmental project, Life-cycle analysis, cost benefit analysis, Guidelines for Environmental Audit.	05
	TOTAL	**26**

Text Books:

1. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T., "Environmental Encyclopedia", Jaico Publications House, 1st edition, 2000.
2. Agarwal, K.C, "Environmental Biology", Nidhi Publishers, 2nd edition, 2008.

Reference Books:

1. Erach Bharucha, "The Biodiversity of India", Mapin Publishing Pvt. Ltd., 1st Edition, 2002.
2. Brendan Gleeson and Nicholas Low (Eds.), "Global Ethics and Environment", Routledge, London, 1999.
3. Peter H. Gleick, "Water in Crisis", Pacific Institute for Studies in Development, Environment & Security, Stockholm Environment Institute, Oxford University Press, 1993.
4. Martha J. Groom, Gary K. Meffe, and Carl Ronald Carroll, "Principles of Conservation Biology", Sinauer Associates, Sunderland, 2006.
5. R. Edward Grumbine and M. K. Pandit, "Threats from India's Himalaya Dams", Science, Vol. 339, pp. 36–37, 2013.
6. Patrick McCully, "Rivers No More: The Environmental Effects of Dams", pp. 29–64, Zed Books, 1996.

E-Resources:
1. NPTEL video lecture on Environmental Impact Assessment https://www.youtube.com/watch?v=_iLdyhgFv1U 2. Sustainability Concepts - Innovations and Challenges https://www.youtube.com/watch?v=A9PGRnkLubE&list=PLbRMhDVUMngd2-jPdQSk3QNBTf2n7FxXU&index=2 3. Natural Resources Management https://www.youtube.com/watch?v=vsXv3anIBSU&list=PLwdnzlV3ogoV162m7Q1rCQamsvKWT9D08 4. Biodiversity & conservation https://www.youtube.com/watch?v=eJBfZGEzUfA&list=PLwdnzlV3ogoV162m7Q1rCQamsvKWT9D08&index=9

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)								**Semester: III**	
Course: Open Elective – I (Green Energy and Sustainability)								**Code: 25ALOE301C**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Renewable energy, power generation technology

Course Objectives:

1. To study cleaner production and life cycle assessment.
2. To understand green fuels.
3. To learn green technology and green engineering.
4. To learn waste management.
5. To study sustainable technologies.

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

CO1	Understand green technology principles, green chemistry, and process intensification for sustainable industries.
CO2	Evaluate the benefits, challenges, and environmental impact of green fuels compared to conventional fossil fuels.
CO3	Apply cleaner production principles and life cycle assessment for sustainability.
CO4	Assess waste types, audits, and management strategies with focus on health and environmental impact.
CO5	Explain sustainable technologies considering ecological, economic, and social dimensions.
CO6	Analyze practical challenges, case studies, and laws in implementing green technologies.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Principles of Green Technology and Green Engineering:** Processes and products for green safe and economically acceptable to the society, green chemistry and Process intensification. **Green Industrial Processes:** Pollution statistics from various industries. A greener approach towards all these industries.	05
2.	**Green Fuels:** Definition of Green Fuels, their benefits and challenges, comparison of green fuels with conventional fossil fuels with reference to environmental, economic and social impacts, public policies and market driven initiatives, Biomass energy: Concept of biomass energy utilization, types of biomass.	05
3.	**Cleaner Production:** Definition, Importance, Principles of Cleaner Production and its Benefits, Role	04

	Of industry, Clean development mechanism, Reuse, Recovery, Recycle, Raw material substitution- Wealth from waste. Role of CP in Achieving Sustainability, Benefits, Role of Industry, Government and Institutions, Environmental Management, Pollution Prevention and Cleaner Production Awareness Plan, Environmental Statement, Carbon credit, Carbon trading. Introduction to Life Cycle Assessment (LCA) and Elements of LCA.	
4.	**Waste Management:** Waste stream assessment (WSA), Waste generation and composition, Waste characteristics (physical and chemical), Waste audit, Health and Environmental effects (public health and environmental), Comparative assessment of waste generation and Composition of developing and developed nations, a case study results from an Indian city, Handouts on solid waste compositions. E-waste generation.	04
5.	**Sustainable Technology:** Understand the Sustainable Technology, Three principle dimensions: the ecological, the economic and the social dimension, including intergenerational justice; use a systems perspective, to describe sustainability challenges and possibilities for major technical systems and for their transformation to meet sustainability requirements.	04
6	**Challenges and Practical Implementation:** Responsibilities and potentials of companies for action. Green Productivity and emerging technologies. Implementation of the practical applications of Green emerging technologies and sustainable development. Case studies in Green Technology. Green laws compliance.	04
	TOTAL	**26**

Text Books:

1. Matlack A.S., "Introduction to Green Chemistry", Marcel Dekker Publication.
2. Modak P., Visvanathan C. and Parasnis M., "Cleaner Production Audit Environmental System Reviews", Asian Institute of Technology Publication.
3. Anastas P.T. and Warner J.C., "Green Chemistry: Theory and Practice", Oxford University Press.
4. Bishop P. L., "Pollution Prevention: Fundamentals and Practice", McGraw-Hill Publication, Boston.
5. Clark J.H. and Macquarie D.J., "Handbook of Green Chemistry and Technology", Wiley Blackwell Publication.

Reference Books:

1. Sawyer C.N, McCarty P.L and Parkin G.F., "Chemistry for Environmental Engineering and Science", 5th ed. McGraw-Hill Professional Publication.
2. Paul L Bishop, "Pollution Prevention: Fundamentals and practice", McGraw-Hill International Publication.
3. Das A. K, "Environmental Chemistry with Green Chemistry", Books and Allied (P) Ltd. Publication.
1. V.K. Ahluwalia, "Green Chemistry Environmentally Benign Reactions", springer publication.
2. V.K. Ahluwalia, Ane. "Green Chemistry: Environmentally Benign Reactions", springer publication.
3. Mike Lancaster, "Green Chemistry: An Introductory Text", Royal Society of Chemistry publication.

E-Resources:

1. NPTEL Course on "Energy Resources, Economics and Sustainability", By Prof. Pratham Arora, IIT Roorkee,
https://onlinecourses.nptel.ac.in/noc25_hs86/preview

2. NPTEL Course on "Sustainable Energy Technology", By Prof. Sayak Banerjee, IIT Hyderabad.
https://onlinecourses.nptel.ac.in/noc23_me138/preview

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)								**Semester: III**	
Course: Open Elective – I (Basics of Consumer Electronics)								**Code: 25ALOE301D**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Basic understanding current, voltage, and electronics components

Course Objectives:

1. Understand principles and components of audio, video, and communication systems.
2. Develop practical skills in installation, operation, and maintenance of electronics.
3. Prepare students for technical roles in electronics service and support industry.

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

CO1	Understand the working principles and components of basic audio systems and home theatre setups.
CO2	Explain the functioning of modern video display technologies and remote-control operations.
CO3	Identify and describe the types, specifications, and working of projectors and CCTV systems.
CO4	Describe satellite communication principles and DTH system setup and components.
CO5	Explain the construction, working, and common issues in basic household appliances like washing machines, mixers, and induction cooktops.
CO6	Understand the operation and features of kitchen and office equipment such as microwave ovens, printers, and scanners.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Audio Systems:** Introduction to audio systems, Audio amplifier, Microphone, Loudspeaker, Public address system, DJ system: concept and components, Audio as Data and Signal, Digital Audio Processes: Time Compression & Expansion, Block diagram and working of home theatre system	05
2.	**Video Systems and Display Technologies:** Elements of TV communication system, Scanning process and its necessity, Comparison: CRT, LCD, and LED TVs, LCD and LED TV: principles and section-wise working, 3D TV: Basic working principle, IPS panels and features, Interfaces: HDMI, USB, RGB, etc., TV remote control: types, IR code transmission/reception, functions, faults	05
3.	**Projectors and Surveillance Systems:** LCD vs. LED Projectors: differences and specs, Working principle and faults in	04

	LED projectors, CCTV Cameras: types and specifications, CCTV setup and components, Digital Video Recorders: types and working	
4.	**Satellite Communication and DTH Technology:** Basics of satellite communication, Merits, demerits, and applications, Satellite types, orbits, frequency bands, Components of DTH: PDA, LNBC, satellite receiver, dish alignment, Cable types, impedance, MDU design, Set Top Box: block diagram, features, I/O ports, Cable modem termination system, software, CPE	04
5.	**Domestic Appliances – Part I**: Washing Machines: types, parts, block diagrams, timers, motors, Vacuum Cleaner: block diagram, working, features, motors, circuits, Mixer/Grinder: parts, speed control, auto overload protection, Electric Iron & Steam Iron: principle, thermostat, parts, Water Purifiers: RO/UV principles, components, faults, Immersion Heater: working, insulation, Induction Cooktop: principle, tubes, heat sinking, fault identification	04
6.	**Domestic Appliances – Part II and Office Equipment:** Microwave Oven: types, block & wiring diagram, microwave generation, Food Processors: parts and working, Printers: dot matrix, inkjet, laser; advantages, disadvantages, connectivity, Digital Electronic Lock, Xerox Machine, Scanner, Fax Machine	04
	TOTAL	**26**

Text Books:

1. S. P. Bali, "Consumer Electronics", 1st Edition, Paperback, English.
2. B. R. Gupta, "Consumer Electronics", Paperback, English.
3. Dr. J. S. Chitode, "Consumer Electronics – A Conceptual Approach".
4. Douglas Kinney, "A Beginner's Guide to Consumer Electronics Repair: Handbook and Tutorial".
5. Anand, "Consumer Electronics".
6. H. Davidson, "Troubleshooting Consumer Electronics Audio Circuits".

Reference Books:

1. Dennis Roddy, "Satellite Communications", McGraw Hill.
2. R. G. Gupta, "Audio Video Systems – Principles, Maintenance and Troubleshooting", Tata McGraw-Hill.
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press.
4. S. P. Sharma, "Appliance Servicing and Repair Guide", Katson Books

E-Resources:
1. Audio System Engineering (IIT Kharagpur), Course page: https://nptel.ac.in/courses/117/105/117105133 2. Satellite Communication & DTH NOC: Satellite Communication Systems (IIT Kharagpur) Course page: https://archive.nptel.ac.in/courses/117/105/117105131/

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)									**Semester: III**
Course: Open Elective – I (Renewable Energy Systems)									**Code: 25ALOE301E**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Fundamentals of Mechanical Engineering, Physics, Thermodynamics

Course Objectives:

1. Discuss the global and national energy scenarios and environmental impacts and sustainability concerns associated with fossil fuel use.
2. Identify and explain the working principles of solar radiation measuring instruments including pyrheliometers, pyranometers, and sunshine recorders.
3. Classify various types of wind-mills and describe their structural components.
4. Introduce biomass as an energy source and describe biomass conversion technologies.
5. Describe the construction, working, and applications of various renewable energy sources.

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

CO1	Identify and describe the main types of renewable energy sources and their respective limitations.
CO2	Compare various types of solar collectors based on design and performance.
CO3	Identify and explain factors affecting wind characteristics and wind energy generation.
CO4	Interpret the advantages and limitations of biomass energy in comparison with other renewable sources.
CO5	Apply energy conversion principles to assess the feasibility of alternative energy systems.
CO6	Compare the suitability of renewable energy technologies (like fuel cells) for specific applications.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Renewable Energy:** Environmental consequence of fossil fuel, Limits Of Fossil Fuel, Energy Scenario, Classification of Energy Sources, types of renewable energy sources, limitations.	04
2.	**Solar Energy:** Environmental impacts of solar energy, Solar radiation measurements, Solar constant, Solar Radiation Measuring Instruments (Radiometers): Pyrheliometers, Pyranometers, Sunshine recorder, classification of solar collectors	05
3.	**Wind Energy:** Factors affecting the wind, Classification of Wind-mills, Main Components of a wind-mill, wind speed prediction, Advantages of Fixed and variable speed	04
	systems,	

4.	**Biomass Energy:** Introduction, Biomass Conversion, Types of biogas plants: Floating dome type, Fixed dome type, Biodiesel, Significance of biodiesel	04
5.	**Other Forms of Renewable Energy Sources**: Introduction, hydro energy, geothermal energy, wave & tidal energy, Energy Conversion Principles, Environmental considerations	04
6.	**Applications of Renewable Energy Sources**: Photovoltaic (PV) cell, Solar water heater, Crop And Grain Drying, Space And Water Heating, Solar Energy Applications for Agriculture, Fuel Cell	05
	TOTAL	**26**

Text Books:

1. S. P. Sukhatme and J. K. Nayak, "Solar Energy: Principles of Thermal Collection and Storage", 3rd Edition, Tata McGraw-Hill Education Pvt. Ltd., 2008.
2. J. Twidell and Tony Weir, "Renewable Energy Resources", 2nd Edition, Taylor & Francis, 2006.
3. B. H. Khan, "Non-Conventional Energy Resources", 2nd Edition, Tata McGraw-Hill Education Pvt. Ltd., 2009.
4. Prabir Basu, "Biomass Gasification, Pyrolysis and Torrefaction", Academic Press, Elsevier, 2013.

Reference Books:

1. O. P. Gupta, "Energy Technology", Khanna Book Publishing, New Delhi.
2. V. V. N. Kishore, "Renewable Energy Engineering and Technology: Principles and Practice", Routledge, 1st Edition, 2019.
3. N. Jenkins and J. Ekanayake, "Renewable Energy Engineering", Cambridge University Press, 1st Edition, 2017.
4. G. Boyle, "Renewable Energy", OUP Oxford, 2nd Edition, 2009.

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc22_ph44/preview
2. https://nptel.ac.in/courses/103103206
3. https://onlinecourses.swayam2.ac.in/nou22_ge71/preview
4. https://www.coursera.org/specializations/renewable-energy
5. https://www.coursera.org/learn/exploring-renewable-energy
6. https://www.youtube.com/watch?v=VfowJHJz6-s

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

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

Prerequisites:

Strategic thinking, natural, formal and informal logic, Conceptual clarity, logical reasoning, analytical mind

Course Objectives:

1. To acquire basic knowledge of problem classification, identification, formulation and root cause analysis.
2. To understand the structured way of solving problems with the various right tools and techniques.
3. To understand process of creative problem solving and decision making.

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

CO1	Classify problems, able to define the problem statement precisely by analysing its root cause.
CO2	Demonstrate solution of various problems using Fishbone and five why techniques.
CO3	Apply tools to create new ideas using SCAMPER and carry out decision making scientifically.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Fundamentals of Problem Solving:** Problem definitions, Classifications of problems-Simple and complex, structured, semi structured and unstructured problems with real life technical and non-technical examples, problem solving techniques- Root cause Analysis	09
2.	**Tools and techniques of Problem Solving:** Fishbone Diagram (Ishikawa or Cause-and-Effect Diagram), 5 Whys technique, Demonstration of technique through case studies, parametric study of various problem finding in various sectors and its scientific approach (campus, manufacturing firm, environment, highways, students' fraternity, water and air pollution, national security etc.)	08
3.	**Creative Problem Solving and Decision making:** Creativity, types of innovation, blocks of creativity, three components of creativity, Tools for defining existing problems and creation of new ideas, data collection and fact findings, Decision making, its tools, risk analysis, Delphi technique, SCAMPER technique	09
	TOTAL	**26**

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.

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: III**
Course: Electronics Workshop									**Code: 25ECVS304**
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. To familiarize students with the usage of electronic simulators.
2. To enable students to practically understand error analysis, bridge circuits, and waveform measurements.
3. To expose students to sensors and transducers used in automation systems.

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

CO1	Understand and apply basic MATLAB commands to perform matrix operations and plotting
CO2	Implement basic electronic circuit components in Multisim.
CO3	Understand microcontroller architecture and basic programming concepts.
CO4	Create and edit PCB layouts
CO5	Develop a PCB

Course Contents:

List of Experiments:

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
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
9. Introduction to Proteus
10. Basic Microcontroller Applications such as LED blinking
11. Sensor Interfacing
12. Introduction to PCB software
13. Schematic and PCB layout Design
14. To study PCB Etching Process

Text Books :

1. MATLAB for Engineers – Holly Moore
2. Electronic Instrumentation by H.S. Kalsi – McGraw Hill
3. Circuit Analysis with Multisim – David Báez-López and Félix Guerrero-Castro
4. PCB Design for Real-World Design Engineers – Chris Schroeder
5. Modern Electronic Instrumentation and Measurement Techniques – Helfrick & Cooper

Reference Books:

1. Electrical and Electronic Measurements and Instrumentation – A.K. Sawhney
2. Electronic Measurements and Instrumentation – D.V.S. Murthy

E-Resources:

1.	NPTEL Videos	NPTEL Course on Electronic Measurements
2.	Virtual Labs	IIT Virtual Lab – Electrical Measurements
3.	Simulations	NI Multisim, Proteus, LTspice
4.	Tutorials	All About Circuits, Electronics Tutorials

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: III**
Course: Project Based Learning									**Code: 25ECCE301**
Teaching Scheme				**Evaluation Scheme**					
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%)

Learning Resources

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". 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.
4. 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.
2. What is PBL? Buck Institute for Education.
3. www.howstuffworks.com.
4. Condliffe, Barbara. "Project-Based Learning: A Literature Review. Working Paper." MDRC (2017).
5. Activity-Based Learning.

NPTEL Resources:

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

BACK TO STRUCTURE

Liberal Learning - III

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Guitar)								**Code: 25ECCC305A**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Basic knowledge of Indian classical music and Guitar musical instrument.

Course Objectives:

1. To develop advanced guitar techniques, including scales, arpeggios, fingerstyle, and lead guitar skills.
2. To strengthen students' understanding of music theory, chord construction, harmony, improvisation, and melodic phrasing.
3. To enhance ensemble performance, stage confidence, musical communication, and readiness for intermediate-level performances.

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

CO1	Perform advanced scales, arpeggios, chord progressions, and fingerstyle techniques with accuracy.
CO2	Apply music theory concepts in lead guitar playing, improvisation, and melodic expression.
CO3	Demonstrate confident solo and ensemble performances with effective musical expression and stage readiness.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Revision of Semester II concepts, Warm-up & Finger Independence	2
2.	Major & Minor Scale Revision (Two Octaves)	2
3.	Pentatonic Scales & Blues Scale	2
4.	Arpeggios and Picking Exercises	2
5.	Chord Construction & Extended Chords (7th, Maj7, m7)	2
6.	Chord Progressions in Different Keys	2
7.	Fingerstyle Techniques – Patterns & Independence	2

8.	Lead Guitar Techniques – Hammer-ons, Pull-offs, Slides	2
9.	Improvisation using Pentatonic Scale	2
10.	Genre-based Playing (Blues, Rock, Pop)	2
11.	Ensemble Playing & Rhythm Coordination	2
12.	Solo Performance Practice & Individual Corrections	2
13.	Mock Performance & Stage Preparation	2
	TOTAL	**26**

Text Books:

1. Hal Leonard Corporation, "Hal Leonard Guitar Method – Complete Edition", Hal Leonard Publications.
2. Mel Bay, "Modern Guitar Method – Grades 1, 2 & 3", Mel Bay Publications.
3. William Leavitt, "A Modern Method for Guitar (Books 1–3)", Berklee Press.
4. Richard Chapman, "The Complete Guitar Manual", DK Publishing.
5. Ralph Denyer, "The Guitar Handbook", Knopf Publishing..

Reference Books:

1. Troy Stetina, "Fretboard Mastery", Hal Leonard Publications.
2. Tom Kolb, "Music Theory for Guitarists", Hal Leonard Publications.
3. Don Latarski, "Practical Theory for Guitar", Alfred Music.
4. Bruce Buckingham, "Scales and Modes for Guitar", Hal Leonard Publications.
5. Mark Phillips and Jon Chappell, "Guitar For Dummies", Wiley Publishing.

E-Resources:

1. **Berklee Online** – Guitar lessons, music theory, ear training, and performance resources. https://online.berklee.edu
2. **Justin Guitar** – Structured guitar lessons from beginner to advanced. https://www.justinguitar.com
3. **Fender Play** – Interactive lessons on chords, scales, techniques, and songs. https://www.fender.com/play
4. **TrueFire** – Professional online guitar courses covering multiple genres and techniques. https://truefire.com
5. **Ultimate Guitar** – Tabs, chord charts, scales, and community resources. https://www.ultimate-guitar.com
6. **MuseScore** – Free music notation software and sheet music library. https://musescore.org
7. **MusicTheory.net** – Interactive music theory lessons and exercises.

https://www.musictheory.net

8. **Yamaha Music India** – Educational resources on guitar fundamentals and musicianship. https://in.yamaha.com

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Singing)								**Code: 25ECCC305B**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Basic knowledge of Indian classical music in singing.

Course Objectives:

1. To develop students' understanding of prescribed ragas and talas through theoretical and practical study.
2. To enhance vocal skills through Alankar practice in Shuddha and Vikrit (Komal) Swaras and different musical forms.
3. To strengthen rhythmic knowledge, musical expression, voice culture, and stage performance skills.

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

CO1	**Demonstrate** understanding of prescribed ragas, talas, and Alankars through accurate vocal performance.
CO2	**Apply** rhythmic patterns such as Bhajani Theka and Jhaptal in prescribed vocal compositions.
CO3	**Perform** festival songs, ghazals, and vocal compositions with proper pitch, voice control, musical expression, and stage confidence.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Detailed Study of Prescribed Ragas: Raga Bageshree ,Raga Des, Raga Khamaj	6
2.	Study of Prescribed Talas: Bhajani Theka, Jhaptal	4
3.	Basic theory concepts	2
4.	Identification of Raga Characteristics and Tala Structure	2
5.	Festival Songs	2
6.	Gazals	2

7.	Soulful / Light Vocal Songs	2
8.	Interpretation and Presentation of Different Song Styles	2
9.	Practice of Ten Alankars in Shuddha/ Komal swaras	2
10.	Alankars based on the Prescribed Ragas	2
	TOTAL	**26**

Text Books:

1. V. N. Bhatkhande, "Kramik Pustak Malika (Vol. III & IV)", Publications.
2. V. D. Paluskar, "Sangeet Bal Prakash", Publications.

Reference Books:

1. V. N. Bhatkhande, "Hindustani Sangeet Paddhati (Vol. I–IV)", Publications.
2. Ashok Da. Ranade, "Hindustani Music: Tradition in Transition", Publications.
3. S. N. Ratanjankar, "Abhinav Geet Manjari", Publications.

E-Resources:

1. Sangeet Natak Akademi - All India Radio (Akashvani)
2. SwarGanga Music Foundation
3. YouTube – Sangeet Natak Akademi Channel
4. Digital Tanpura and Tabla Applications (e.g., iTanpura, Riyaz, NaadSadhana)

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Cinematography)								**Code: 25ECCC305C**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

A basic understanding of film theory, Camera operation, Lighting techniques and visual storytelling is essential for cinematography.

Course Objectives:

1. To identify and operate camera equipment while understanding camera functions and exposure settings.
2. To develop skills in composition, framing, perspective, and lighting techniques.
3. To create visual stories through different photography genres and creative image-making.
4. To apply basic photo editing and post-processing techniques using editing software.

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

CO1	Operate cameras and apply appropriate settings, exposure, and lighting techniques to capture quality photographs.
CO2	Compose visually appealing photographs using principles of composition, design, and creative framing.
CO3	Capture photographs across different genres such as portrait, landscape, product, event, and wildlife photography.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Introduction to Videography	2
2.	Basics of Video Camera operations	2
3.	Techniques for steady shooting (Tripod, Gimble)	2
4.	Basics shot types (Wide, Medium, Close-up)	2
5.	Basics shot types (Wide, Medium, Close-up)	2
6.	Camera Movement (Pan, Tilt, Roll)	2
7.	Practical	2
8.	Composition Technique - Focus and Depth of field	2
9.	Natural vs artificial lighting	2
10.	Practical	2
11.	Filming Techniques	2
12.	Audio Recording	2
13.	Practical Session	2
	TOTAL	**26**

Text Books:
1. Peterson, B., "Understanding Exposure – Theory + Fundamentals", Amphoto Books. 2. Kelby, S., "The Digital Photography Book – Practical + Shooting", Rocky Nook.
Reference Books:
1. Langford, M., "Langford's Basic Photography – Technical Concepts", Focal Press. 2. Freeman, M., "The Photographer's Eye – Composition, Visual Balance, Framing, Perspective", Ilex Press.
E-Resources:
1. https://www.youtube.com/watch?v=xKRh4PI-BKg 2. https://www.youtube.com/@StudioBinder/videos

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Dance)								**Code: 25ECCC305D**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Good stamina, flexibility and familiarity with simple rhythmic patterns and beats.

Course Objectives:

1. To strengthen students' technical proficiency through advanced Adavus, Jathis, and rhythmic patterns.
2. To develop expressive skills (Abhinaya) by interpreting simple classical compositions.
3. To enhance coordination, balance, posture, and stage presence through regular practical training.
4. To introduce students to intermediate Bharatanatyam repertoire such as Jatiswaram and improve performance skills.

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

CO1	Demonstrate dance techniques with precision, balance, posture, and rhythmic accuracy.
CO2	Apply musicality, synchronization, expression, and storytelling in solo and group performances.
CO3	Create dance combinations using choreography principles with confidence, creativity, and stage presence.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Introduction to forms and previous year revision	2
2.	Choreography on song/ composition	6
3.	Application and introduction to emotions for better understanding of movements	4
4.	Rhythm and rhythmic movements	6
5.	Introduction to different forms other than the teaching format	2
6.	Insights to choreographies and partner motions in folk forms	4
7.	Mock performance training and presentation with costumes	2
	TOTAL	**26**

Text Books:

1. Bharata Muni, "Natya Shastra", translated by Manomohan Ghosh, Asiatic Society, Kolkata.
2. Nandikeshvara, "Abhinaya Darpana", translated by Manomohan Ghosh.
3. Balasaraswati, T., "Bharatanatyam", Madras Music Academy.
4. Krishna Iyer, E., "Bharatanatyam", Ganesh & Co., Chennai.

Reference Books:

1. Kothari, Sunil, "Bharatanatyam", Marg Publications, Mumbai.
2. Vatsyayan, Kapila, "Classical Indian Dance in Literature and the Arts", Sangeet Natak Akademi.
3. Subramaniam, Padma, "Bharata's Art: Then and Now", Bharata Ilango Foundation.
4. Vatsyayan, Kapila, "Indian Classical Dance", Publications Division, Government of India.
5. Srinivasan, Priya, "Sweating Saris: Indian Dance as Transnational Labor", Temple University Press.
6. Sangeet Natak Akademi, "Bharatanatyam – A Reader", Sangeet Natak Akademi, New Delhi.

E-Resources:

1. https://youtu.be/XONKu803dAk?si=LkLbNKPUvKpfZJkF
2. https://youtu.be/D0Ow529EHSo?si=upTtBpNp1lODzHMq
3. https://youtu.be/JDfYT3Ax7mE?si=Q9VYWj95cnLikw2V
4. https://youtu.be/GcZJMiHds3U?si=AXAMwJ37YuDEVbTF
5. https://youtu.be/2j9KmG25l8g?si=zH9rKV-VY7RPirgD

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Synthesizer/Keyboard)								**Code: 25ECCC305E**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Basic knowledge of Indian classical music and Keyboard musical instrument.

Course Objectives:

1. To strengthen students' understanding and practical application of major/minor scales, chords, chord progressions, and inversions.
2. To develop skills in Western Staff Notation, accompaniment techniques, melody integration, and left-hand coordination.
3. To enhance technical proficiency, musical expression, rhythmic accuracy, ensemble coordination, and stage confidence.

Course Outcomes:

CO1	Apply scales, chords, chord progressions, and inversions in keyboard performance.
CO2	Perform musical compositions using Indian and Western Staff Notation with suitable accompaniment techniques.
CO3	Demonstrate technical proficiency, musical interpretation, ensemble coordination, and stage confidence.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Revision of all Major Scales	2
2.	Revision of all Minor Scales (Natural, Harmonic & Melodic)	2
3.	Revision of Major and Minor Chords,	2
4.	Revision of Chord Progression, Family chords, Chords Inversion	2
5.	Playing Simple Songs with Indian Notation	2
6.	Introduction to Staff Notation	2

7.	Understanding the Difference between Indian and Western Staff Notation	2
8.	Reading and Playing Simple Melodies from Staff Notation	2
9.	Playing Songs using Both Indian and Staff Notation	2
10.	Fundamentals of Keyboard Accompaniment	2
11.	Accompaniment using Major and Minor Chords	2
12.	Accompaniment with Scales and Simple Songs	2
13.	Group Performance	2
	TOTAL	**26**

Text Books:

1. Aaron, M., "Michael Aaron Piano Course – Grade 2", Alfred Music.
2. Thompson, J., "John Thompson's Modern Course for the Piano – Second Grade", Willis Music.
3. Hanon, C. L., "The Virtuoso Pianist in Sixty Exercises", G. Schirmer.
4. Agay, D., "Learning to Play Piano – Book 2", Yorktown Press.

Reference Books:

1. Thompson, J., "Modern Course for the Piano", Willis Music.
2. Aaron, M., "Piano Course", Alfred Music.
3. Hanon, C. L., "The Virtuoso Pianist", G. Schirmer.
4. Harrison, M., "Contemporary Music Theory", Hal Leonard.
5. ABRSM, "Music Theory in Practice (Grades 1–5)", Associated Board of the Royal Schools of Music.

E-Resources:

1. https://www.youtube.com/watch?v=5nA245TZvBY
2. https://www.youtube.com/watch?v=h4YGP7GyZNU&list=PLUPHIkAcHm-SvoAmFIkec2STxRdvJnYYF

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Basketball)								**Code: 25ECCC305F**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop fundamental basketball skills, physical fitness, teamwork, and understanding of rules and strategies to enable effective participation and performance in the game.

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

CO1	Demonstrate basic basketball skills such as dribbling, passing, shooting, and defensive fundamentals effectively.
CO2	Apply offensive and defensive strategies, including transition play, during gameplay and scrimmages.
CO3	Understand and implement basketball game rules and referee gestures accurately in practical situations.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Fundamentals Skill Review:** Refresh all core basketball skills. Perform all basic techniques confidently.	2
2.	**Skill Circuit:** Practice all basic skills in rotation. Improve overall basketball fundamentals.	2
3.	**Small Group Practice:** Apply skills in partner and group activities. Work effectively with teammates.	2
4.	**Player Stance & Footwork:** Improve movement and body balance. Apply proper stance during movement.	2
5.	**Passing Under Movement:** Practice passing while changing positions. Execute accurate passes while moving.	2

6.	**Dribbling Around Cones:** Improve control through obstacle drills. Maintain dribbling control in different directions.	2
7.	**Assessment- V**	2
8.	**Shooting Practice:** Practice shooting from different spots. Improve shooting accuracy.	2
9.	**Rebounding Drills:** Practice timing and ball recovery. Perform effective rebounding.	2
10.	**Individual Defense:** Practice defensive movement in simple drills. Apply defensive techniques effectively.	2
11.	**Body Technique:** Improve body positioning and balance. Demonstrate better body control.	2
12.	**Combined Fundamental Drills:** Integrate all basketball skills. Execute skills smoothly in sequence, Practice skills with a partner. Improve teamwork and communication	2
14.	**Assessment – VI**	2
	TOTAL	**26**

Text Books:

1. FIBA, "Official Basketball Rules", International Basketball Federation (FIBA)
2. Dr. James Naismith, "Basketball: Its Origin & Development",
3. John R. Wooden, "Practical Modern Basketball", Allyn & Bacon

Reference Books:

1. James Naismith – Basketball: Its Origin and Development – University of Nebraska Press.
2. Jerry V. Krause & Don Meyer – Basketball Skills & Drills – Human Kinetics

E-Resources:

1. Rules of Basketball : How to Play Basketball : Basketball Rules for Beginners
2. How To Dribble A Basketball For Beginners! Basketball Basics for Kids Basketball Training
3. How To Shoot A Basketball For Beginners! Basketball Basics [SECRETS]
4. Basketball: Rebounding

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Cricket)								**Code: 25ECCC305G**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop basic cricket skills. Fitness, teamwork, and knowledge of rules and strategies for effective game performance.

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

CO1	Analyze batting, bowling, fielding, and match strategies across T20, ODI, and Test cricket formats.
CO2	Apply tactical decision-making, leadership, field placements, and performance analysis during competitive matches.
CO3	Demonstrate effective cricket performance by integrating sports psychology, nutrition, injury prevention, and technology in match situations.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Batting Strategies:** Build innings in different formats	2
2.	**Bowling Plans:** Field settings and tactical bowling	2
3.	**Captaincy & Leadership:** Decision-making and leadership	2
4.	**Match Strategy:** Powerplay, middle overs, death overs	2
5.	**T20 Cricket Strategies:** Aggressive tactics	2
6.	**ODI Cricket Strategies / Test Cricket Strategies:** Rotation of strike and partnerships / Patience and long-form tactics	2
7.	**Assessment – V**	2
8.	**Advanced Field Placements:** Offensive and defensive setups	2
9.	**Sports Psychology:** Confidence and concentration	2
10.	**Nutrition for Cricketers:** Performance nutrition	2
11.	**Injury Prevention & Recovery:** Basic sports medicine	2
12.	**Technology in Cricket:** DRS, Hawk-Eye, performance analysis	2
14.	**Assessment – VI**	2
	TOTAL	**26**

Text Books:
1. Sanjay Manjrekar, "Cricket Fundamentals", Orient BlackSwan 2. Ravi Shastri, "Winning Cricket: Skills and Strategies", Notion Press 3. R. Sridhar, "Coaching Beyond", Rupa Publications India
Reference Books:
1. Rob Eastaway, "Cricket Explained: From Grubbers to Googlies", St. Martin's Griffin 2. Surendra Shrivastava, "Cricket – Khel Aur Niyam", Prabhat Prakashan
E-Resources:
1. Sports and Performance Nutrition, IIT Madras, https://onlinecourses.nptel.ac.in/noc24_hs82/ 2. How to Play Cricket 3. Cricket rules explained in 2 minutes 4. Every Cricket Shot Explained in 21 Minutes

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Rifle and Pistol Shooting)								**Code: 25ECCC305H**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop safe shooting skills, accuracy concentration, and proper shooting techniques in students. It also aims to build discipline, confidence and prepare shooters for competitive events.

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

CO1	Explain safe rifle handling, range discipline, equipment, and match procedures.
CO2	Demonstrate proper shooting techniques, physical coordination, and shooting posture.
CO3	Apply mental focus, concentration, and scientific principles to improve shooting performance.
CO4	Demonstrate sportsmanship, discipline, and overall proficiency in competitive shooting.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Recoil Management:** How to avoid recoil	2
2.	**Loading and Unloading Procedures: P**rocedure to load a gun.	2
3.	**Malfunction Identification and Clearance:** What is malfunction and its solutions	2
4.	**PGun Cleaning and Maintenance:** Process to open a gun and clean it	2
5.	**Ammunition Types and Selection:** Selecting a perfect ammunition from different ammunition companies	2
6.	**Environmental Effects on Shooting:** Effect on a shot of environment	2
7.	**Assessment – V**	2
8.	**Scoring Systems:** How to read score.	2
9.	**Competition Rules:** Explaining the rules and commands	2
10.	**Match Preparation:** Physical and mental preparation of a shooter for match	2
11.	**Mental Conditioning and Concentration:** Making a shooter mentally strong and increasing concentration process	2
12.	**Time-Controlled Shooting:** Procedure to fire a shot in given time	2
13.	**Assessment – VI**	2
	TOTAL	**26**

Text Books:

1. International Shooting Sport Federation (ISSF), "ISSF Official Statutes, Rules and Regulations", International Shooting Sport Federation (ISSF)

2. National Rifle Association (NRA), "The NRA Guide to the Basics of Pistol Shooting", National Rifle Association of America
3. National Rifle Association (NRA), "The NRA Guide to the Basics of Rifle Shooting", National Rifle Association of America

Reference Books:

1. National Rifle Association (NRA), "The Fundamentals of Rifle Marksmanship", National Rifle Association of America
2. International Shooting Sport Federation (ISSF), "ISSF Official Statutes, Rules and Regulations", International Shooting Sport Federation (ISSF)
3. National Rifle Association (NRA), "The NRA Guide to the Basics of Pistol Shooting", National Rifle Association of America
4. National Rifle Association (NRA), "The NRA Guide to the Basics of Rifle Shooting", National Rifle Association of America

E-Resources:

1. Introduction to Exercise Physiology & Sports Performance, IIT Madras, https://nptel.ac.in/courses/109106406
2. Open Sight Air Rifle Shooting Sports For Beginners. @TheGunzoneNetwork - YouTube
3. Basics of the Standing Position | Sauer Academy
4. The Ideal Air Rifle Shooter with Abhinav Bindra [IND]

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Volleyball)								**Code: 25ECCC305I**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To equip participants with the essential skills and knowledge of volleyball, enabling them to perform fundamental techniques, understand basic rules, and participate in basic gameplay scenarios confidently.

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

CO1	Explain safe rifle handling, range discipline, equipment, and match procedures.
CO2	Demonstrate proper shooting techniques, physical coordination, and shooting posture.
CO3	Apply concentration, mental focus, and scientific principles to improve shooting performance.
CO4	Demonstrate discipline, sportsmanship, and overall proficiency in competitive shooting.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Double Blocking Technique:** Introduction to double blocking, stance and ready position, footwork for lateral movement, timing the jump with the attacker, hand positioning over the net, coordination between middle and wing blocker, drills on blocking angles and recovery.	2
2.	**Advance Digging:** Advanced defensive posture, digging against hard-driven spikes, rolling and diving techniques, pancake save, anticipation and reading the attacker, transition from defense to offense, reaction drills**.**	2
3.	**Advance Setting:** Jump setting, back setting, quick setting, setting accuracy under pressure, decision-making, communication with hitters, setter movement and transition drills.	2
4.	**Cross Court And Line Spiking:** Approach mechanics, body positioning, wrist action, cross-court attack, line attack, shot placement, attacking against blockers,	2

	controlled hitting drills**.**	
5.	**Advanced Blocking:** Single, double and triple blocking strategies, reading setter intentions, block coverage, penetration over the net, transition after blocking, tactical blocking drills.	2
6.	**Libero Skills:** Role and responsibilities of the libero, serve receive, defensive positioning, emergency setting, court communication, floor defense techniques, specialized libero drills.	2
7.	**Assessment – V**	2
8.	**Offensive Systems (5-1):** Introduction to the 5–1 offensive system, player rotations, setter responsibilities, transition from defense to offense, positional responsibilities, team coordination.	2
9.	**Offensive Combinations:** Quick attacks, tandem attack, slide attack, combination plays, synchronization between setter and attackers, offensive communication and execution drills.	2
10.	**Team Defensive System:** Perimeter defense, rotational defense, block-defense coordination, defensive coverage, court positioning, communication, transition to counterattack.	2
11.	**Tactical Serving:** Float serve and jump serve placement, serving strategies against different formations, targeting weak receivers, serving under pressure, tactical decision-making.	2
12.	**Competitive Match Practice:** Full competitive matches following official rules, tactical implementation, referee signals, teamwork, leadership, sportsmanship, and post-match performance evaluation.	2
13.	**Assessment – VI**	2
	TOTAL	**26**

Text Books:

1. Fédération Internationale de Volleyball (FIVB), "Official Volleyball Rules", FIVB Publications
2. Bonnie Kenny & Cindy Gregory, "Volleyball: Steps to Success", Human Kinetics
3. Anita Bean, "The Complete Guide to Sports Nutrition", Bloomsbury Sport
4. Ian Jeffreys, "The Warm-Up", Human Kinetics

Reference Books:

1. Pete Waite, "Aggressive Volleyball", Human Kinetics
2. Bob Bertucci, "Volleyball Drill Book", Human Kinetics

E-Resources:
1. Volleyball Rules : How to Play Volleyball : The Rules of Volleyball EXPLAINED! 2. 6 Basic Skills in Volleyball - YouTube 3. Everything You Need to Know About the Game of Volleyball - YouTube

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: III**	
Course: Liberal Learning – III (Football)								**Code: 25ECCC305J**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To enhance football players' technical skills, tactical understanding, physical fitness, teamwork, and sportsmanship, fostering a comprehensive understanding and appreciation of the game.

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

CO1	Explain attacking, defensive, formation, and set-piece principles in football.
CO2	Apply possession, counter-attacking, and transition strategies in match situations.
CO3	Analyze performance using psychology, nutrition, injury management, and technology.
CO4	Demonstrate teamwork, decision-making, and tactical skills during matches.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Principles of Attack:** Understand and apply the principles of attack, including creating space, supporting teammates, progressing the ball, and creating goal-scoring opportunities.	2
2.	**Principles of Defense**: Understand and apply the principles of defense, including pressure, cover, balance, marking, and communication to effectively prevent opponents from scoring.	2
3.	**Team Formations:** Understand and apply different team formations to improve player positioning, tactical organization, and overall team performance.	2
4.	**Transition Play:** Understand and apply effective transition play by quickly switching between attacking and defensive phases to maintain team advantage.	2
5.	**Possession-Based Football:** Develop possession-based football skills by improving ball retention, passing accuracy, movement, and decision-making to control the game effectively.	2
6.	**Counter-Attacking Football:** Understand and apply counter-attacking principles by transitioning quickly from defense to attack through speed, movement, and	2

	effective decision-making.	
7.	**Assessment-V**	2
8.	**Set-Piece Organization**: Understand and apply set-piece organization by developing effective attacking and defensive strategies for free kicks, corners, and restarts.	2
9.	**Sports Psychology**: Develop mental skills such as confidence, focus, motivation, resilience, and decision-making to enhance football performance and overall sporting attitude.	2
10.	**Injury Management**: Understand basic injury management practices, including prevention, immediate care, recovery strategies, and safe return-to-play procedures for football players.	
11.	**Technology in Football:** Understand the role of technology in football by exploring tools for performance analysis, player development, match decisions, and injury prevention.	2
12.	**Full Match Analysis:** Analyze full match performance by evaluating tactics, player decisions, team organization, strengths, and areas for improvement.	2
13.	**Assessment-VI**	2
	TOTAL	**26**

Text Books:

1. Fédération Internationale de Football Association (FIFA), "Laws of the Game", FIFA
2. International Football Association Board (IFAB), "Laws of the Game", IFAB

Reference Books:

1. Charles Hughes, "The Winning Formula in Soccer", Meyer & Meyer Sport
2. Fédération Internationale de Football Association (FIFA), "Laws of the Game", FIFA
3. International Football Association Board (IFAB), "Laws of the Game", IFAB

E-Resources:

1. Udemy – Soccer Courses - https://www.udemy.com/topic/soccer/
2. Beginner's guide to football | Football for dummies
3. Every position in soccer explained
4. Rules Of Soccer : How to play Soccer : Soccer Rules for Beginners

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: III**
Course: Internship – II									**Code: 25ECIN301**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
4 Weeks			**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.

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Database Management									**Code: 25ECPC405**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	**-**	**-**	**03**	**40**	**60**	**-**	**-**	**-**	**100**

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.	**06**
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**	**06**
3.	**Relational Model and Relational Algebra** Structure of relational databases, Keys: Primary, Foreign, Candidate, Super key,	**07**

	Integrity constraints, Relational Algebra: Select, Project, Join, Union, Set difference, Cartesian product, Division, Use cases in electronics: Data logs from microcontrollers	
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	**06**
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	**39**

Text Books :

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

Reference Books:

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

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

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Database Management Lab									**Code: 25ECPC405P**
Teaching Scheme (Hrs/week)				**Evaluation Scheme(Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**-**	**25**	**-**	**25**

Prerequisites: Basic knowledge of data structures, computer programming and digital logic

Course Objectives:

1. To develop proficiency in SQL and PL/SQL programming
2. To apply database programming concepts for developing suitable database applications
3. To develop practical skills in MongoDB programming using CRUD operations, logical operators, aggregation, indexing, and MapReduce for handling and processing NoSQL databases.

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

CO1	Implement SQL queries for suitable database applications.
CO2	Implement PL/SQL programs for database processing, data merging, and auditing.
CO3	Implement MongoDB operations for suitable NoSQL database applications.

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.)
   - Accept roll no. & name of book from user.
   - 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.
   - If no. of days>30, per day fine will be Rs 50 per day & for days less than 30, Rs. 5 per day.
   - After submitting the book, status will change from I to R.
   - 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

Reference Books:

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

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)				**Semester: IV**					
Course: Communication Systems				**Code: 25ECPC406**					
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	**-**	**-**	**03**	**40**	**60**	**-**	**-**	**-**	**100**

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 basic elements of communication systems, spectrum allocation, types of noise, and perform noise calculations including SNR and noise figure.
CO2	**A**nalyze amplitude modulation principles, design AM modulators and demodulators, and explain transmitter and receiver architectures including TRF and superheterodyne.
CO3	Explain theory and mathematical representation of FM and PM, analyze bandwidth requirements, and design modulators and demodulators for FM systems.
CO4	**A**pply sampling theory, distinguish between sampling types, and explain the generation and detection of PAM, PWM, and PPM signals along with FDM and TDM techniques.
CO5	Explain the process of quantization, PCM and delta modulation techniques, and evaluate the performance of different digital modulation schemes including companding.
CO6	**A**nalyze baseband signaling methods, interpret eye diagrams, and understand techniques to reduce inter-symbol interference using pulse shaping and scrambling.

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	6
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.	7
3.	**Angle Modulation:** Basic concept, mathematical analysis, frequency spectrum of FM wave, sensitivity,	7

	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	
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	7
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.	6
6.	**Baseband transmission & reception:** Line codes: Unipolar, Bipolar, NRZ, RZ, RZ-AMI, Manchester Baseband Pulse Shaping, M-ray Signaling, ISI, eye diagram, scrambler, Unscramble	6
	TOTAL	**39**

Text Books :

1. George Kennedy, ―Electronic Communications‖, McGraw Hill.
2. Wayne Tomasi _Electronics Communication System '-Fundamentals through Advanced. – 5th Edition-Pearson Education.
3. Analog and Digital communication – J S Chitode Technical Publications,2009
4. B. P. Lathi 'Modern Digital and analog Communication System' Oxford University press, 4th Edition

Reference Books:

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

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/

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Communication Systems Lab									**Code: 25ECPC406P**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**-**	**25**	**-**	**25**

Prerequisites:

Electronic Devices and Circuits, Time domain and frequency domain analysis

Course Objectives:

1. To introduce the fundamental concepts of analog and digital communication systems.
2. To develop practical understanding of sampling, reconstruction, aliasing, companding, line coding, modulation/demodulation, and signal transmission techniques.
3. To provide hands-on experience in analyzing communication systems using hardware and MATLAB simulation, including modulation index, bandwidth, and signal-to-noise ratio.

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

CO1	Implement AM, FM, PAM, PWM and various analog/digital communication techniques and analyze their waveforms.
CO2	Analyze sampling, reconstruction, aliasing, PCM, DM, ADM, companding and line-coding techniques using appropriate performance parameters.
CO3	Simulate and evaluate communication systems using MATLAB by determining parameters such as modulation index, bandwidth and signal-to-noise ratio.

List of Experiments:

Minimum 10 Experiments should be conducted:

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

Reference Books:

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

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Object Oriented Programming									**Code: 25ECPC407**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
03	**-**	**-**	**03**	**40**	**60**	**-**	**-**	**-**	**100**

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	7
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	7
3.	**C++ POLYMORPHISM :** Introduction: Polymorphism – Compile time and Run time Polymorphism, Type	7

	conversion, Pointer, Pointers to object, this pointer, Virtual function, Pure virtual 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	6
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	6
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.	6
	TOTAL	42

Text Books :

1. E.Balagurusamy, "Object-Oriented Programming with C++",7th edition, Graw-Hill Publication, ISBN 10: 9352607996 ISBN 13: 9789352607990
2. Deitel,"C++ How to Program", 4th Edition, Pearson Education, ISBN:81-297-0276-2

Reference Books:

1. Herbert Scheldt, "C++-The complete reference", Eighth Edition, McGraw Hill Professional, ISBN:978-00-72226805

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

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Object Oriented Programming Lab									**Code: 25ECPC407P**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**-**	**-**	**25**	**25**

Prerequisites:

Programming and Problem Solving

Course Objectives:

1. To understand C++ programming fundamentals and problem-solving techniques.
2. To apply object-oriented programming concepts in C++.
3. To use advanced C++ features for application development.

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

CO1	Develop programs using C++ fundamentals and data structures.
CO2	Implement object-oriented concepts using C++.
CO3	Apply templates, exception handling, file handling, and STL containers.

List of Experiments:

Perform any 08 experiment out of 14:

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

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. Implement student Data Base Application with following functionality

    a. Create and write student data in the file
    b. Display File contents
    c. Search a record based on Roll no. and name
    d. Modify a record e. Delete record Write the output in the output File

14. Write a C++ program to generate Country-Currency chart of all countries across the globe using MAP Container

Reference Books:

1. Herbert Scheldt, "C++-The complete reference", Eighth Edition, McGraw Hill Professional, ISBN:978-00-72226805

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Sensors and Applications									**Code: 25ECMD402**
Teaching Scheme(Hours/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	06
2.	**Temperature & Chemical Sensors:** **Temperature:** RTD, thermistors, thermocouples, noncontact temperature measurement- pyrometers.	06

	Semiconductor temperature sensing (LM75), Acoustics sensors for sound level measurement, Humidity Sensors. **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.	06
	TOTAL	**39**

Text Books :

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

Reference Books:

1. Curtis Johnson; ― Process Control Instrumentation Technology ‖; Prentice Hall of India Pvt. Ltd.; 7th Edition.
2. Ernest O. Doebelin; ―Measurement System Application and Design ‖; Mc-Graw Hill; 5th Edition.
3. David G. Alciatore, Michael B Histand; ― Introduction to Mechatronics and Measurement System ‖; Tata McGraw Hill.
4. C.S. Rangan, G.R. Sarma, V.S.V. Mani; ― Instrumentation Devices and Systems ‖; Tata McGraw Hill; 2nd Edition.

E-Resources:

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

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)									**Semester: IV**
Course: Open Elective – II (Cyber Security & Laws)									**Code: 25ALOE402**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Foundational knowledge in computer science, networking.

Course Objectives:

1. To introduce the cyber world and cyber law in general.
2. To enhance the understanding of problems arising out of online transactions and provoke them to find solutions.
3. To know the technologies that stand behind certain cyber rimes.
4. To identify and analyze statutory, regulatory, constitutional, and organizational laws that affect the information technology professional.

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

CO1	Illustrate and discuss the basic concepts of cyber security, Devices.
CO2	Understand the aspects related to personal data privacy and security.
CO3	Understand the main components of cyber security plan.
CO4	Understand about the type and nature of cyber-crimes.
CO5	Articulate the well-known cyber-attack incidents, explain the attack scenarios, and explain mitigation techniques.
CO6	Explain the difference between Systems Cyber Security, Network Cyber Security, and Cryptography, Crypto-Protocols, etc.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Cyber Security:** Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security.	04
2.	**Digital Devices Security, Tools and Technologies for Cyber Security:** End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy, Cyber Security best practices, Significance of host firewall, Wi-Fi security, Configuration of basic security policy and permissions.	04

3.	**Cyber security Management, Compliance and Governance:** Cyber security Plan- cyber security policy, cyber crises management plan., Business continuity, Risk assessment, Types of security controls and their goals, Cyber security audit and compliance, National cyber security policy and strategy.	05
4.	**Cybercrimes:** Targeting Computer systems and Mobiles- data diddling attacks, spyware, logic bombs, DoS, DDoS, APTs, virus, Trojans, ransomware, data breach Cybersquatting, Pharming, drug trafficking, human trafficking., Social Media Scams & Frauds- impersonation, identity theft Cyber Police stations, Crime reporting procedure, Case studies	05
5.	**Cybercrime**: Illustrations, Examples and Mini cases, Real-life examples, Mini Cases- Social Engineering Attacks, Illustration of financial frauds in cyber domain, Digital Signature- Related Crime scenarios, Digital forensics case Illustrations, Online scams**.**	04
6.	**Cyber law:** Cybercrime and legal landscape around the world, IT Act,2000 and its amendments. Limitations of IT Act, 2000. Cybercrime and punishments, Cyber Laws and Legal and ethical aspects related to new technologies- AI/ML, IOT, Block chain, Dark net and social media, Cyber Laws of other countries.	04
	TOTAL	**26**

Text Books:

1. Michael E. Whitman, Herbert J. Mattord, (2018), "Principles of Information Security", 6th edition, Cenage Learning, N. Delhi.
2. Chris Reed & John Angel, "Computer Law", OUP, New York, (2007).
3. Prasad R.S., "Cyber Crime an Introduction".
4. Ed. Kumar Krishna, "Cyber Laws".

Reference Books:

1. Angus M. Marshall, "Digital forensics: Digital evidence in criminal investigation", John – Wiley and Sons, 2008.
2. Sushma Arora, Raman Arora, "Cyber Crimes & Laws", 4th Edition 2021, Publisher: Taxmann,
3. N S Nappinai, "Technology Laws Decoded", 1st Edition, Publisher: Lexis Nexis.

E-Resources:
1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview 2. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview 3. https://onlinecourses.nptel.ac.in/noc25_cs116/preview

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)								**Semester: IV**	
Course: Open Elective – II (Sustainability and Climate Change)								**Code: 25ALOE402B**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Students should have knowledge about current environmental issues, various types of pollution and the concept of sustainable development.

Course Objectives:

1. To introduce the fundamental concepts and definitions of sustainability
2. To equip students with knowledge of sustainable construction solutions.
3. To develop an understanding of the Earth's climate system, assess the impacts of climate change, and evaluate the vulnerabilities of natural systems.

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

CO1	Explain the principles, challenges, global agreements, and legislations related to sustainable development and environmental protection.
CO2	Apply green materials, energy-water efficiency strategies, and green building rating systems to develop sustainable infrastructure solutions.
CO3	Analyze the earth's climate system, human influences, and observed trends to understand the fundamentals of climate change.
CO4	Evaluate the causes, impacts, and physical evidence of climate change at global and regional scales.
CO5	Assess the sectoral impacts of climate change on natural systems, infrastructure, and human health.
CO6	Recommend mitigation strategies and policy measures through international frameworks and technological interventions to address climate change.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Sustainable Development:** Definitions & Dimensions: sustainability, Brundtland Report, triple bottom line (economic, social, environmental), Global & Local Environmental Challenges: resource depletion, climate change, pollution, Agenda 21, CDM, Paris/Kyoto Protocols, Clean Development Mechanism, Environmental Legislation & Standards: ISO 14000 series, Indian Water & Air Acts.	05

2.	**Sustainable Solutions:** Green Materials & Techniques: low-VOC paints, agro-waste bricks, bamboo, ferro-cement, stabilized soil blocks. Energy & Water Efficiency: passive design, renewable/solar/wind energy, rainwater harvesting, EIA in construction. Green Building Systems: LEED, GRIHA, ECBC, BREEAM rating frameworks for sustainable infrastructure.	05
3.	**Climate & Climate Change Fundamentals:** Earth's Climate System: Atmosphere structure, energy balance, greenhouse effect, climate zones, monsoons, El Niño/La Niña Human Influence: Greenhouse gas emissions, global warming trends, carbon cycle, RCP/SSP scenarios, Indian climate observations	04
4.	**Climate Change Impact:** Climate Change Impact: Temperature shifts, sea-level rise, extreme weather, glacier melt, urban heat islands, Natural vs. anthropogenic causes; Milankovitch cycles, anthropogenic emissions. Physical evidence: rising global temperatures, melting glaciers, sea-level rise, extreme weather trends in India and globally.	04
5.	**Impacts on Natural System:** Sectoral impacts: agriculture, water resources, infrastructure, coastal zones, urban systems including heat islands, flooding, human health	04
6.	**Mitigation & Policy Measures:** International policy processes: UNFCCC, IPCC, Kyoto/Montreal Protocols, CDM & carbon trading Technological and engineering mitigation: renewable energy, CCS, reflective surfaces (cool roofs), bioengineering (e.g., slope stabilization)	04
	TOTAL	**26**

Text Books:

1. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science", Pearson Education.
2. D. N. Murty, "Sustainable Development", Himalaya Publishing House.
3. Peter P. Rogers, Kazi F. Jalal, and John A. Boyd, "An Introduction to Sustainable Development", Routledge, Earthscan Series.
4. N. H. Ravindranath and Jayant Sathaye, "Climate Change and Developing Countries", Springer.

Reference Books:

1. K. S. Jagadish et al., "Alternative Building Materials & Technologies", New Age International Publishers.
2. P. T. Anastas and J. B. Zimmerman, "Principles of Green Engineering", Oxford University Press.
3. David T. Allen and David R. Shonnard, "Sustainability Engineering: Concepts, Design & Case
4. Studies", Pearson Education.
5. S. Kumar Dash, "Climate Change – An Indian Perspective", Cambridge University Press, 2007.
6. John M. Wallace and Peter V. Hobbs, "Atmospheric Science: An Introductory Survey", Elsevier Academic Press, 2006.
7. IPCC Assessments, Intergovernmental Panel on Climate Change (IPCC), as referenced in Anna University syllabus.

E-Resources:

1. UNEP (United Nations Environment Programme) https://www.unep.org/resources
2. IPCC (Intergovernmental Panel on Climate Change) Reports https://www.ipcc.ch/reports/
3. edX - Sustainability Courses https://www.edx.org/learn/sustainability
4. Coursera - Climate Change Courses https://www.coursera.org/courses?query=climate%20change
5. NASA Global Climate Change: Vital Signs of the Planet https://climate.nasa.gov/
6. World Bank Open Knowledge Repository https://openknowledge.worldbank.org/
7. UC Berkeley Environmental Courses (Search for PDFs) https://nature.berkeley.edu/classes/
8. MIT Open Courseware - Environmental Topics https://ocw.mit.edu/courses/find-by-topic/#cat=environment

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)									**Semester: IV**
Course: Open Elective – II (Energy Audit and Electrical Safety)									**Code: 25ALOE402C**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Concept of power & energy in three phase & single phase, Various electrical equipment & specifications

Course Objectives:

1. To Study the importance of energy security for sustainable development and the fundamentals of energy conservation.
2. To introduce performance evaluation criteria of various electrical and thermal installations to facilitate the energy management
3. To relate the data collected during performance evaluation of systems for identification of energy saving opportunities
4. Understand the key terms and definitions related to electrical safety.
5. Learn about preliminary preparations and preconditions necessary before starting installation work.

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

CO1	Illustrate present state of energy security and its importance.
CO2	Identify and describe the basic principles and methodologies adopted in energy audit of utility.
CO3	Illustrate and analyze the Financial Analysis Techniques.
CO4	Evaluating the performance of some common thermal installations and list the energy saving opportunities.
CO5	Demonstrate awareness of the scope and significance of electrical safety in reducing risk and ensuring safe practices in electrical systems.
CO6	Identify and a**ssess** the potential risks and hazards associated with the installation process of electrical equipment.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Energy Scenario:** Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, Energy Conservation Act-2001 and its features, Re-structuring of the energy supply	05

	sector, energy strategy for the future, air pollution, climate change, Electricity Act, 2003.	
2.	**Energy Management & Audit:** Definition, need and types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments, Facility as an energy system, Energy analysis and the Sankey Diagram, Organizing - location of energy management, top management support, managerial function, roles and responsibilities of energy manager, force field analysis, Energy policies and its purpose.	05
3.	**Financial Management:** Investment-need, appraisal and criteria, financial analysis techniques-simple payback period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of ESCOs, Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques -energy consumption, production, cumulative sum of difference (CUSUM).	04
4.	**Energy Efficiency in Electrical Utilities:** Electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors, energy conservation opportunities in Fans, Blower, Pumps, Lighting System.	04
5.	**Introduction to Electrical Safety, Shocks And Their Prevention:** Terms and definitions, objectives of safety and security measures, Hazards associated with electric current and voltage, principles of electrical safety, Primary and secondary electrical shocks, causes of electrical shock and its severity, medical analysis of electric shocks and its effects, shocks due to flash/ Spark over's, prevention of shocks, safety precautions against contact shocks, flash shocks, burns in residential buildings and shops.	04
6.	**Safety During Installation of Plant and Equipment:** Introduction, preliminary preparations, preconditions for start of installation work, risks during installation of electrical plant and equipment, safety aspects during installation, field quality and safety during erection, personal protective equipment for erection personnel, installation of a large oil immersed power transformer, installation of outdoor switchyard equipment, safety during installation of electrical rotating machines.	04
	TOTAL	**26**

Text Books:

2. 1. Energy Audit and Management, Volume-I, IECC Press.
3. W.R. Murphy, G. McKay Butter worth," Energy management", Elsevier/bsp Books Pvt. Ltd., 2003.
4. Gupta B. R.: Generation of Electrical Energy, Eurasia Publishing House Pvt. Ltd., New Delhi, 2001
5. Prasanna Chandra, "Financial management", Tata McGraw Hill, 10th Edition, 2019.
6. Rao, S. and Saluja, H.L., "Electrical Safety, Fire Safety Engineering and Safety Management", Khanna Publishers, 1988.
7. Pradeep Chaturvedi, "Energy Management Policy, Planning & Utilization", Concept Publishing.

Reference Books:

1. Albert Thumann, P.E., C.E.M. William J. Younger, "Handbook of Energy Audits", River Publishers,
2. Paul O'Callaghan, "Energy management", McGraw-Hill Education, 1992.
3. CB Smith, "Energy Management Principles", Pergamon Press, New York.
4. W. C. Turner, "Energy Management Hand Book". John Wiley and sons.

E-Resources:

1. NPTEL course on Basic Principles of Energy Management & Energy Audit, By Dr. R. N. Patel & Dr. Akhilesh Kumar Tiwari, Chhattisgarh Swami Vivekanand Technical University, Bhilai.
   Basic Principles of Energy Management & Energy Audit - Course
2. NPTEL course on Building Energy Systems and Auditing, By Prof. Shankha Pratim Bhattacharya, IIT Kharagpur.
   Building Energy Systems and Auditing - Course

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs)									**Semester: IV**
Course: Open Elective – II (Digital Marketing)									**Code: 25ALOE402D**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Fundamentals of Business, Digital Tools

Course Objectives:

1. To understand digital marketing & process of website design.
2. To identify the keywords for a website & understand the SEO.
3. To Study the various Digital Marketing Tools.
4. To learn the use of social media websites for Digital Marketing.
5. To be Conversant with Linked In platform.
6. To know the recent trends in Digital Marketing.

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

CO1	Design websites using free tools like wordpress and explore it for digital marketing.
CO2	Apply various keywords for a website & to perform SEO.
CO3	Understand the various SEM Tools and implement the Digital Marketing Tools.
CO4	Illustrate the use of Facebook, Instagram and YouTube for Digital Marketing in real life.
CO5	Use Linked in platform for various campaigning.
CO6	Understand the importance of recent trends in digital marketing.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Digital Marketing Planning and Structure:** Importance of Digital Marketing, Digital Marketing Vs. Traditional Marketing, Inbound vs Outbound Marketing, Understanding Demographics. WWW, Buying a Domain, Core Objective of Website and Flow, One Page Website, Strategic Design of Products & Services Page, Strategic Design of Landing Page, Segmentation & Targeting and Positioning to Digital Marketing, Portfolio, Gallery and Contact Designing Wordpress Website.	04
2.	**Search Engine Optimization (SEO):** Fundamentals; Keywords and SEO Content Plan; SEO & Business Objectives; Writing SEO Content; On-site & off-site SEO; Optimize Organic Search Ranking, Website SEO Auditing.	04

	Introduction to Web Analytics	
3.	**Search Engine Marketing:** Importance of Adwords, Google Ad Types, PPC Cost Formula, Ad Page Rank, Billing and Payments, Adwords User Interface, Keyword Planner, Creating Ad Campaigns, Creating Text Ads, Creating Ad Groups, Search Engine Marketing (SEM) Tools, Bidding Strategy for CPC. Case Studies. Conversion Tracking Code, Designing Image Ads, Creating Video Ads, Youtube Video Promotion	05
4.	**Social Media Marketing (SMM) Part 1:** **B to C Perspective, B to B Perspective:** Introduction; Major Social Media Platforms for Marketing; Developing Data-driven Audience & Campaign Insights; Social Media for Business. **Facebook & Instagram Marketing:** Understanding of Facebook Marketing, Types of Facebook Advertising, Creating first ad on Facebook, Setting Campaign and optimization, Facebook Power Editor, Facebook Video Marketing, Facebook App & Shopping Marketing. **Youtube Marketing:** YouTube Account Setup (Create a business account with a personal account), YouTube Monetization, YouTube Ads, YouTube Analytics.	05
5.	**Social Media Marketing (SMM) Part 2:** **LinkedIn Advertising:** How to use Linkedin Professionally, Types of LinkedIn Advertising, LinkedIn New feed Advertising, LinkedIn Message Pitching, Traffic and Leads Generation, Billing and Report. **Email Marketing:** Email Software and Tools, Importing Email Lists, Planning Email Campaign, Email Templates and Designs, Sending HTML Email Campaigns, Web Forms Lead Importing, Integrating Landing Page Forms, Campaign Reports and Insights, Segmentation Strategy, Responder Tracker.	04
6.	**Upcoming Trends in Digital Marketing:** Podcast, OTT Platforms, Mob-Ad, No Click Searches, Google Verified Listing, Voice Search, Visual Search, Online Reviews, Automated and Smart Bidding, Chatbots, Affiliate Marketing.	04
	TOTAL	**26**

Text Books :

1. Cory Rabazinsky, "Google-Ad words for Beginners: A Do-It-Yourself Guide to PPC Advertising".
2. Ian Brodie, "Email Persuasion: Captivate and Engage Your Audience, Build Authority and Generate More Sales With Email Marketing".
5. Jan Zimmerman and Deborah, "Social Media Marketing All-In-One for Dummies".
6. Dave Chaffey, Fiona Ellis-Chadwick, Kevin Johnston, Richard Mayer, "Internet Marketing", Pearson Education.
7. Oliver J Rich, "Digital Marketing".
8. Gerry T. Warner and Joe Wilson Schaefer "Online Marketing".

Reference Books:

1. Prof. Seema Gupta, "Digital Marketing", Mcgraw Hill Publications.
2. Judy Strauss, Adel Ansary, Raymond Frost, Prentice Hall, "E- Marketing".
3. Dr. Andy Williams,"WordPress for Beginners 2020: A Visual Step-by-Step Guide to Mastering WordPress".
4. Cecilia Figueroa, "Introduction To Digital Marketing 101", BPB Publications.
5. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns by Ian Dodson, Wiley; 1st edition (2016).
6. Digital Marketing For Dummies by Ryan Deiss and Russ Henneberry, For Dummies

E-Resources:

1. Digital Tools Certification- By Google.

Link of the Course: https://skillshop.exceedlms.com/student/catalog

2. Swayam Certification course on, "Digital Marketing", by Dr. Tejindarpal Singh Panjab University Chandigarh.

Link of the Course: https://swayam.gov.in/nd2_ugc19_hs26/preview

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Common to all Programs))									**Semester: IV**
Course: Open Elective – II (Entrepreneurship and Innovations)									**Code: 25ALOE402E**
Teaching Scheme				**Evaluation Scheme**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
02	**-**	**-**	**02**	**-**	**-**	**50**	**50**	**-**	**100**

Prerequisites:

Professional Development, Quality Management System

Course Objectives:

1. To learn the students various aspects of innovation and methods of fostering Innovation
2. To appreciate the importance of embarking on self-employment and has developed the confidence and personal skills for the same.
3. To start a small business enterprise by liaising with different stake holders.
4. To effectively manage small business enterprise.

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

CO1	Understand the key concepts of innovation
CO2	Identify and analyze opportunities for innovation
CO3	Recognize the potential and value of self-employment
CO4	Develop a viable business plan for a small enterprise
CO5	Apply financial principles to plan and structure engineering and automation projects effectively
CO6	Apply fundamental principles of management

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to Innovation:** Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities, Promoting and managing innovation, Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation	04
2.	**Strategy for Commercializing Innovation:** Innovation Process, Risks and barriers for introducing products and services, selecting a Strategy, setting up the Investment and establishing organisation, Evaluating the Costs and impact of the Project	04
3.	**Entrepreneurship:** Definition. Growth of industries in developing countries; role of industries in the national economy; characteristics; demand based and resources based ancillaries and sub-control types. Government policies, stages in starting an industry,	04

	types(family business/start-ups etc.), Sources of finance	
4.	**Project Identification and Accountancy:** Assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, Accountancy: Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, preparation of financial reports, accounts and stores studies.	04
5.	**Project Planning and Control:** The financial functions cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. Profit planning and programming, planning cash flow, capital expenditure and operations. Control of financial flows, control and communication.	05
6	**Laws:** Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.	05
	TOTAL	**26**

Text Books:

1. Rabindra N. Kanungo, "Entrepreneurship and Innovation", Sage Publications, New Delhi, 1998.
2. Donald F. Kuratko, "Entrepreneurship – Theory, Process and Practice", 9th Edition, Cengage Learning, 2014.
3. Peter F. Drucker, "Innovation and Entrepreneurship", Butterworth-Heinemann.

Reference Books:

1. Robin Lowe and Sue Marriott, "Enterprise: Entrepreneurship and Innovation – Concepts, Contexts and Commercialization", Butterworth-Heinemann.
2. S. S. Khanka, "Entrepreneurial Development", S. Chand & Co. Ltd., Ram Nagar, New Delhi, 2013.
3. Joseph L. Massie, "Essentials of Management", Prentice Hall of India.

E-Resources:

1. https://ocw.mit.edu/collections/entrepreneurship/
2. https://onlinecourses.nptel.ac.in/

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

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

Prerequisites:

This course demands attributes like Positive outlook, Teamwork, effective communication, emotional intelligence, computer literacy, people skill, professional attributes, good leader.

Course Objectives:

1. To curate project, its types, classification and characteristics of project
2. To understand various project selection models to select project and check feasibility of it for success.
3. To understand project life cycle analysis, significance of each stage

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

CO1	Aware with lifecycle models of project management.
CO2	Know roles and responsibilities of project manager and apply technique of project selection
CO3	Understand project life cycle analysis and implement it to real life projects.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Introduction to project management:** Project attributes, types of projects, project classification, characterizers of project, Trends in project managements, SMART project, project, program and portfolio fundamental differences with real world examples, project selection models.	8
2.	**Project Selection Models:** Net present value, weighted scoring model, internal rate of return, analytical hierarchy process, project manager, project manager office, project manager attributes, organization structure of project organization, leadership ethics, management style, leadership competencies.	8
3.	**Project Initiation:** Project life cycle analysis, significance of each stage. Stakeholder types, their role and analysis, commitment assessment matrix, Resolving conflicts, negotiation, human factors in project management, Introduction to Agile project management Project management in real world.	10
	TOTAL	**26**

Text Books:

1. Gary Richard Son, Brad Jackson, "Project Management Theory & Practice" CRC Press.
2. Arun Kanda, "Project Management: A Lifecycle Approach", PHI.

3. John M. Nicholas, Herman Steyn, "Project Management for business engineering and technology", Elsevier.

Reference Books:

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

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
3. Project management for beginners by Ramesh Kumar https://youtu.be/gnkjcRDQkw0?list=PLLy_2iUCG87CBuNhvti0h6W54ZmqrSDMJ

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

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

Prerequisites:

Problem Solving Techniques-I, Strategic thinking, natural, formal and informal logic, Conceptual clarity, logical reasoning, analytical mind.

Course Objectives:

1. To acquire basic knowledge creative problem solving.
2. To understand the Skills and attitudes requirements for critical thinking.
3. To understand process of creative problem solving and design thinking

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

CO1	Apply concepts of critical thinking to complex problems of real world.
CO2	Apply skills and develop attitude of positivity and openness to undertake problem
CO3	Demonstrate ideation tools, diagram and maps for intricate problem solving

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	**Critical Thinking and Problem Solving:** Knowledge: fundamentals of logics, cognitive biases, advanced problem-solving techniques. Linking Critical Thinking and Cognitive Biases, the art of asking questions, problem framing, problem setting, Classification of methods of Problem Solving, Method for Problem Solving.	08
2.	**Skills and attitudes requirements for critical thinking:** Skills: identify own cognitive biases, identify biases in other, ability to apply a structured method to solve problems. Attitudes: metacognition, positivity with respect to problems Use Scenarios, Solving Contradictions, Combination, Crossover, brainstorming 3-6-5, 9 quadrants, Functional Brainstorming, TRIZ, The power of critical thinking: Effective reasoning about ordinary and extraordinary claims.	08
3.	**Design Thinking:** The Basis for Design Thinking, The Design Thinking Team, Design Thinking Workshops and Meetings, Listening and Empathizing Techniques Design Thinking Frameworks, Ideation tools, Use of Diagrams and Maps in Design Thinking – Empathy map. Affinity diagram, mind map, journey map Brief introduction of story telling.	10
	TOTAL	**26**

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. 3. Goudar, Amitkumar, "The Secrets of Design Thinking Mindset: More Tools and Techniques to Enhance Your Design Thinking Skill", Notion Press. 4. Agarwal, Anuja, "Design Thinking: A Framework for Applying Design Thinking in Problem Solving", 1st Edition, BPB Publications.
Reference Books:
1. Henderson, William, "Master Critical Thinking, Creative, Logic & Problem-Solving Skills", Peak Publish LLC. 2. Sharma, Narender, "Handbook of 7 QC Tools", Shakehand with Life.
E-Resources:
1. Coursera: "Effective Problem-Solving and Decision-Making" - https://www.coursera.org/learn/problem-solving 2. Design thinking by NPTEL Link - nptel.ac.in/courses/110106124

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Python Programming									**Code: 25ECVS405**
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.

List of Experiments:

Perform any THREE from each group

Group A

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

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

Group C

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

Group D

1. 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
2. Write a Python program to handle exceptions like divide by zero, file not found and invalid input using try-except blocks
3. Write a Python program to perform basic array operations, matrix addition, subtraction and multiplication using NumPy.
4. Write a Python program to generate and plot sine, cosine and square wave signals using matplotlib.
5. 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.
6. 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, ISBN:978-1-118-29027-9
Reference Books:
1. Allen Downey, Jeffery Elkner, Chris Meyers. "How to think like a Computer Scientist: Learning with Python."Dreamtech Press ISBN:9789351198147. 2. Yashwant Kanetkar & A. Kanetkar, "Let us Python, BPB Publisher, ISBN:9789389845006 3. "Python Crash Course", by Eric Matthes 4. "Fluent Python" by Luciano Ramalho 5. "Learning Python", by Mark Lutz
E-Resources:
www.nptelvideos.in https://snakify.org/en/ https://docs.python.org/3/

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Liberal Learning - IV

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Liberal Learning – IV (Guitar)									**Code: 25ECCC406A**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Basic knowledge of Indian classical music and Guitar musical instrument.

Course Objectives:

1. To develop advanced technical proficiency, musical interpretation, and performance skills through complex repertoire.
2. To enhance creativity, improvisation, composition, and theoretical understanding across multiple musical genres.
3. To strengthen ensemble leadership, stage performance, and professional musicianship for advanced musical pursuits.

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

CO1	Perform advanced guitar repertoire with technical accuracy, musical expression, and stylistic interpretation.
CO2	Apply advanced harmony, rhythm, improvisation, composition, and performance techniques across different musical genres.
CO3	Demonstrate ensemble leadership, collaboration, stage etiquette, and professional musicianship.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Revision of Semester III Concepts	2
2.	Advanced Chord Voicings & Inversions	2
3.	Modal Scales & Advanced Scale Applications	2
4.	Improvisation over Chord Progressions	2
5.	Advanced Fingerstyle & Hybrid Picking	2
6.	Guitar Solo Techniques – Bends, Vibrato, Legato	2
7.	Song Arrangement & Musical Interpretation	2

8.	Introduction to Composition & Melody Writing	2
9.	Ensemble Rehearsal & Musical Communication	2
10.	Genre-based Performance (Jazz, Rock, Blues, Contemporary)	2
11.	Stage Performance Techniques & Performance Psychology	2
12.	Mock Recital & Individual Feedback	2
13.	Final Rehearsal & Performance Preparation	2
	TOTAL	**26**

Text Books:

1. Hal Leonard Corporation, "Hal Leonard Guitar Method – Complete Edition", Hal Leonard Publications.
2. Mel Bay, "Modern Guitar Method – Grade 1, 2 & 3", Mel Bay Publications.
3. Leavitt, W., "A Modern Method for Guitar (Books 1–3)", Berklee Press.
4. Stetina, T., "Fretboard Mastery", Hal Leonard Publications.
5. Kolb, T., "Music Theory for Guitarists", Hal Leonard Publications.

Reference Books:

1. Chapman, R., "The Complete Guitar Manual", DK Publishing.
2. Latarski, D., "Practical Theory for Guitar", Alfred Music.
3. Denyer, R., "The Guitar Handbook", Knopf Publishing.
4. Buckingham, B., "Scales and Modes for Guitar", Hal Leonard Publications.

E-Resources:

1. Berklee Online – Guitar lessons, music theory, ear training, and performance resources. https://online.berklee.edu
2. JustinGuitar – Structured guitar lessons from beginner to advanced. https://www.justinguitar.com
3. Fender Play – Interactive lessons on chords, scales, techniques, and songs. https://www.fender.com/play
4. TrueFire – Professional online guitar courses covering multiple genres and techniques. https://truefire.com
5. Ultimate Guitar – Tabs, chord charts, scales, and community resources. https://www.ultimate-guitar.com
6. MuseScore – Free music notation software and sheet music library. https://musescore.org
7. MusicTheory.net – Interactive music theory lessons and exercises. https://www.musictheory.net

8. Yamaha Music India – Educational resources on guitar fundamentals and musicianship. https://in.yamaha.com

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DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Liberal Learning – IV (Singing)									**Code: 25ECCC406B**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Basic knowledge of Indian classical music in singing.

Course Objectives:

1. To develop voice modulation, singing, and expression techniques across different musical genres.
2. To familiarize students with microphone handling, studio setup, microphone placement, and recording practices.
3. To enhance students' recording and stage performance skills through practical application of raga, tala, rasa, and presentation techniques.

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

CO1	Apply voice modulation, pitch control, and singing techniques in various styles.
CO2	Perform Khayal, Semi-Classical, and Folk compositions with musical expression.
CO3	Demonstrate microphone handling, recording skills, and stage presentation.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Voice range development and voice modulation, Pitch control and tonal accuracy	4
2.	Voice culture for studio singing	4
3.	Singing techniques in different genres: Light Music, Film Songs, Ghazals, Lavani etc., Expression according to song style	4
4.	Vilambit Khayal, Drut Khayal	4
5.	Semi-Classical Music, Folk Music	2
6.	Performance practice, Stage presentation skills	2

7.	Knowledge of Raga and Tala, Rasa and Musical Expression	2
8.	Studio setup, Microphone handling techniques, Microphone placement, Recording techniques, Recording practice	4
	TOTAL	**26**

Text Books:

1. Bhatkhande, V. N., "Kramik Pustak Malika (Vol. III & IV)", Hindustani Music Publications.
2. Paluskar, V. D., "Sangeet Bal Prakash", Gandharva Mahavidyalaya Mandal.

Reference Books:

1. Bhatkhande, V. N., "Hindustani Sangeet Paddhati (Vol. I–IV)", Sangeet Karyalaya.
2. Ranade, A. D., "Hindustani Music: Tradition in Transition", Promilla & Co. Publishers.
3. Ratanjankar, S. N., "Abhinav Geet Manjari", Sangeet Karyalaya.

E-Resources:

1. Sangeet Natak Akademi
2. All India Radio (Akashvani)
3. SwarGanga Music Foundation
4. YouTube – Sangeet Natak Akademi Channel
5. Digital Tanpura and Tabla Applications (e.g., iTanpura, Riyaz, NaadSadhana)

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Liberal Learning – IV (Cinematography)									**Code: 25ECCC406C**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

A basic understanding of film theory, Camera operation, Lighting techniques and visual storytelling is essential for cinematography.

Course Objectives:

1. To develop proficiency in camera operation, exposure settings, and photographic composition.
2. To apply lighting techniques and visual storytelling principles across different photography genres.
3. To develop basic image editing and post-processing skills using appropriate software.
4. To enhance creative, technical, and professional skills for effective photography practice.

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

CO1	Operate cameras confidently and use various camera settings effectively.
CO2	Apply exposure principles by controlling aperture, shutter speed, and ISO to capture quality images.
CO3	Compose visually appealing photographs using principles of composition and design.
CO4	Utilize natural and artificial lighting techniques to enhance photographic results.
CO5	Capture photographs in different genres such as portrait, landscape, product, event, and wildlife photography.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Revision Session Of Sem III	2
2.	Storyboarding and planning	2
3.	Short film Screening	2
4.	Short Film Project (Camera-Phone)	2

5.	Short Film Project	2
6.	Short Film Project	2
7.	Short Film Project	2
8.	Short Film Project	2
9.	Short Film Project	2
10.	Short Film Project Submission	2
11.	Introduction Video Editing	2
12.	Basic Knowledge of Editing Tools	2
13.	Basics Timeline, Color Correction, Transition, Effects	2
	TOTAL	**26**

Text Books:

1. Peterson, B., "Understanding Exposure – Theory + Fundamentals", Amphoto Books.
2. Kelby, S., "The Digital Photography Book – Practical + Shooting", Rocky Nook.

Reference Books:

1. Langford, M., "Langford's Basic Photography – Technical Concepts", Focal Press.
2. Freeman, M., "The Photographer's Eye – Composition, Visual Balance, Framing, Perspective", Ilex Press.

E-Resources:

1. https://youtu.be/V7z7BAZdt2M?si=to4yQ46zEKRbxKOm
2. https://youtu.be/WXdAX0No2hM?si=GZu_mJsmyJ7NGnAU

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Liberal Learning – IV (Dance)									**Code: 25ECCC406D**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Good stamina, flexibility and familiarity with simple rhythmic patterns and beats.

Course Objectives:

1. To develop advanced dance techniques with precision, coordination, balance, flexibility, and rhythmic control.
2. To enhance expressive skills, musicality, stage presence, and overall performance quality.
3. To develop creativity and choreography skills through individual and group dance compositions.
4. To integrate technique, rhythm, expression, synchronization, and stagecraft in complete performances.
5. To develop leadership, teamwork, discipline, confidence, and professional performance skills through rehearsals, competitions, and cultural events.

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

CO1	Demonstrate advanced dance techniques with precision, coordination, flexibility, balance, and rhythmic control.
CO2	Apply musicality, expression, synchronization, creativity, and stage presence in individual and group performances.
CO3	Create and present dance compositions using advanced choreography, formations, transitions, and stagecraft.
CO4	Plan, rehearse, and perform polished dance presentations for cultural events, competitions, and advanced training.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	Revision of prior semester & Warm-up	2

2.	Introduction formatted story telling through dance	2
3.	Learning the First Half of the Composition ,	2
4.	Completion of Composition with Rhythm and introduction to live music dancing format	2
5.	Theme-Based Choreography – Planning and Concept Development	2
6.	Production introduction and choreography completion	2
7.	Lights and stage formative knowledge	2
	TOTAL	**26**

Text Books:

1. Bharata Muni, "Natya Shastra", translated by Manomohan Ghosh, Asiatic Society, Kolkata.
2. Nandikeshvara, "Abhinaya Darpana", translated by Manomohan Ghosh.
3. Balasaraswati, T., "Dance", Madras Music Academy.
4. Krishna Iyer, E., "Dance", Ganesh & Co., Chennai.

Reference Books:

1. Kothari, Sunil, "Dance", Marg Publications, Mumbai.
2. Vatsyayan, Kapila, "Dance: Indian Dance in Literature and the Arts", Sangeet Natak Akademi.
3. Payne, Helen, "Creative Dance and Movement in Groupwork", Routledge, 2021.

E-Resources:

1. https://youtu.be/VTrGVHvWfPA?si=AvKTenB7bpx302R6
2. https://youtu.be/pG0NmQDKspc?si=AEfhbRAEs9OjNErp
3. https://youtu.be/eg-3ybiL6UI?si=AOj0NuGXDupxD2Mt

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Liberal Learning – IV (Synthesizer/Keyboard)									**Code: 25ECCC406E**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Basic knowledge of Indian classical music and Keyboard musical instrument.

Course Objectives:

1. To strengthen understanding of fundamental keyboard concepts and techniques.
2. To develop proficiency in major and minor scales and arpeggios through practical exercises.
3. To enhance accompaniment, improvisation, and jamming skills through practical performance.
4. To develop listening skills, musical creativity, and ensemble performance techniques.

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

CO1	Demonstrate improved technical proficiency through advanced practice of Major and Minor Scales.
CO2	Perform musical pieces based on Minor Scales with proper fingering, expression and dynamics.
CO3	Apply arpeggio patterns effectively in chord progressions and keyboard performance.
CO4	Demonstrate accompaniment, improvisation and jamming skills in solo and group performances.
CO5	Develop listening ability, rhythmic accuracy and musical confidence through ear training and ensemble practice.

Course Contents:

Unit	**Description**	**Duration (Hrs.)**
1.	Revision of all Major Scales	2
2.	Revision of all Minor Scales (Natural, Harmonic & Melodic)	2
3.	Revision of Major and Minor Chords,	2
4.	Revision of Chord Progression, Family chords, Chords Inversion	2

5.	Playing Simple Songs with Indian Notation	2
6.	Introduction to Staff Notation	2
7.	Understanding the Difference between Indian and Western Staff	2
8.	Reading and Playing Simple Melodies from Staff Notation	2
9.	Playing Songs using Both Indian and Staff Notation	2
10.	Fundamentals of Keyboard Accompaniment	2
11.	Accompaniment using Major and Minor Chords	2
12.	Accompaniment with Scales and Simple Songs	2
13.	Group Performance	2
	TOTAL	**26**

Text Books:

1. Aaron, M., "Michael Aaron Piano Course – Grade 2", Alfred Music.
2. Thompson, J., "John Thompson's Modern Course for the Piano – Second Grade", Willis Music.
3. Hanon, C. L., "The Virtuoso Pianist in Sixty Exercises", G. Schirmer.
4. Agay, D., "Learning to Play Piano – Book 2", Yorktown Press.

Reference Books:

1. Thompson, J., "Modern Course for the Piano", Willis Music.
2. Aaron, M., "Piano Course", Alfred Music.
3. Harrison, M., "Contemporary Music Theory", Hal Leonard.
4. Hanon, C. L., "The Virtuoso Pianist", G. Schirmer.
5. ABRSM, "Music Theory in Practice (Grades 1–5)", Associated Board of the Royal Schools of Music.

E-Resources:

1. https://youtu.be/2mPS-2guHVo?si=8X_4KKezIdrMejLH
2. https://youtu.be/tEtukfFv3Wk?si=2iJ8wdD0dfjWauPb

BACK TO STRUCTURE

Program: B. Tech. (Electronics and Computer Engineering)	**Semester: IV**
Course: Liberal Learning – IV (Basketball)	**Code: 25ECCC406F**

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Teaching Scheme (Hrs/week)				Evaluation Scheme (Marks)					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop fundamental basketball skills, physical fitness, teamwork, and understanding of rules and strategies to enable effective participation and performance in the game.

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

CO1	Demonstrate fundamental basketball skills including passing, dribbling, shooting, and rebounding.
CO2	Apply proper footwork, body control, and individual defensive techniques during play.
CO3	Integrate fundamental skills effectively through drills, small-sided games, and practice matches.
CO4	Demonstrate teamwork, coordination, confidence, and consistency in basketball performance.

Course Contents:

Sr. No.	Description	Duration (Hrs.)
1.	**Complete Skill Revision:** Review all basketball fundamentals. Recall and perform all basic skills.	2
2.	**Passing & Receiving Practice:** Improve passing speed and accuracy. Demonstrate efficient passing skills.	2
3.	**Dribbling:** Enhance control and confidence. Maintain effective dribbling during movement.	2
4.	**Shooting:** Continue improving shooting technique. Achieve better shooting consistency.	2
5.	**Rebounding:** Reinforce rebounding fundamentals. Secure rebounds confidently.	2
6.	**Individual Defense:** Improve defensive positioning. Apply correct defensive techniques.	2
7.	**Assessment – VII**	2

8.	**Body Technique and Footwork:** Reinforce movement and balance. Demonstrate efficient basketball footwork.	2
9.	**Skill Integration:** Combine all fundamental skills. Execute basketball movements smoothly.	2
10.	**Partner Skill:** Develop teamwork through drills. Improve coordination with teammates.	2
11.	**Small Sided Games:** Apply skills in simple match situations. Use basketball fundamentals during gameplay.	2
12.	**Practice Match:** Reinforce practical learning. Participate confidently in basketball games.	2
13.	**Assessment - VIII**	2
	TOTAL	**26**

Text Books:

1. FIBA, "Official Basketball Rules", International Basketball Federation (FIBA)
2. Dr. James Naismith, "Basketball: Its Origin & Development"
3. John R. Wooden, "Practical Modern Basketball", Allyn & Bacon

Reference Books:

1. James Naismith – Basketball: Its Origin and Development – University of Nebraska Press.
2. Jerry V. Krause & Don Meyer – Basketball Skills & Drills – Human Kinetics

E-Resources:

1. Rules of Basketball : How to Play Basketball : Basketball Rules for Beginners
2. How To Dribble A Basketball For Beginners! Basketball Basics for Kids Basketball Training
3. How To Shoot A Basketball For Beginners! Basketball Basics [SECRETS]
4. Basketball: Rebounding

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: IV**	
Course: Liberal Learning – IV (Cricket)								**Code: 25ECCC406G**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop basic cricket skills. Fitness, teamwork, and knowledge of rules and strategies for effective game performance.

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

CO1	Demonstrate basic batting, bowling, and fielding skills with consistency.
CO2	Apply learned cricket skills, coordination, and decision-making during match situations.
CO3	Demonstrate basic umpiring knowledge, fair play, teamwork, and sportsmanship.
CO4	Demonstrate overall cricket proficiency through practice and competitive matches.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Revision of Batting Skills:** Strengthen all basic batting techniques.	2
2.	**Revision of Bowling:** Improve consistency and control in bowling.	2
3.	**Revision of Fielding Skills:** Enhance catching, throwing, and ground fielding.	2
4.	**Combined Skill Practice:** Practice batting, bowling, and fielding together.	2
5.	**Net Practice:** Improve performance through focused practice.	2
6.	**Team Coordination:** Develop communication during play.	2
7.	**Assessment - VII**	2
8.	**Match Awareness Practice Match I:** Understand basic match situations / Apply all learned skills in a game.	2
9.	**Practice Match II:** Improve decision-making during play.	2
10.	**Practice Match III:** Build confidence through match experience.	2
11.	**Basic Umpiring:** Learn simple umpiring signals and decisions.	2
12.	**Fair Play & Sportsmanship:** Understand discipline and ethics in cricket.	2
13.	**Assessment - VIII**	2
	TOTAL	**26**

Text Books:

1. Sridhar, R., "Coaching Beyond", Rupa Publications India.

Reference Books:
1. Eastaway, R., "Cricket Explained: From Grubbers to Googlies", St. Martin's Griffin.
E-Resources:
1. How to Play Cricket 2. Cricket rules explained in 2 minutes 3. Every Cricket Shot Explained in 21 Minutes

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: IV**	
Course: Liberal Learning – IV (Rifle and Pistol Shooting)								**Code: 25ECCC406H**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To develop safe shooting skills, accuracy, concentration, and proper shooting techniques in students.
2. To build discipline, confidence and prepare shooters for competitive events.

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

CO1	Explain safe rifle handling, range discipline, equipment, and match procedures.
CO2	Demonstrate proper shooting techniques, coordination, and posture.
CO3	Apply mental focus and scientific principles to improve shooting performance.
CO4	Demonstrate discipline, sportsmanship, and overall shooting proficiency.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Shot calling:** Shot calling is the ability to mentally identify the exact location of the shot.	2
2.	**Maintain training diary:** To maintain notes given by coach	2
3.	**Pressure handling:** To handle pressure during match, shooters get tensed during match due to crowd or pressure about the performance	2
4.	**Full qualification matches:** Qualifying test match	2
5.	**Final match:** Final match between the qualified shooters	2
6.	**Dry firing test:** To do the whole process of firing the shot but the gun is not loaded	2
7.	**Assessment –VII**	2
8.	**Advanced Accuracy Drills:** It is a structured training exercise designed to improve precision, consistency, shot execution and mental control.	2
9.	**Mock Competition I:** It is a simulated shooting match conducted under actual competition conditions –match no.- **1**	2
10.	**Mock Competition II:** It is a simulated shooting match conducted under actual competition conditions –match no.- **2**	2
11.	**Equipment Inspection and Adjustment:** Learn to adjust the weapon according to the shooter	2
12.	**Ethics and sportsmanship:** It refers to the moral principles ,values, and respectful behavior that guide shooters during training and competition	2

13.	**Assessment – VIII**	2
	TOTAL	**26**

Text Books:

1. International Shooting Sport Federation (ISSF), "ISSF Official Statutes, Rules and Regulations", International Shooting Sport Federation (ISSF)
2. National Rifle Association (NRA), "The NRA Guide to the Basics of Pistol Shooting", National Rifle Association of America
3. National Rifle Association (NRA), "The NRA Guide to the Basics of Rifle Shooting", National Rifle Association of America

Reference Books:

1. National Rifle Association (NRA), "The Fundamentals of Rifle Marksmanship", National Rifle Association of America
2. International Shooting Sport Federation (ISSF), "ISSF Official Statutes, Rules and Regulations", International Shooting Sport Federation (ISSF)
3. National Rifle Association (NRA), "The NRA Guide to the Basics of Pistol Shooting", National Rifle Association of America
4. National Rifle Association (NRA), "The NRA Guide to the Basics of Rifle Shooting", National Rifle Association of America

E-Resources:

1. Introduction to Exercise Physiology & Sports Performance, IIT Madras, https://nptel.ac.in/courses/109106406
2. Open Sight Air Rifle Shooting Sports For Beginners. @TheGunzoneNetwork - YouTube
3. Basics of the Standing Position | Sauer Academy
4. The Ideal Air Rifle Shooter with Abhinav Bindra [IND]

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)								**Semester: IV**	
Course: Liberal Learning – IV (Volleyball)								**Code: 25ECCC406I**	
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To equip participants with the essential skills and knowledge of volleyball, enabling them to perform fundamental techniques, understand basic rules, and participate in basic gameplay scenarios confidently.

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

CO1	Explain the official rules, referee signals, and scoring procedures of volleyball.
CO2	Demonstrate advanced volleyball skills, fitness components, and position-specific techniques.
CO3	Apply offensive, defensive, and tactical strategies effectively during competitive play.
CO4	Demonstrate proficiency in officiating, teamwork, sportsmanship, and overall match performance.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Official Volleyball Rules:** History and development of volleyball rules, Court dimensions and equipment specifications, Team composition and player positions, Rotation and substitution rules, Scoring system (Rally Point System), Faults, violations, and penalties, Service order and match regulations.	2
2.	**Referee Signals:** Duties of the first and second referee, Official hand signals for all game situations, Line judge signals, Communication between officials, Practical demonstration of referee signals.	2
3.	**Score Sheet And Match Procedures:** Components of the official score sheet, Recording player line-ups and substitutions, Recording time-outs, sanctions, and	2

	scores, Match protocol before, during, and after play, Practical score sheet filling	
4.	**Physical Conditioning:** Volleyball-specific warm-up exercises, Strength development for upper and lower body, Core stability exercises, Endurance training, Cool-down and recovery methods.	2
5.	**Speed And Agility And Plyometric:** Sprint drills , Agility ladder exercises, Cone drills , Jump training (plyometrics) , Explosive movement drills for volleyball	2
6.	**Flexibility And Injury Prevention:** Dynamic and static stretching, Mobility exercises, Common volleyball injuries, Injury prevention techniques, Recovery and rehabilitation basics	2
7.	**Assessment - VII**	2
8.	**Position-Specific Training:** Setter responsibilities and drills, Outside hitter techniques, Middle blocker skills, Opposite hitter training, Libero defensive techniques, Position-based game practice.	2
9.	**Complex Offensive System:5**–1 offensive system, 6–2 offensive system, Quick attack combinations, Setter-hitter coordination, Transition offense, Team offensive strategies.	2
10.	**Complex Defensive System:** Block defence system, Perimeter defense, Rotation defense, Backcourt positioning, Defensive communication, Transition from defense to attack.	2
11.	**Tournament Practice:** League and knockout match formats, Tournament scheduling, Team strategy under competition conditions, Match officiating practice, Sportsmanship and fair play.	2
12.	**Comprehensive Skill Revision:** Revision of all technical skills, Tactical system review, Fitness drills, Match-based practice, Error correction and performance improvement	2
13.	**Assessment - VIII**	2
	TOTAL	**26**

Text Books:

1. Fédération Internationale de Volleyball (FIVB), "Official Volleyball Rules", FIVB Publications
2. Bonnie Kenny & Cindy Gregory, "Volleyball: Steps to Success", Human Kinetics
3. Anita Bean, "The Complete Guide to Sports Nutrition", Bloomsbury Sport
4. Ian Jeffreys, "The Warm-Up", Human Kinetics

Reference Books:
1. Pete Waite, "Aggressive Volleyball", Human Kinetics 2. Bob Bertucci, "Volleyball Drill Book", Human Kinetics
E-Resources:
1. Volleyball Rules : How to Play Volleyball : The Rules of Volleyball EXPLAINED! 2. 6 Basic Skills in Volleyball - YouTube 3. Everything You Need to Know About the Game of Volleyball - YouTube

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Liberal Learning – IV (Football)									**Code: 25ECCC406J**
Teaching Scheme (Hrs/week)				**Evaluation Scheme (Marks)**					
Lecture	**Practical**	**Tutorial**	**Credit**	**CIE**	**ETE**	**TW**	**OR**	**PR**	**Total**
-	**02**	**-**	**01**	**-**	**-**	**25**	**-**	**-**	**25**

Prerequisites:

Proper health, Basic knowledge of rules of the game.

Course Objectives:

1. To enhance football players' technical skills, tactical understanding, physical fitness, teamwork, and sportsmanship, fostering a comprehensive understanding and appreciation of the game.

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

CO1	Demonstrate advanced football skills, position-specific techniques, and physical conditioning.
CO2	Apply leadership, coaching, refereeing, and talent identification skills in football.
CO3	Analyze match statistics, player performance, and team effectiveness using appropriate methods.
CO4	Demonstrate teamwork, fair play, ethics, and overall football proficiency in competitive matches.

Course Contents:

Sr. No.	**Description**	**Duration (Hrs.)**
1.	**Advanced Technical Drills:** Develop advanced football techniques through challenging drills that improve skill execution, speed, accuracy, and game adaptability.	2
2.	**Position-Specific Training:** Understand and apply position-specific skills, roles, and responsibilities to enhance individual performance within the team structure.	2
3.	**Leadership & Captaincy:** Develop leadership qualities, communication skills, and decision-making abilities to effectively guide and motivate teammates.	2
4.	**Football Coaching Methods:** Understand and apply effective coaching methods, session planning, and teaching approaches to improve player development.	2
5.	**Talent Identification:** Understand the principles of talent identification by evaluating technical, physical, tactical, and psychological attributes of players.	2
6.	**Strength & Conditioning:** Develop football-specific strength, endurance, speed, agility, and conditioning to improve athletic performance and reduce injury risk.	2
7.	**Assessment-VII**	2

8.	**Refereeing & Match Officiating:** Understand the laws of the game and develop basic refereeing skills for fair and effective match officiating.	2
9.	**Match Statistics & Performance Analysis:** Analyze match statistics and performance data to evaluate player contributions, team effectiveness, and areas for improvement.	2
10.	**Fair Play & Professional Ethics:** Understand the importance of fair play, respect, discipline, teamwork, and ethical behavior in football.	2
11.	**Tournament Practical:** Apply technical, tactical, physical, and teamwork skills in a competitive tournament environment.	2
12.	**Final Competitive Match:** Demonstrate overall football development by applying skills, tactics, teamwork, and sportsmanship in a competitive match setting.	2
13.	**Assessment-VIII**	2
	TOTAL	**26**

Text Books:

1. Fédération Internationale de Football Association (FIFA), "Laws of the Game", FIFA.
2. International Football Association Board (IFAB), "Laws of the Game", IFAB.

Reference Books:

1. Hughes, C., "The Winning Formula in Soccer", Meyer & Meyer Sport.
2. Fédération Internationale de Football Association (FIFA), "Laws of the Game", FIFA.
3. International Football Association Board (IFAB), "Laws of the Game", IFAB

E-Resources:

1. Beginner's guide to football | Football for dummies
2. Every position in soccer explained
3. Rules Of Soccer : How to play Soccer : Soccer Rules for Beginners

BACK TO STRUCTURE

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Program: B. Tech. (Electronics and Computer Engineering)									**Semester: IV**
Course: Internship – III									**Code: 25ECIN402**
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.

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