ANNEXURE –I

Syllabus of III and IV Semester Courses for Four-Year Multidisciplinary Undergraduate B.Tech. Degree Programme in Electronics & Telecommunication Engineering

(In view of NEP-2020)

For students admitted in academic session 2025-26 and onwards



03/09/2026

SHRI JAWAHARLAL DARDA EDUCATION SOCIETY'S
JAWAHARLAL DARDA
INSTITUTE OF ENGINEERING AND TECHNOLOGY, YAVATMAL
AN AUTONOMOUS INSTITUTE
Affiliated to Sant Gadge Baba Amravati University, Approved by AICTE, New Delhi and DTE Maharashtra
93VP+PWF: P6, MIDC Area, Lohara, Yavatmal - 445 001, Maharashtra (www.jdiet.ac.in)

1. Vision:

To be a centre of excellence for Electronics & Telecommunication Engineering education by creating skilled, innovative and ethical engineers for the benefit of industry and society.

2. Mission:

1. To provide quality engineering education through effective and compatible teaching learning methodologies.
2. To encourage students and faculty for research and innovations by providing facilities.
3. To facilitate students for pursuing higher education, entrepreneurial and professional career.
4. To create a bond with alumni, industry and society for up gradation and social responsibility.

3. Programme Education Objectives

PEO 1: Fundamental Knowledge: Students of the program will be skilled in fundamental concepts of Electronics & Telecommunication Engineering and allied branches by developing strong background in applied sciences & Engineering.

PEO 2: Design & Experimentation Skills: Students of the program will be prepared with skills of design & experimentation along with problem solving in the area of Electronics & Telecommunication Engineering and allied branches.

PEO 3: Specialization: Students will be prepared to develop skills that are necessary for success in industry or higher studies such that they can pursue their career in the field of Electronics & Telecommunication Engineering and allied branches.

PEO 4: Professional Skills: The students will be prepared to enhance their communication skills, presentation skills, ability to work in a team and ethical values that are necessary to thrive in their career.

PEO 5: Self Learning: The students will be prepared to continue their professional development through continuing education so that they can adapt to ever changing technical environment.

4. SDG of United Nation

1. **No Poverty** – End poverty in all its forms everywhere.
2. **Zero Hunger** – End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
3. **Good Health and Well-being** – Ensure healthy lives and promote well- being for all at all ages.

4. **Quality Education** – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
5. **Gender Equality** – Achieve gender equality and empower all women and girls.
6. **Clean Water and Sanitation** – Ensure availability and sustainable management of water and sanitation for all.
7. **Affordable and Clean Energy** – Ensure access to affordable, reliable, sustainable, and modern energy for all.
8. **Decent Work and Economic Growth** – Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.
9. **Industry, Innovation, and Infrastructure** – Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10. **Reduced Inequalities** – Reduce inequality within and among countries.
11. **Sustainable Cities and Communities** – Make cities and human settlements inclusive, safe, resilient, and sustainable.
12. **Responsible Consumption and Production** – Ensure sustainable consumption and production patterns.
13. **Climate Action** – Take urgent action to combat climate change and its impacts.
14. **Life Below Water** – Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.
15. **Life on Land** – Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss.
16. **Peace, Justice, and Strong Institutions** – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels.
17. **Partnerships for the Goals** – Strengthen the means of implementation and revitalize the global partnership for sustainable development.

5. WK: Washington Accord Knowledge Profile-Attributes for engineering program

WK1: A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK2: Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modeling applicable to the discipline.

WK3: A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK4: Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK5: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK6: Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK7: Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK8: Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK9: Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

6. Programme Outcomes (NBA, Jan 2025)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization.

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

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.

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.

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.

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.

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

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.

7. Programme Specific Indicators

Telecommunications

1. Remember key protocols (e.g. TCP/IP LTE) for configuring telecommunication networks.
2. Understand principles of signal modulation for reliable data transmission.
3. Apply antenna design techniques to optimize wireless network coverage.
4. Analyze network performance metrics to identify connectivity issues.
5. Evaluate efficiency of 5G/6G network architectures for high-speed applications.
6. Create scalable network topologies for increased data traffic.
7. Design error-correction algorithms to enhance data integrity.
8. Develop software for network management systems to automate fault detection.
9. Assess cybersecurity risks in telecommunication networks for data protection.
10. Integrate satellite communication systems with terrestrial networks.
11. Optimize bandwidth allocation for real-time multimedia streaming.

Consumer Electronics

12. Remember specifications of microcontrollers used in consumer devices.
13. Understand power consumption principles for energy-efficient gadgets.
14. Apply embedded system programming for smart device firmware.
15. Analyze circuit designs to improve wearable technology performance.
16. Evaluate user interface designs for usability and customer satisfaction.
17. Create innovative display technologies for next-generation smartphones.
18. Design compact power management circuits for portable devices.
19. Develop wireless charging systems for consumer electronics.
20. Assess product reliability through stress testing of components.
21. Integrate sensors for real-time environmental monitoring in smart appliances.
22. Optimize audio signal processing for high-fidelity sound in devices.

Information Technology

23. Explain Python programming concepts and write scripts to automate network and IT infrastructure tasks, incorrating variables, loops, functions, and error handling.

24. Implement network automation workflows using Python libraries (e.g., Netmiko, Paramiko) for device configuration, backups, and routine maintenance.
25. Configure IT infrastructure using standard network protocols and integrate IoT devices for enhanced data analytics.
26. Describe cloud computing architectures and design scalable IT solutions for enterprise environments.
27. Apply cybersecurity frameworks, analyze network traffic, and mitigate real-time cyber threats.
28. Evaluate software performance and optimize database systems for enterprise-level IT applications.
29. Create APIs to integrate telecommunication systems with IT platforms and design secure data storage solutions for sensitive information.
30. Develop automation scripts for IT system monitoring and implement basic Ansible playbooks for deployment tasks.
31. Parse and interpret structured data formats (JSON, YAML) and create configuration templates for automated deployments.
32. Demonstrate professional communication, teamwork, documentation skills, and the use of version control (Git) in collaborative IT and networking projects.

Healthcare Equipment Manufacturing

33. Remember regulatory standards (e.g. FDA IEC) for medical device development.
34. Understand biomedical signal processing for diagnostic equipment.
35. Apply embedded systems design for reliable medical monitoring devices.
36. Analyze sensor data to improve precision of diagnostic tools.
37. Evaluate safety and efficacy of medical imaging systems.
38. Create wearable health monitors for real-time patient data collection.
39. Design low-power circuits for implantable medical devices.
40. Develop software for real-time analysis of medical sensor data.
41. Assess electromagnetic compatibility of medical devices.
42. Integrate wireless communication modules into medical devices.
43. Synthesize AI-driven solutions for diagnostic imaging systems.

Defense and Aerospace

44. Remember military standards for electronic systems in defence applications.
45. Understand radar signal processing for accurate target detection.
46. Apply embedded systems design for avionics in aircraft navigation.
47. Analyze communication systems for secure data transmission.
48. Evaluate reliability of components under extreme aerospace conditions.
49. Create fault-tolerant systems for satellite communication

networks.

50. Design high-frequency circuits for radar and surveillance systems.
51. Develop encryption algorithms for secure military communications.
52. Assess electromagnetic interference in aerospace electronic systems.
53. Integrate GPS and inertial navigation systems for precise positioning.
54. Optimize power systems for unmanned aerial vehicles (UAVs).

Automotive

55. Remember automotive communication protocols (e.g. CAN LIN for vehicle systems.
56. Understand electric vehicle powertrain architectures for efficient design.
57. Apply sensor fusion techniques for advanced driver-assistance systems (ADAS).
58. Analyze vehicle communication networks for real-time data exchange.
59. Evaluate battery management systems for EV performance and safety.
60. Create embedded software for autonomous vehicle control systems.
61. Design power electronics for efficient energy conversion in EVs.
62. Develop diagnostic tools for vehicle system troubleshooting.
63. Assess electromagnetic compatibility of automotive electronic systems.
64. Integrate V2X communication for smart traffic systems.
65 Synthesize AI-based solutions for predictive maintenance in automotive systems.

Power Electronics

66. Remember principles of power conversion for designing efficient inverters.
67. Understand thermal management techniques for high-power systems.
68. Apply control strategies to stabilize voltage in power supply systems.
69. Analyze power losses in converters to improve energy efficiency.
70. Evaluate reliability of power electronics in renewable energy systems.
71. Create high-efficiency power converters for solar and wind energy.
72. Design switching circuits for high-frequency power applications.
73. Develop control algorithms for smart grid power distribution.
74. Assess safety standards compliance in power electronic systems.
75. Integrate energy storage systems with power electronics for grid stability.
76. Optimize power factor correction in industrial power systems.

Research and Academia

77. Remember fundamental theories of electronics for teaching.
78. Understand emerging trends in telecommunication technologies for research.
79. Apply simulation tools to model electronic circuits for experiments.
80. Analyze experimental data to validate telecommunication theories.
81. Evaluate feasibility of novel electronic designs for research applications.
82. Create innovative research methodologies for wireless technologies.
83. Design experimental setups for testing electronic components.
84. Develop open-source tools for educational purses in electronics.
85. Assess impact of research findings on industry applications.
86. Integrate interdisciplinary approaches in electronics research.
87. Synthesize new theoretical frameworks for telecommunication protocols.

Broadcasting and Media

88. Remember broadcasting standards (e.g. ATSC DVB) for media transmission.
89. Understand signal compression techniques for high-quality media streaming.
90. Apply digital signal processing to enhance audio and video quality.
91. Analyze transmission errors to improve broadcasting reliability.
92. Evaluate performance of media delivery networks for low-latency streaming.
93. Create adaptive streaming algorithms for variable network conditions.
94. Design satellite broadcasting systems for global content distribution.
95. Develop software for real-time media encoding and decoding.
96. Assess signal interference in broadcasting systems for optimal performance.
97. Integrate IP-based technologies for hybrid broadcasting solutions.
98. Optimize bandwidth usage for 4K/8K video streaming applications.

Semiconductor Industry

99. Analyze the characteristics and behaviour of semiconductor devices for application in ICs.
100. Design VLSI circuits and systems using industry-standard EDA tools.
101. Apply semiconductor fabrication processes to create functional devices.
102. Evaluate the performance, yield, and reliability of semiconductor devices and systems.

103. Implement FPGA/ASIC solutions for specific applications.
104. Integrate semiconductor packaging and testing techniques to meet industry standards.
105. Develop low-power, high-performance microelectronic systems considering scalability and cost-effectiveness.
106. Create simulation models to verify and validate semiconductor circuit designs.

Basic Science

107. Apply mathematical techniques such as algebra, trigonometry, calculus, differential equations, linear algebra, probability and statistics to solve problems.
108. Apply physical principles such as motion, forces, energy and materials to solve problems.
109. Apply knowledge of chemical properties and reactions for construction material and environment (Corrosion, polymer, electrochemistry etc.).

Engineering Science Courses

110. Demonstrate proficiency in basic workshop operations (fitting, carpentry, welding, sheet metal, plumbing and machining etc.).
111. Apply the principles of engineering mechanics to analyse and solve problems involving forces, moment, equilibrium, friction, centred and MOI etc.
112. Apply the principles electrical engineering to analyse and maintain electrical systems, circuits, machines and power systems.
113. Demonstrate ability to interpreted and create drawings using geometric constructions, orthographic projections, isometric projections and CAD tools.
114. Demonstrate ability to apply fundamental principles of algorithms, programming, data structures and computing system to solve conceptual problems.

Generic Competencies

A. Problem-Solving Skills

115. Analytical Thinking: Ability to analyze complex problems, break them down into smaller components, and find effective solutions.
116. Critical Thinking: Ability to evaluate multiple solutions to a problem and choose the best course of action based on available data, safety, and cost-efficiency.

B. Communication Skills

117. Oral Communication: Ability to communicate complex technical information clearly to a variety of audiences, including clients, stakeholders, contractors, and team members.
118. Written Communication: Proficiency in drafting reports, proposals, technical specifications, and documentation that are clear, concise, and accurate.
119. Interpersonal Communication: Ability to collaborate effectively

with multidisciplinary teams, clients, and project stakeholders.

C. Project Management

120. Time Management: Efficiently managing time and prioritizing tasks to meet deadlines in a dynamic project environment.
121. Resource Management: Ability to plan, allocate, and manage resources such as labour, materials, and equipment to ensure project efficiency.
122. Budgeting and Cost Control: Skills in estimating project costs, monitoring budgets, and ensuring projects are completed within financial constraints.
123. Risk Management: Ability to identify, assess, and mitigate risks during the planning and execution of engineering projects.

D. Teamwork and Leadership

124. Team Collaboration: Working effectively as part of a team, contributing to the success of the project through collaboration, open communication, and respect for others' expertise.
125. Leadership Skills: Leading and motivating a team of engineers, contractors, and other stakeholders to meet project goals and deadlines.
126. Conflict Resolution: Ability to resolve conflicts between team members, clients, or contractors, ensuring that project objectives are still achieved.

E. Attention to Detail

127. Accuracy: Ensuring all engineering calculations, designs, and project plans are accurate and align with building codes, regulations, and standards.
128. Quality Assurance: Ensuring that the materials and processes used in construction adhere to high standards of quality and safety.

F. Ethical and Professional Integrity

129. Ethical Decision Making: Adhering to a strict code of ethics, ensuring public safety, environmental protection, and transparency in all dealings.
130. Accountability: Taking responsibility for the success or failure of a project, being proactive in addressing issues, and delivering results.

G. Adaptability and Flexibility

131. Openness to Change: Being able to adapt to new technologies, tools, and methods, as well as evolving project requirements or environmental conditions.
132. Learning and Development: Actively seeking opportunities for professional growth, staying current with industry trends, and acquiring new skills to remain competitive.

H. Creativity and Innovation

133. Creative Problem Solving: Thinking outside the box and coming up with novel solutions to engineering challenges.
134. Innovative Design: Contributing new ideas for designs and

processes that can improve efficiency, reduce costs, or make better use of resources.

I. Cultural and Environmental Awareness

135. Sustainability Awareness: Knowledge of sustainable construction methods, green building practices, and the importance of reducing the environmental impact of engineering projects.
136. Cultural Sensitivity: Understanding and respecting cultural differences when working in diverse teams or international projects.
137. Environmental Impact Understanding: Considering the environmental consequences of engineering decisions and striving to minimize negative impacts through design and construction methods.

J. Decision-Making Skills

138. Data-Driven Decisions: Using available data, facts, and technical analysis to make informed decisions about the design, execution, and management of projects.
139. Prioritizing Decisions: Knowing which decisions need immediate attention and which can be deferred, especially in a high-pressure environment.

K. Regulatory and Legal Knowledge

140. Familiarity with Building Codes and Standards: Understanding and ensuring compliance with local, national, and international building codes, safety regulations, and legal standards.
141. Health and Safety: Knowledge of safety regulations and best practices for ensuring the health and safety of workers, the public, and the environment throughout the project lifecycle.

L. Client-Focused Mindset

142. Client Management: Building and maintaining strong relationships with clients, understanding their needs, and ensuring their expectations are met throughout the project.
143. Customer Service Orientation: Ensuring that client concerns are addressed promptly, and working toward providing value-added solutions that meet their goals.

8. Scheme of Electronics & Telecommunication Engineering Department

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - I (First Year) [Group - A/B]

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Mathematics - I	BSC	1SH101BS1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	Applied Physics	BSC	1SH102BS1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
3	Programming for Problem Solving	ESC	1CS103ES1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
4	Engineering Mechanics	ESC	1CE104ES1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
5	Applied Physics Lab	BSC	1SH105BS1	0	0	2	0	2	1					25	25	50	25	50	
6	Programming for Problem Solving Lab	ESC	1CS106ES1	0	0	2	0	2	1					25	25	50	25	50	
7	Engineering Mechanics Lab	ESC	1CE107ES1	0	0	2	0	2	1					25	25	50	25	50	
8	Workshop	ESC	1ME108ES1	0	0	2	0	2	1					25	25	50	25	50	
9	Electronic Workshop	VSC	1ET109VS1	1	0	2	1	4	2						50	50	25	50	
10	Communication Skills	AEC	1SH110AE1	1	0	2	1	4	2					25	25	50	25	50	
11	Sports & Yoga	CC	1SH111CC1	0	0	4	0	4	2						50	50	25	50	
Total				**14**	**0**	**16**	**14**	**44**	**22**			**400**				**350**		**750**	

Notional Learning Hours: [Workload (teaching/guidance/practicum) 30x15 = 450 Hrs] + [Learner-engaged time 14x15 = 210 Hrs]

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - II (First Year) [Group - A/B]

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Mathematics - II	BSC	2SH112BS1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	Applied Chemistry	BSC	2SH113BS1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
3	Basic Electrical Engineering	ESC	2EE114ES1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
4	Engineering Graphics	ESC	2ME115ES1	2	0	0	2	4	2	60	40	100	40					100	4 Hrs.
5	Introduction to Digital Logic	PCC	2ET116PC1	1	0	2	1	4	2						50	50	25	50	
6	Indian Knowledge System (IKS) in Electronics & Telecommunication	IKS	2ET117IK1	1	0	2	1	4	2						50	50	25	50	
7	Applied Chemistry - Lab	BSC	2SH118BS1	0	0	2	0	2	1					25	25	50	25	50	
8	Basic Electrical Engineering - Lab	ESC	2EE119ES1	0	0	2	0	2	1					25	25	50	25	50	
9	Engineering Graphics/CAD Lab	ESC	2ME120ES1	0	0	2	0	2	1					25	25	50	25	50	
10	Universal Human Values	SEC	2CE121VS1	1	0	2	1	4	2						50	50	25	50	
11	Digital Wellness	CC	2SH122CC1	1	0	2	1	4	2						50	50	25	50	
Total				**15**	**0**	**14**	**15**	**44**	**22**			**400**				**350**		**750**	

Notional Learning Hours: [Workload (teaching/guidance/practicum) 29x15 = 435 Hrs] + [Learner-engaged time 15x15 = 225 Hrs]

Exit Option (Level 4.5) for Undergraduate Certificate in Odd Semester of next Academic Year as approved by BOS																			
12	Electronics Servicing and Maintenance	EC	3ET123EC1	2	0	4	2	8	4	30	20	50	20	25	25	50	25	100	2 Hrs.
13	Assembly & Maintenance of Personal Computer	EC	3ET124EC1	2	0	4	2	8	4	30	20	50	20	25	25	50	25	100	2 Hrs.
OR																			
14	Internship / Apprenticeship in Industry	EI	3ET125EI1	0	0	16	0	288	8					100	100	200	100	200	
OR																			
15	Two MOOC/NPTEL Courses	EC	3ET126OC_	8	0	0	8	16	8										

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - III (Second Year)

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Electronic Devices & Circuits	PCC	3ET201PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	Signals & Systems	PCC	3ET202PC1	2	0	0	2	4	2	60	40	100	40					100	3 Hrs.
3	Analog & Digital Communication	PCC	3ET203PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
4	Multidisciplinary Minor - I	MDM	3_204MD_	2	0	0	2	4	2	30	20	50	20					50	2 Hrs.
5	Open Elective - I	OE	3_205OE_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
6	Electronic Devices & Circuits Lab	PCC	3ET206PC1	0	0	2	0	2	1					25	25	50	25	50	
7	Signals & Systems Lab	PCC	3ET207PC1	0	0	2	0	2	1					25	25	50	25	50	
8	Analog & Digital Communication Lab	PCC	3ET208PC1	0	0	2	0	2	1					25	25	50	25	50	
9	Basic Financial Management	EEM	3ET209EM1	2	0	0	2	4	2						50	50	25	50	
10	Constitutional Values and Fundamental Duties	VEC	3SH210VE1	2	0	0	2	4	2						50	50	25	50	
11	Field Project	FP	3ET400FP1	0	0	4	0	4	2					25	25	50	25	50	
12	Disaster Management and Preparedness	NC	3AL001NC1	2	0	0	0	2	-						50	50	25	50	
Total				**19**	**0**	**10**	**17**	**46**	**22**			**450**				**300**		**750**	
Notional Learning Hours: [Workload (teaching/guidance/practicum) 29x15 = 435 Hrs] + [Learner-engaged time 17x15 = 255 Hrs]																			
Optional Course for Double Minor / Honours Degree																			
13	Double Minor / Honours Course - I	DH	3__211DH_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - IV (Second Year)

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Electromagnetic Fields	PCC	4ET212PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	Analog & Digital Electronics	PCC	4ET213PC1	2	0	0	2	4	2	60	40	100	40					100	3 Hrs.
3	Network Analysis	PCC	4ET214PC1	2	0	0	2	4	2	60	40	100	40					100	3 Hrs.
4	Multidisciplinary Minor - II	MDM	4_215MD_	2	0	0	2	4	2	30	20	50	20					50	2 Hrs.
5	Open Elective - II	OE	4_216OE_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
6	Analog & Digital Electronics Lab	PCC	4ET217PC1	0	0	2	0	2	1					25	25	50	25	50	
7	Network Analysis Lab	PCC	4ET218PC1	0	0	2	0	2	1					25	25	50	25	50	
8	Python Programming Lab	SEC	4ET219VS1	0	0	4	0	4	2						50	50	25	50	
9	Technical Writing	AEC	4SH220AE1	1	0	2	1	4	2						50	50	25	50	
10	Fundamentals of Book Keeping and Accounting	EEM	4SH221EM1	1	0	2	1	4	2						50	50	25	50	
11	Environmental Science	VEC	4CE222VE1	2	0	0	2	4	2	30	20	50	20					50	2 Hrs.
Total				**16**	**0**	**12**	**16**	**44**	**22**			**500**				**250**		**750**	
Notional Learning Hours: [Workload (teaching/guidance/practicum) 28x15 = 420 Hrs] + [Learner-engaged time 16x15 = 240 Hrs]																			
Optional Course for Double Minor / Honours Degree																			
12	Double Minor / Honours Course - II	DH	4__223DH_	4	0	0	4	8	4	60	40	100	40					100	3 Hrs.
Exit Option (Level 5) for Undergraduate Diploma in Odd Semester of next Academic Year as approved by BOS																			
13	Microprocessors/Microcontrollers based Product Design	EC	5ET224EC1	2	0	4	2	8	4	30	20	50	20	25	25	50	25	100	2 Hrs.
14	Signal Processing with MATLAB	EC	5ET225EC1	2	0	4	2	8	4	30	20	50	20	25	25	50	25	100	2 Hrs.
OR																			
15	Internship / Apprenticeship in Industry	EI	5ET226EI1	0	0	16	0	288	8					100	100	200	100	200	
OR																			
16	Two MOOC/NPTEL Courses	EC	5ET227OC_	8	0	0	8	16	8										

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - V (Third Year)

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Fiber Optics & Satellite Communication	PCC	5ET228PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	Microcontroller & Applications	PCC	5ET229PC1	3	1	0	4	8	4	60	40	100	40					100	3 Hrs.
3	Digital Signal Processing	PCC	5ET230PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
4	Programme Elective Course - I	PEC	5ET231PE_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
5	Multidisciplinary Minor - III	MDM	5_232MD_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
6	Open Elective - III	OE	5_233OE_	2	0	0	2	4	2	30	20	50	20					50	2 Hrs.
7	Microcontroller Lab	PCC	5ET234PC1	0	0	2	0	2	1					25	25	50	25	50	
8	Digital Signal Processing Lab	PCC	5ET235PC1	0	0	2	0	2	1					25	25	50	25	50	
9	Programme Elective Course - I - Lab	PEC	5ET236PE_	0	0	2	0	2	1					25	25	50	25	50	
10	Multidisciplinary Minor - III - Lab	MDM	5_237MD_	0	0	2	0	2	1					25	25	50	25	50	
Total				**17**	**1**	**8**	**18**	**44**	**22**			**550**				**200**		**750**	
Notional Learning Hours: [Workload (teaching/guidance/practicum) 26x15 = 390 Hrs] + [Learner-engaged time 18x15 = 270 Hrs]																			
Optional Course for Double Minor / Honours Degree																			
11	Double Minor / Honours Course - III	DH	5__238DH_	4	0	0	4	8	4	60	40	100	40					100	3 Hrs.

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - VI (Third Year)

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Embedded Systems	PCC	6ET239PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	Digital Image Processing	PCC	6ET240PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
3	Control System	PCC	6ET241PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
4	Programme Elective Course - II	PEC	6ET242PE_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
5	Programme Elective Course - III	PEC	6ET243PE_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
6	Multidisciplinary Minor - IV	MDM	6_244MD_	2	0	0	2	4	2	30	20	50	20					50	2 Hrs.
7	Embedded Systems lab	PCC	6ET245PC1	0	0	2	0	2	1					25	25	50	25	50	
8	Digital Image Processing Lab	PCC	6ET246PC1	0	0	2	0	2	1					25	25	50	25	50	
9	Programme Elective Course - II- Lab	PEC	6ET247PE_	0	0	2	0	2	1					25	25	50	25	50	
10	Personal Skills (GD& PI)	SEC	6SH248VS1	1	0	2	1	4	2						50	50	25	50	
Total				**18**	**0**	**8**	**18**	**44**	**22**			**550**				**200**		**750**	

Notional Learning Hours: [Workload (teaching/guidance/practicum) 26x15 = 390 Hrs] + [Learner-engaged time 18x15 = 270 Hrs]

Optional Course for Double Minor / Honours Degree																			
11	Double Minor / Honours Course - IV	DH	6__249DH_	4	0	0	4	8	4	60	40	100	40					100	3 Hrs.
Exit Option (Level 5.5) for B. Voc in Odd Semester of next Academic Year as approved by BOS																			
12	PC Hardware and Computer networking	EC	7ET250EC1	2	0	4	2	8	4	30	20	50	20	25	25	50	25	100	2 Hrs.
13	Embedded system design IoT	EC	7ET251EC1	2	0	4	2	8	4	30	20	50	20	25	25	50	25	100	2 Hrs.
OR																			
14	Internship / Apprenticeship in Industry	EI	7ET252EI1	0	0	16	0	288	8					100	100	200	100	200	
OR																			
15	Two MOOC/NPTEL Courses	EC	7ET253OC__	8	0	0	8	16	8										

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - VII (Final Year)

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Mobile Communication and Networks	PCC	7ET301PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	VLSI Design	PCC	7ET302PC1	2	0	0	2	4	2	60	40	100	40					100	3 Hrs.
3	Programme Elective Course - IV	PEC	7ET303PE_	2	0	0	2	4	2	60	40	100	40					100	3 Hrs.
4	Programme Elective Course - V	PEC	7ET304PE_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
5	Multidisciplinary Minor - V	MDM	7_305MD_	2	0	0	2	4	2	30	20	50	20					50	2 Hrs.
6	VLSI Design Lab	PCC	7ET306PC1	0	0	2	0	2	1					25	25	50	25	50	
7	Programme Elective Course – IV Lab	PCC	7ET307PE_	0	0	2	0	2	1					25	25	50	25	50	
8	Research Methodology	RM	7ET401RM1	2	0	4	2	8	4	30	20	50	20		50	50	25	100	2 Hrs.
9	Project	PR	7ET402PR1	0	0	8	0	8	4					50	100	150	75	150	
Total				**14**	**0**	**16**	**14**	**44**	**22**			**500**				**300**		**800**	
Optional Course for Double Minor / Honours Degree																			
10	Double Minor / Honours Course - V	DH	7__308DH_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
Optional Course for Honours with Research Degree																			
11	Research Project	RP	7ET403RP1	0	0	18	0	18	9	0	0	0	0	100	100	200	100	200	

Notional Learning Hours: [Workload (teaching/guidance/practicum) 30x15 = 450 Hrs] + [Learner-engaged time 14x15 = 210 Hrs]

Jawaharlal Darda Institute of Engineering & Technology, Yavatmal (Autonomous Institute)

Curriculum Structure (Scheme) for Four Year Multidisciplinary B. Tech in Electronics & Telecommunication Degree Programme

Semester - VIII (Final Year)

Sr. No.	Course Name	Course Category	Course Code	Course Plan per Week (Hrs.)					Credits	Theory Evaluation		Theory (Total)		Practical/Term Work Evaluation		Practical/Term Work Evaluation (Total)		Total Max Marks	Theory Exam Time (Hrs.)
										SEE	CIA			EE	PA				
				L	T	P	SL	Total		Max Marks	Max Marks	Max Marks	Min Marks	Max Marks	Max Marks	Max Marks	Min Marks		
1	Biomedical Electronics (Online)	PCC	8ET309PC1	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
2	Programme Elective Course - V (Online)*	PEC	8ET310PE_	3	0	0	3	6	3	60	40	100	40					100	3 Hrs.
3	Multidisciplinary Minor - VI (Online)	MDM	8_311MD_	2	0	0	2	4	2	30	20	50	20					50	2 Hrs.
4	On Job Training (Internship/Apprenticeship)	OJT	8ET404IN1	0	0	24	0	24	12					100	100	200	100	200	
Total				**8**	**0**	**24**	**8**	**40**	**20**			**250**				**200**		**450**	
Notional Learning Hours: [Workload (teaching/guidance/practicum) 32x15 = 480 Hrs] + [Learner-engaged time 8x15 = 120 Hrs]																			
Optional Course for Honours with Research Degree																			
5	Research Project	RP	8ET405RP1	0	0	18	0	18	9	0	0	0	0	100	100	200	100	200	

* Can be considered for MOOCS/NPTEL courses.

9. List of Programme Elective Courses

Students will have an option to choose the PEC offered by their respective Major Discipline offered during semester V to VIII Programme Elective Courses offered by Electronics & Telecommunication Engineering

Sr. No.	Semester	Programme Elective Course/Subjects Name	Course Code
1	V	Sensors and Transducers (PEC-I)	5ET231PE1
2		Sensors and Transducers – Lab (PEC- Lab I)	5ET236PE1
		OR	
3		Communication Network (PEC-I)	5ET231PE2
4		Communication Network - Lab (PEC- Lab I)	5ET236PE2
5	VI	IoT & Applications (PEC-II)	6ET242PE1
6		IoT & Applications -Lab (PEC-Lab II)	6ET246PE1
		OR	
7		Cryptography & Network Security (PEC-II)	6ET242PE1
8		Cryptography & Network Security-Lab (PEC- Lab II)	6ET246PE1
9		Computer Architecture (PEC-III)	6ET243PE2
		OR	
10		Introduction to AI (PEC-III)	6ET243PE2
11	VII	Microwave Theory and Techniques (PEC-IV)	7ET303PE1
12		Microwave Theory and Techniques (PEC- Lab IV)	7ET307PE1
		OR	
13		Advance Digital Signal Processing (PEC-IV)	7ET303PE2
14		Advance Digital Signal Processing (PEC- Lab IV)	7ET307PE2
15		Power Electronics (PEC-V)	7ET304PE2
		OR	
16		PLC & Industrial Automation (PEC-V)	7ET304PE2
17	VIII	*Information Theory & Coding (PEC-VI)	8ET310PE1
		OR	
18		* Antenna & Wave Propagation (PEC-VI)	8ET310PE2

10. Syllabus for Semester III & IV

Level:	**5**	Course Code:	**3ET201PC1**	Course Category:	**PCC**
Course Name	**Electronic Devices & Circuits**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 3ET201PC1 Electronic Devices & Circuits is a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to introduce the fundamentals of semiconductor electronic devices, their construction, characteristics, working principle and applications in various electronic circuits.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET201PC1.1	Describe the working of diodes to understand its applications.	C-2
3ET201PC1.2	Illustrate the application of diodes as a component for simple circuits.	C-3
3ET201PC1.3	Describe Bipolar Junction Transistor in details to understand its applications.	C-3
3ET201PC1.4	Explain basics of JFET, MOSFET, UJT to interpret their operational parameters.	C-2
3ET201PC1.5	Explain the feedback concept, topologies and their applications in sinusoidal oscillators.	C-2
3ET201PC1.6	Describe the multistage amplifiers and emitter followers.	C-3

Course Contents:

Unit 1	**Introduction to Diodes:** PN junction diode: Construction, Working, diode equation, V-I characteristics. Zener diode: Construction, Working, V-I characteristics LED: Construction, Working, V-I Characteristics. Photodiode: Construction, Working, V-I Characteristics.	7 Hrs
Unit 2	**Applications of Diodes:** PN junction diode: As a Switch, rectifier, analysis of Half Wave Rectifier, Full Wave Rectifier, filters C, L, LC and CLC filters, Clipping and Clamping circuits. Zener diode: As a voltage regulator.	8 Hrs
Unit 3	**Bipolar Junction Transistors:** BJT configurations: CB, CE and CC with characteristics and parameters, transistor as a switch, Transistor switching times, dc load line, transistor biasing methods, bias stability, h-parameters and hybrid model.	8 Hrs
Unit 4	**JFET, MOSFET and UJT:** JFET: Theory, construction and characteristics, parameters (μ, gm & rd), MOSFET: Theory, construction and characteristics of enhancement & depletion type MOSFET, UJT**:** Theory, construction and characteristics; UJT as relaxation oscillator.	7 Hrs
Unit 5	**Feedback amplifiers and Sinusoidal oscillators:** Feedback amplifiers: Feedback concept, effects of negative feedback, basic feedback topologies, Sinusoidal oscillators: Barkhausen's criteria, Hartley, Colpitts, RC Phase shift, Wein bridge and crystal oscillators.	7 Hrs
Unit 6	**Multistage Amplifiers and Emitter Followers:** Multistage Amplifiers: Need of multistage, RC coupled amplifier, transformer coupled amplifier direct coupled amplifier. Emitter Followers: Basic emitter follower, Darlington emitter follower, Bootstrapping principle.	8 Hrs

Text Books:

1. David Bell, Electronic Devices and Circuits, Oxford University Press.
2. Milliman and Halkias, Integrated Electronics, Tata McGraw Hill, New Delhi

References:

1. Robert L.Boylestad, Electronic Devices and Circuit Theory, Pearson Education
2. Donald A Neamen, Electronic Circuit Analysis and Design Tata McGraw Hill,

E Resources :

1. Electronics Tutorials: https://www.electronics-tutorials.ws/
2. e-book: Electronic Devices and Circuit Theory, Robert Boylestad - 11th Edition: https://kolegite.com/EE_library/books_and_lectures/.pdf

Mapping of COs with POs and PSOs

COs	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET201PC1.1	3	2	2	-	2	-	-	-	-	-	-	3	1	-
3ET201PC1.2	3	3	2	-	2	-	-	-	-	-	-	3	1	-
3ET201PC1.3	3	2	2	-	2	-	-	-	-	-	-	3	1	-
3ET201PC1.4	3	3	2	2	2	-	-	-	-	-	-	3	1	-
3ET201PC1.5	3	3	2	2	2	-	-	-	-	-	-	3	1	-
3ET201PC1.6	3	3	2	2	2	-	-	-	-	-	-	3	1	-
3ET201PC1CO	3	3	2	2	2	-	-	-	-	-	-	3	1	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**3ET202PC1**	Course Category:	**PCC**
Course Name	**Signals & Systems**			
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours **02 30 Hrs**
Total Credit Hours	**60 Hrs**			
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks **40**
EE Marks	**--**	PA Marks	**--**	Total Marks **100**

Course Description:

Subject Code 3ET202PC1 Signals & Systems is a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of the course is to develop a clear understanding of the fundamental characteristics and classifications of signals and systems, along with signal analysis in both time and transform domains using tools such as Fourier and Laplace transforms.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET202PC1.1	Describe the continuous time signals and systems for mathematical operations and their classification.	C-2
3ET202PC1.2	Apply concepts of Fourier series to understand the spectral characteristics of continuous-time periodic signals.	C-3
3ET202PC1.3	Apply concepts of Fourier Transform to analyse the spectral characteristics of continuous-time aperiodic signals.	C-3
3ET202PC1.4	Apply the Laplace transform for analysis of continuous-time systems.	C-3
3ET202PC1.5	Describe the Discrete Time signals and systems for mathematical operations and their classification.	C-2
3ET202PC1.6	Describe the concept of sampling to the conversion of analog signals into discrete signals.	C-2

Course Contents:

Unit 1	**Continuous time signals and systems**: Signal types, Signal Operations, Signal Classification, Energy and Power Signal, Even and Odd functions, Convolution, System Classification.	5 Hrs
Unit 2	**Continuous-Time Signal Analysis -The Fourier Series:** Periodic Signal Representation by Trigonometric Fourier Series, Existence and Convergence of Fourier Series, Exponential Fourier Series.	5 Hrs
Unit 3	**Continuous-Time Signal Analysis-The Fourier Transform:** Aperiodic Signal Representation by Fourier Integral, Properties of Fourier Transform, Inverse Fourier Transform, Fourier Spectrum.	5 Hrs
Unit 4	**Continuous-Time System Analysis Using Laplace Transform**: Laplace Transform, Region of convergence, Properties of Laplace transform, Inverse Laplace transforms	5 Hrs
Unit 5	**Time-Domain Analysis of Discrete-Time Signals & Systems:** Signal Operations, Classification of Discrete-Time Systems, convolution sum, Properties of linear Convolution.	5 Hrs
Unit 6	**Sampling and Reconstruction** Sampling Theorem, Nyquist rate and Aliasing, Reconstruction of signals samples, Ideal and practical sampling techniques.	5 Hrs

Text Books:

1. Lathi B. P., Principles of Linear Systems and Signals, Second Edition (International Version) Oxford University Press.
2. Alan V. Oppenheim & Alan S. Willsky with S. Hamid Nawab, Signals & Systems, PHI Publication, Second Edition.
3.A.Anand Kumar, Signals and Systems, PHI Publication, Second Edition.

Reference Books:

1. Ambardar A., Analog and Digital Signal Processing, Thomson Learning-2005.
2. Simon Haykin, Barry Van Veen, Signals & Systems, II Edition, Wiley Pub.
3. Michael J. Roberts, Signals and Systems Analysis Using Transform Methods and MATLAB, Mc Hill Publication.

E Resources:

1. NPTEL Course: https://onlinecourses.nptel.ac.in/noc21_ee28/preview

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET202PC1.1	3	2	1	2	–	–	–	–	–	–	–	3	2	–
3ET202PC1.2	3	3	2	2	1	–	–	–	–	–	–	3	2	–
3ET202PC1.3	3	3	2	3	1	–	–	–	–	–	–	3	3	–
3ET202PC1.4	3	3	2	3	1	–	–	–	–	–	–	3	3	1
3ET202PC1.5	3	2	1	2	–	–	–	–	–	–	–	3	2	–
3ET202PC1.6	3	2	1	3	1	–	–	–	–	–	–	3	2	1
3ET202PC1.CO	3	3	2	3	1	–	–	–	–	–	–	3	3	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**3ET203PC1**	Course Category:	**PCC**
Course Name	**Analog & Digital Communication**			
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours **45 Hrs**
Total Credit Hours	**90 Hrs**			
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks **40**
EE Marks	**--**	PA Marks	**--**	Total Marks **100**

Course Description:

Subject Code 3ET203PC1 Analog & Digital Communication is a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of the course is to provide a solid foundation in analog and digital communication by introducing modulation techniques, transmitter–receiver architectures, noise analysis, sampling, pulse modulation, and digital modulation methods.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET203PC1.1	Explain AM modulation methods and their mathematical representation and describe transmitter–receiver operation and key receiver characteristics to understand the functioning and performance of AM communication systems.	C-2
3ET203PC1.2	Analyze FM generation techniques and pre-emphasis/de-emphasis, and explain FM receiver operation and discriminator circuits to understand the behavior and performance of FM communication systems.	C-3
3ET203PC1.3	Apply the sampling theorem, compare sampling techniques, and describe analog pulse modulation methods such as PAM, PWM, and PPM to analyze signal conversion and transmission processes.	C-3
3ET203PC1.4	Demonstrate PCM, DPCM, DM, and ADM techniques, and apply companding and line coding methods to understand efficient digital representation and transmission of signals.	C-3
3ET203PC1.5	Explain digital communication system blocks and analyze information theory concepts including entropy and information rate to evaluate the limits	C-3

	and efficiency of digital communication.	
3ET203PC1.6	Illustrate digital modulation schemes like BPSK, QPSK, FSK, and QASK, and describe carrier, bit, and symbol synchronization methods to understand modern digital communication techniques.	C-3

Course Contents:

Unit 1	**AM Transmitters and Receivers:** Need of modulation, AM Modulation (Mathematical expression), Single sideband communication: Principles of DSB-FC, DSBSC, SSB-SC modulation with its comparison. Superheterodyne receiver: block diagram, need of AGC. Receiver characteristics: selectivity, sensitivity, fidelity, Image frequency & its rejection, double spotting.	8 Hrs
Unit 2	**FM Transmitters and Receivers:** FM modulation, FET reactance modulator (circuit & analysis), basic concept of indirect FM generation, narrowband and wideband FM, its comparison. Pre-emphasis and de-emphasis. FM receiver block diagram with amplitude limiter. Foster-Seeley discriminator.	8 Hrs
Unit 3	**Techniques of sampling:** Sampling theorem in time domain, Nyquist criteria, aliasing effect. Types of sampling: ideal, natural, flat-top. Aperture effect. Comparison of sampling techniques. Introduction to pulse Analog modulation: PAM, PWM, PPM.	7 Hrs
Unit 4	**Digital Pulse Modulation:** Types of digital pulse modulation techniques. Generation & reception of Pulse Code Modulation. Quantization. Generation & reception of Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation.	7 Hrs
Unit 5	**Introduction to Digital Communication System:** Functional blocks of digital communication system. Scrambler and unscrambler. Digital representation of signals: Desirable properties of line coding. Information theory: measure of information, entropy, information rate. Introduction to Binary symmetric channel.	7 Hrs
Unit 6	**Digital Modulation:** Introduction, Types of digital modulation techniques, Generation and detection of BPSK, DPSK, QPSK, BFSK and QASK. Comparison of digital modulation systems. Synchronization: Carrier synchronization using M^{th} power loop, Bit & symbol synchronization-Clock recovery.	8 Hrs

Text Books:

1. Kennedy G., Electronic Communication System, Tata Mc-Graw Hill Co., New Delhi (Third Ed).
2. Taub and Schilling D.L., Principles of Communication Systems, Mc-Graw Hill Co., New Delhi
3. (Second Ed.).
4. Shanmugam K.S., Digital & Analog Communication Systems, John Wiley & Sons, NewYork, 1996.
5. Lathi B. P., Modern Digital and Communication Systems, Holt Rinchart and Winston Inc.,New York, 1993.

Reference Books:

1. Proakis J. K., Digital Communication, Mc-Graw Hill Book Co., London (Second Edition).
2. Glover and Grant, Digital Communication, Prentice Hall Publication.
3. Collins Dennis, Collins John, Electronic Communications, PHI.
4. Wayne Tomasi, Electronic Communication Systems, Pearson Education, (Fifth Edition).

E Resources :

2. Principles of Communication Systems: https://ocw.mit.edu/courses/6-450-principles-of-digital-communication-i-fall-2006
3. Digital Communication: https://web.stanford.edu/class/ee179/
4. https://www.allaboutcircuits.com/textbook/communications/

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET203PC1.1	3	2	-	1	1	-	-	-	-	1	-	2	2	-
3ET203PC1.2	3	3	-	2	1	-	-	-	-	1	-	2	-	-
3ET203PC1.3	3	2	-	2	1	-	-	-	-	1	-	2	2	-
3ET203PC1.4	3	3	-	2	1	-	-	-	-	1	-	2	-	-
3ET203PC1.5	3	3	-	1	1	-	-	-	-	1	1	2	-	-
3ET203PC1.6	3	3	-	2	1	-	-	-	-	1	1	2	-	-
3ET203PC1CO	3	3	-	2	1	-	-	-	-	1	-	2	1	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**3ET204MD1**	Course Category:	**MDM**
Course Name	**Principles of Electronics**			
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours **30 Hrs**
Total Credit Hours	**60 Hrs**			
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks **20**
EE Marks	**--**	PA Marks	**--**	Total Marks **50**

Course Description:

Subject Code 3ET204MD1 Principles of Electronics is compulsory Multi-Disciplinary Minor course offered by the department of Electronics & Telecommunication Engineering for other Second Year B. Tech Major Disciplines.

Course Objectives:

The objectives of this course is to introduce the basic of semiconductor devices and application to develop basic circuits of electronics application

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET204MD1.1	Describe the construction, working, and characteristics of diodes (PN, Zener, LED) to analyze their applications in rectifiers and voltage regulation.	C-2
3ET204MD1.2	Illustrate the construction, operation, and characteristics of BJT, to apply as switch and amplifier in electronic circuits.	C-3
3ET204MD1.3	Illustrate the construction and operation of JFET, MOSFET and UJT to understand the characteristic behavior of these devices.	C-2

Course Contents:

Unit 1	**Introduction to diodes and its application:** PN junction diode: Construction, Working, diode equation, V-I characteristics, as a Switch, rectifier, analysis of Half Wave Rectifier, Full Wave Rectifier, Zener diode: Construction, Working, V-I characteristics, Zener diode as a voltage regulator, LED: Construction, Working and V-I Characteristics.	10 Hrs
Unit 2	**Bipolar Junction Transistors:** Principles, PNP, NPN Transistor, BJT configurations common base, common emitter and common collector with characteristics and parameters, transistor as a switch, transistor as an amplifier.	10 Hrs

Unit 3	**JFET, MOSFET and UJT:** JFET- Theory, construction and characteristics, parameters (μ, gm & rd) MOSFET-Theory, construction and characteristics of enhancement & depletion type MOSFET. UJT-Theory, construction and characteristics	10 Hrs

Text Books:

1. David Bell, Electronic Devices and Circuits, Oxford University Press,2010
2. Milliman and Halkias, Integrated Electronics Tata McGraw Hill, New Delhi

References:

1. Robert L.Boylestad, Electronic Devices and Circuit theory, Publ. Pearson Education.
2. Donald A Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill, 3rd Edition, 2003

E Resources :

1. https://open.umn.edu/opentextbooks/textbooks/
2. https://www.coursera.org/learn/transistor-field-effect-transistor-bipolar-junction-transistor

Mapping of COs with POs & PSOs

CO	**PO**											**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
3ET204MD1.1	3	3	2	2	1	–	–	–	–	–	–	3	2	1
3ET204MD1.2	3	3	3	3	1	–	–	–	–	–	1	3	3	1
3ET204MD1.3	3	3	3	3	2	–	–	–	–	–	–	3	2	–
3ET204MD1.CO	3	3	2	3	1	–	–	–	–	–	1	3	3	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**3SH205OE1**	Course Category:	**OE**
Course Name	**Soft Skills & Profile Building**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 3SH205OE1Soft Skills & Profile Building is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:

The objective of this course is to focus on developing advanced communication skills, leadership qualities and professional etiquette among engineering graduates.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3SH205OE1.1	Apply advanced interpersonal, analytical, and persuasive communication techniques in professional contexts for effective professional interactions.	C-3
3SH205OE1.2	Demonstrate professional workplace etiquette, business communication, and group discussion skills to enhance employability.	C-3 A-3
3SH205OE1.3	Analyze leadership styles, emotional intelligence, and team dynamics for effective collaboration.	C-4 A-3
3SH205OE1.4	Design a structured and realistic career plan aligned with industry expectations and personal goals for professional growth.	C-6
3SH205OE1.5	Create ATS-friendly résumés, professional portfolios, and digital profiles for personal branding.	C-6 P-4
3SH205OE1.6	Perform effectively in interviews, workplace simulations, and job-search processes with professional confidence for enhanced employability.	C-3 P-3 A-3

Course Contents:

Unit 1	**Advanced Communication Dynamics:** Advanced interpersonal communication strategies; speech articulation; structuring thoughts and fluency techniques; analytical and critical communication; storytelling techniques for impactful presentations; persuasive communication models.	7 Hrs
Unit 2	**Global Workplace Etiquettes, Email Writing & GD–PI Perspective:** Professional greetings and workplace conduct; giving and receiving feedback; handling criticism and adaptability issues; professional values such as punctuality and attire; types of handshakes and significance; effective business email writing; types of Group Discussions, purpose of GDs; mock GDs (video-based); interview strategies and techniques.	8 Hrs
Unit 3	**Leadership, Team Dynamics & Corporate Skills:** Personality types using 9/9 matrix; leadership styles; emotional intelligence and leadership relationship; conflict resolution and negotiation techniques; team-building skills (Johari Window perspective); cross-cultural communication; creativity and design thinking; structured problem-solving and decision-making**.**	7 Hrs
Unit 4	**Strategizing Career Planning:** SMART goal setting; mapping skills to career paths; understanding industry expectations; emerging futuristic soft and hard skills (domain-wise); personalized career roadmap; certification planning (technical and non-technical); networking skills and participation in professional communities	7 Hrs
Unit 5	**Profile Building, Portfolio & Personal Branding:** ATS-friendly résumé preparation and common mistakes; video résumé creation and self-marketing pitch; LinkedIn profile optimization and networking strategies; developing online portfolios using platforms such as GitHub, Behance, Google Sites, and Toastmasters	8 Hrs
Unit 6	**Employment Readiness & Industry Integration:** Workplace simulation activities (mock emails, meetings, discussions); mock personal interviews; understanding sector-specific industry dynamics; unconventional career opportunities after engineering; job-hunting strategies and popular job platforms	8 Hrs

Text Books:

1. Alex K., Soft Skills, S. Chand Publishing
2. Meenakshi Raman & Prakash Singh, Business Communication, Oxford University Press

Reference Books:

1. Stephen R. Covey,The 7 Habits of Highly Effective People,Free Press Publication
2. Daniel Goleman, Emotional Intelligence,published by Bantam Books.
3. Shiv Khera, You Can Win,published by Bloomsbury Publishing
4. Richard N. Bolles, What Color Is Your Parachute? Published by Ten Speed Press, Crown Publishing Group

E Resources:

1. NPTEL: Soft Skills and Personality Development
2. LinkedIn Learning – Communication & Career Development Courses
3. Harvard Business Review – Communication & Leadership Articles
4. Coursera /edX – Career Development & Employability Skills Modules

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3SH205OE1.1	2				–	–	–	2	3	–	–	3	2	1
3SH205OE1.2	–				–	2	3	3	3	–	–	1	3	1
3SH205OE1.3	–				–	2	2	3	–	–	–	3	-	1
3SH205OE1.4	–				–	2	–	–	–	2	3	1	2	1
3SH205OE1.5	–				3	–	–	–	2	–	2	3	3	1
3SH205OE1.6	–					2	–	2	3	–	2	3	2	1
3SH205OE1.CO	1				1	2	1	2	2	1	1	2	2	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**3SH205OE2**	Course Category:	**OE**
Course Name	**Team Building & Management**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 3SH205OE2 Team Building & Management is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:

The Objective of the course is to develop teamwork capabilities, leadership and managerial skills, collaborative problem-solving abilities, conflict management techniques, and effective decision-making skills required in professional and organizational settings.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3SH205OE2.1	Explain the principles and importance of effective team building in organizations to foster collaborative work culture.	C-2
3SH205OE2.2	Apply team dynamics and collaboration strategies to achieve common goals.	C-3 A-3
3SH205OE2.3	Analyze leadership styles and managerial roles for effective team performance.	C-4
3SH205OE2.4	Demonstrate conflict resolution, negotiation, and interpersonal management skills for effective team performance.	C-3 A-3
3SH205OE2.5	Apply motivation and performance management techniques in team-based environments for achieving organizational goals.	C-3
3SH205OE2.6	Perform effectively as a team member or leader in simulated managerial scenarios to develop leadership competencies	C-3 P-3 A-3

Course Contents:

Unit 1	**Fundamentals of Team Building:** Concept of teams; types of teams; stages of team development; characteristics of effective teams; roles and responsibilities of team members; barriers to effective teamwork; team norms and values.	7 Hrs

Unit 2	**Team Dynamics & Interpersonal Relationships:** Group behavior and dynamics; interpersonal communication in teams; trust and collaboration; listening as a team skill; diversity and inclusion in teams; cross-cultural team management	8 Hrs
Unit 3	**Leadership in Teams:**Leadership concepts; leadership styles; emotional intelligence and leadership; situational leadership; influence and power in teams; leadership ethics and responsibilities.	7 Hrs
Unit 4	**Conflict Management & Negotiation:** Sources and types of conflict; conflict resolution techniques; negotiation strategies; managing difficult team members; stress management; maintaining team harmony	7 Hrs
Unit 5	**Motivation, Performance & Team Effective ness:** Motivation theories; team motivation techniques; goal setting and performance measurement; feedback and appraisal systems; decision-making in teams; problem-solving techniques.	8 Hrs
Unit 6	**Managerial Skills & Team-Based Applications:** Managerial roles and functions; planning, organizing, and controlling teams; delegation and coordination; workplace simulations (team meetings, role plays); case studies on team management; team performance evaluation.	8 Hrs

Text Books:

1. Stephen P. Robbins, Organizational Behaviour, Pearson Education
2. L.M. Prasad, Management Principles and Practices, published by Sultan Chand & Sons

Reference Books:

1. Patrick Lencioni, The Five Dysfunctions of a Team, published by Jossey-Bass
2. Peter G. Northouse, Leadership, published by SAGE Publications
3. Daniel Goleman, Emotional Intelligence, published by Bantam Books

E Resources:

1. NPTEL – Organizational Behavior & Management Courses
2. LinkedIn Learning – Team Leadership & Management Modules
3. Harvard Business Review – Teamwork & Leadership Articles
4. Coursera / edX – Team Management and Leadership Courses

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
3SH205OE2.1	2	–	–	–	–	–	–	–	–	–	–	3	2	1
3SH205OE2.2	–	2	2	–	–	–	–	3	2	–	–	1	3	1
3SH205OE2.3	–	3	3	–	–	–	–	2	–	–	–	3	-	1
3SH205OE2.4	–	2	2	–	–	2	3	3	–	–	–	1	2	1
3SH205OE2.5	–	2	2	–	–	–	–	2	–	2	–	3	3	1
3SH205OE2.6	–	2	2	–	–	2	–	3	2	–	2	3	2	1
3SH205OE2. CO	1	2	2	-	-	1	1	2	1	1	1	2	2	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	5	Course Code:	3ET206PC1		Course Category:	PCC
Course Name		Electronic Devices & Circuits Lab				
Credits		01	Total L:T:P Hours	0:0:2	Total SL Hours	--
Total Credit Hours		30 Hrs		30 Hrs		
SEE Marks		--	SEE Time	--	CIA Marks	--
EE Marks		25	PA Marks	25	Total Marks	50

Course Description:

Subject Code 3ET206PC1Electronic Devices & Circuits Lab is a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to perform practicals based on Electronic Devices to analyze their application in the electronic circuits.

Course Outcomes:

After completing the course, students will be able to:

CO	Course Outcome	Domain Level
3ET206PC1.1	Demonstrate ability to perform experiments related semiconductor diodes to understand their applications.	C-3, P-5
3ET206PC1.2	Illustrate experimentation related to BJT, FETs and UJT to demonstrate their parametric performance along with their applications.	C-3 P-5
3ET206PC1.3	Recognise applications of BJT to demonstrate its performance in sinusoidal oscillators, multistage amplifier and emitter followers.	C-3, P-4, A1

List of Practicals:

Minimum eight practicals from the list mentioned below.

1. Verify V-I characteristics of p-n junction diode and obtain static and dynamic resistance values.
2. Verify V-I characteristics of Zener diode.
3. Verify V-I characteristics of LED.
4. Obtain the efficiency and ripple factor of half-wave rectifiers without and with filters (C-input filter).
5. Obtain the efficiency and ripple factor of full-wave rectifiers without and with filters (C-input filter).
6. Demonstrate Zener diode as a voltage regulator and calculate line and load regulation factor.
7. Demonstrate diode as a clipper and Clamper for various reference levels.
8. Verify characteristics of CE mode of BJT and compute its h-parameters.

9. Demonstrate voltage divider biasing of CE mode of BJT and determine operating point.
10. Plot the drain and transfer characteristics of JFET (Junction Field Effect Transistor) and calculate rd, gm and μ.
11. Plot the drain and transfer characteristics of depletion MOSFET.
12. Plot the drain and transfer characteristics of enhancement MOSFET .
13. Plot the characteristics of UJT and to calculate the Intrinsic Stand-Off Ratio (η).
14. Demonstrate UJT as a relaxation oscillator.
15. Compute theoretical and practical frequency of Hartley oscillator.
16. Compute theoretical and practical frequency of Colpitts oscillator.
17. Compute theoretical and practical frequency of RC Phase shift oscillator.
18. Obtain frequency response of RC coupled amplifier and verify cut off frequencies and bandwidth
19. Verify performance of emitter follower circuit.

E Resources:

1. Virtual labs by IITS- https://www.vlab.co.in/broad-area-electronics-and-communications/

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET206PC1.1	3	2	-	-	1	-	-	2	2	1	1	3	1	-
3ET206PC1.2	3	2	-	1	1	-	-	2	2	1	1	3	1	-
3ET206PC1.3	3	2	-	1	1	-	-	2	2	1	1	3	1	-
3ET206PC1CO	3	2	-	1	1	-	-	2	2	1	1	3	1	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**3ET207PC1**	Course Category: **PCC**		
Course Name	**Signals & Systems Lab**				
Credits	**01**	Total L:T:P Hours	0:0:2 **30 Hrs**	Total SL Hours	--
Total Credit Hours	**30 Hrs**				
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:

Subject Code 3ET207PC1 Signals & Systems Lab is a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to provide a fundamental understanding of signal generation, analysis, and transformation using MATLAB/SCILAB.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET207PC1.1	Generate different plots and explore results to draw valid conclusions and inferences in Signal Processing	C-6, P-5 A-2
3ET207PC1.2	Apply simulation tools to determine signal processing needs and develop suitable system designs.	C-3 P-5 A-2
3ET207PC1.3	Apply sampling theorem to converting continuous-time signals into discrete-time signals.	C-3, P-5, A-2

List of Practicals:

Minimum eight practical's from the list mentioned below.

1. Study of Signal Processing Functions used in MATLAB / SCILAB
2. Program to generate standard continuous Time Signals
3. Program to generate standard discrete Time Signals.
4. Program to perform basic operations on signals.
5. Program to find Even and Odd parts of a signal.
6. Program to check Periodicity of signals.
7. Program to identify a given system as linear/ non-linear property of a given system
8. Program to identify a given system as time variance/ invariance system
9. Program to find Fourier transform of given signal

10. Program to demonstrate the time domain sampling of band limited signals (Nyquist theorem).

E Resources:

1. Mathwork: Browser-based Matlab.
   https://www.mathworks.com/mwaccount/account/create?cid=getmatlab&wid=&uri=https%3A%2F%2Fmatlab.mathworks.com%2F

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET207PC1.1	3	3	2	2	1	–	–	–	–	–	–	3	3	–
3ET207PC1.2	3	3	2	3	1	–	–	–	–	–	–	3	3	1
3ET207PC1.3	3	2	1	2	1	–	–	–	–	–	–	3	2	1
3ET207PC1.CO	3	2	2	2	1	–	–	–	–	–	–	3	3	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**3ET208PC1**	Course Category:	**PCC**
Course Name	**Analog & Digital Communication Lab**			
Credits	**01**	Total L:T:P Hours	0:0:2 **30 Hrs**	Total SL Hours	**--**
Total Credit Hours	**30 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:

Subject Code 3ET208PC1Analog & Digital Communication Labis a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to provide students with hands-on experience in analog and digital communication systems through practical implementation and analysis of modulation, demodulation, coding, and multiplexing techniques.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET208PC1.1	Perform the AM/FM transmitter–receiver operations and single sideband techniques such as DSB-SC to understand the functioning and characteristics of analog communication systems.	C-3, P-4
3ET208PC1.2	Implement pulse and digital modulation schemes using hardware and MATLAB for waveform and spectral analysis.	C-3, P5
3ET208PC1.3	Participate in a team to demonstrate, perform, and present laboratory experiments with proper documentation to develop collaborative skills and effective technical reporting.	C-3, P-3, A-2

List of Practicals:

Minimum eight practicals from the list mentioned below.

1. Explore the operation of AM transmitters and receivers in a communication system.
2. Explore the operation of FM transmitters and receivers.
3. Study the generation of DSB-SC signals.
4. Verify the operation of PWM, PAM, and corresponding demodulation techniques.
5. Explore Time Division Multiplexing (TDM) as an application of PAM.
6. Verify the process of Pulse Code Modulation (PCM) and its demodulation.

7. Verify the output of Delta Modulation (DM) and Demodulation.
8. Implement various line coding schemes and observe their spectra.
9. Generate and observe ASK, FSK, and PSK waveforms using MATLAB.
10. Analyze and compare the performance of:
    a) Binary Phase Shift Keying (BPSK)
    b) Differential Phase Shift Keying (DPSK)
    c) Quadrature Phase Shift Keying (QPSK)

E Resources:

1. Analog, digital pulse and digital communication techniques with theory and experimental understandings.
    i. https://nptel.ac.in/courses/117/105/117105083
    ii. https://nptel.ac.in/courses/108/104/108104091
    iii. https://www.electronics-tutorials.ws/
2. Line Coding, PCM, Digital Mod simulation codes, Signal spectra, Receiver analysis. https://in.mathworks.com/help/comm/examples.html

Mapping of COs with Pos & PSOs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
3ET208PC1.1	3	2	2	1	2	-	-	-	-	1	-	2	-	-
3ET208PC1.2	3	2	2	2	3	-	-	-	-	1	-	2	2	-
3ET208PC1.3	3	-	1	-	1	-	-	-	3	3	2	2	-	-
3ET208PC1CO	3	1	2	1	2	-	-	-	1	2	1	2	1	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	5	Course Code:	3ET209EM1	Course Category:	EEM
Course Name	**Basic Financial Management**				
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	--	PA Marks	**50**	Total Marks	**50**

Course Description:

Subject Code 3ET209EM1 Basics Financial Management is a compulsory Engineering Economics & Management course for Second Year B. Tech. Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to introduce the fundamentals of financial management to understand financial terminologies for interpretation in practice.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcomes	Domain Level
3ET209EM1.1	Describe basics of financial management to understand Indian financial system.	C-2
3ET209EM1.2	Explain fundamentals of accounting and financial statements to practice in professional life.	C-2
3ET209EM1.3	Interpret concept of costing for project budgeting and evaluation for applying in professional career.	C-2

Course Contents:

Unit 1	**Basics of Financial Management:** Meaning and importance of financial management, meaning of terminologies -assets, liabilities, equity, role of finance in engineering projects and startups. Introduction to the Indian financial system: Banks, Financial markets, Regulatory bodies (RBI, SEBI – basic idea and functions only), Time value of money – simple concept of present and future value.	10 Hrs
Unit 2	**Fundamentals of Accounting & Financial Statements:** Basic purpose of accounting, Simple interpretation of: Accounts Payable, Accounts Receivable, Budget,Capital,Cash Flow, Depreciation, Revenue, Net	10 Hrs

	Income (Net Profit), Working Capital, Liquidity, Solvency. Introduction to: Journal, Ledger, Trial balance, Financial statements (only understanding, not detailed preparation): Profit & Loss Account, Balance Sheet, Basic idea of depreciation (straight line method only).	
Unit 3	**Basic Costing, Budgeting & Project Evaluation:** Direct, Indirect, Fixed, Variable cost, simple cost sheet concept. Break-even concept (only meaning and simple numerical examples).Budgeting – meaning and need for engineers. Introduction to project evaluation methods: Payback period (only concept + small example), Basic idea of Net Present Value NPV (no complex calculation)Applications in engineering and startups: Costing of a small electronics project, Budgeting for a lab prototype.	10 Hrs

Text Books:

1. O.P.Khanna, Industrial Management, Dhanpat Rai Publications
2. M.Y.Khan & P.K. Jain, Financial Management, Tata McGraw Hill

Reference Books:

1. Prasanna Chandra, Financial Management: Theory & Practice, Mc Hill Publications
2. I.M. Pandey, Financial Management, Vikas Publishing House Pvt. Ltd.

E Resources :

5. E-book- O.P.Khanna, Industrial Management, https://www.scribd.com/document/432344678/o-p-Khanna-Industrial-Engineering

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET209EM1.1	-	-	-	-	2	1	-	-	-	-	3	-	-	1
3ET209EM1.2	-	-	-	-	2	1	-	-	-	-	3	-	-	1
3ET209EM1.3	-	-	-	-	2	1	-	-	-	-	3	-	-	1
3ET209EM1CO	-	-	-	-	2	1	-	-	-	-	3	-	-	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**3SH210VE1**	Course Category:	**VEC**
Course Name	**Constitutional Values and Fundamental Duties**			
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours **30 Hrs**
Total Credit Hours	**60 Hrs**			
SEE Marks	**--**	SEE Time	**--**	CIA Marks **--**
EE Marks	**25**	PA Marks	**25**	Total Marks **50**

Course Description:

Subject Code 3SH210VE1 Constitutional Values and Fundamental Duties is a compulsory Valus enhancement Course for Second Year B. Tech.

Course Objectives:

The objective of the course is to introduce the Indian Constitution, its historical background, fundamental values, rights, and duties.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3SH210VE1.1	Explain the historical background, making, and significance of the Indian Constitution to Understand the Constitution, Preamble, and core values.	C2
3SH210VE1.2	Interpret Fundamental Rights and Duties (Articles 12–35, 51A) to evaluate their implications through case studies in professional and civic life.	C3
3SH210VE1.3	Apply constitutional principles to engineering ethics, sustainability concerns (Articles 48A, 51A(g)), and demonstrate social commitment, innovation, and inclusive growth as nation builders.	C3

Course Contents:

Unit 1	**Introduction to the Constitution and Fundamental Values**: Overview of the Indian Constitution – Historical background and making of the Constitution; Meaning of Constitution; Preamble – Meaning and significance. Core Constitutional Values – Justice (Social, Economic, Political); Liberty (thought, expression, belief, faith, worship); Equality (status and opportunity); Fraternity (dignity and unity of the nation). Relevance of constitutional values for professionals and citizens.	10 Hrs

Unit 2	**Fundamental Rights and Duties**: Fundamental Rights (Articles 12–35) – Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies. Fundamental Duties (Article 51-A) – Importance and implications; Role of youth and professionals in upholding duties. Case studies highlighting real-life significance of rights and duties.	10 Hrs
Unit 3	**Application of Constitutional Values in Engineering and Public Life**: Ethical Responsibilities and Constitutional Alignment – Engineering ethics and public interest; Environment and sustainability as constitutional concern (Articles 48A, 51A(g)); Engineers as nation builders – Social commitment, innovation, and inclusive growth.	10 Hrs

Text Books:

1. Basu D. D., Introduction to the Constitution of India, LexisNexis Publication, New Delhi (Twenty-Third Edition).
2. Jain M. P., Constitution of India, LexisNexis Publication, New Delhi (Eighth Edition).
3. Laxmikanth M., Indian Polity, McGraw Hill Education, New Delhi (Sixth Edition).
4. Austin Granville, The Indian Constitution: Cornerstone of a Nation, Oxford University Press, New Delhi.
5. Shukla V. N., Constitution of India, Eastern Book Company, Lucknow (Twelfth Edition).
6. Government of India, Constitution of India (Bare Act), Government of India Publication, New Delhi.

Reference Books:

1. Subhash Kashyap, Our Constitution, National Book Trust, New Delhi.
2. Durga Das Basu, Shorter Constitution of India, LexisNexis Publication.
3. P. M. Bakshi, The Constitution of India, Universal Law Publishing.
4. J. N. Pandey, Constitutional Law of India, Central Law Agency.
5. Seervai H. M., Constitutional Law of India, N. M. Tripathi Pvt. Ltd. (Vols. I–III).
6. B. Shiva Rao, The Framing of India's Constitution: A Study, Indian Institute of Public Administration.
7. D. C. Wadhwa, Political Science and Constitutional Law, Eastern Book Company.
8. Madhav Khosla, The Indian Constitution: Oxford India Short Introductions, Oxford University Press.

E Resources :

1. NPTEL course on Constitutional Studies, Prof. Sudhir Krishnaswamy, National Law School of India University
2. Constitutional Values and Fundamental Duties (University of Delhi – aligned with NEP 2020, available via NPTEL/DU open learning) https://kmc.du.ac.in/kmcouter/collnews/download/40727448169063791359.pdf/LinkedContents/pdf/All/All

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3SH210VE1.1	3	2	-	1	-	-	-	-	-	-	-	2	2	1
3SH210VE1.2	-	3	2	2	-	2	3	3	-	-	-	3	2	2
3SH210VE1.3	-	-	3	3	-	2	3	2	-	2	-	3	2	1
3SH210VE1CO	1	2	2	2	-	2	2	2	-	1	-	3	2	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**3ET400FP1**	Course Category:	**FP**
Course Name	**Field Project**				
Credits	**02**	Total L:T:P Hours	0:0:4 **60 Hrs**	Total SL Hours	**--**
Total Credit Hours	**60 Hrs**				
SEE Marks	**--**	SEE Time	**--**	CIA Marks	**--**
EE Marks	**25**	PA Marks	**25**	Total Marks	**50**

Course Description:

Subject Code 3ET400FP1 Field Project is a compulsory Experiential Learning Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to expose students to community-based field problems related to electronics and communication through field visits and surveys, enable them to identify and analyze such problems using basic E&TC concepts, and inculcate professional ethics, teamwork, communication skills, and social responsibility through experiential learning.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET400FP1.1	Identify community problems related to electronics & communication systems	C-3, P-4, A-2
3ET400FP1.2	Design socially relevant, low-cost E&TC engineering solutions	C-4, P-4, A-2
3ET400FP1.3	Demonstrate professional ethics, teamwork, and communication skills	C-4, P-4, A-3

Course Contents:

Module	Description	Hours
Module 1	Orientation & Sensitization	4
Module 2	Field Visit & Problem Identification	16
Module 3	Problem–Solution Design & Implementation	28
Module 4	Documentation, Presentation & Reflection	12

Note:

1. Students must collaborate within their assigned practical batches. Each batch should be further divided into subgroups, with five students per subgroup, in accordance with the prescribed guidelines.

2. Typical E&TC Field Problems Identified

1. Poor mobile signal / internet connectivity
2. Digital divide in schools
3. Lack of emergency alert systems
4. Inefficient power usage in electronic systems
5. Absence of low-cost assistive electronic devices
6. Poor awareness of e-waste & renewable energy

3. Suggested E&TC Project Themes

1. Rural mobile signal enhancement models
2. Solar-powered public announcement systems
3. IoT-based water / agriculture monitoring
4. Smart classroom solutions for rural schools
5. Emergency alert & safety systems
6. Assistive devices for elderly / disabled
7. Energy-efficient communication setups
8. E-waste awareness & sustainable electronics

4. Documentation /Project Report Format:

The Documentation /Project Report shall contain the following sections:

1. Title Page
2. Certificate & Declaration
3. Abstract
4. Introduction (Community + E&TC relevance)
5. Objectives
6. Literature Survey
7. Methodology (Survey + Technical)
8. Problem Identification
9. Proposed E&TC Solution
10. Implementation / Simulation
11. Results & Analysis
12. Community Feedback & Social Impact
13. Conclusion & Future Scope
14. References
15. Appendices (Photos, questionnaires, certification letter issued by the Gram Panchayat office)

Course Plan:

Lecture No.	Module Title	Topic	Hours
1	**Module1: Orientation & Sensitization**	NEP 2020: Community Engagement & Role of Engineers, Overview of Rural & Urban Communication Infrastructure, Identification of Community Institutions (GP, School, Self Help Group (SHG), Health Centre), Field Safety, Team Formation, Area & Theme	4

		Allocation. Community survey planning & questionnaire design	
2	**Module 2: Field Visits & Problem Identification**	**Field Visit–I:** 1. Village/Ward, survey identification of communication infrastructure, interaction with local residents 2. Rural school / Anganwadi / Health centre – study of digital divide and ICT facilities 3. Gram Panchayat / Nagarpalika office, observation of public services and schemes,Swachh Bharat / MGNREGS site, observation of technology use, data consolidation.	16
3		**Field Visit–II**: Village/Ward /Rural school / Anganwadi / Health centre/ Gram Panchayat / Nagarpalika office – Interaction, Discussion & Problem Identification to channelize project work.	
4		**Field Visit–III**: Onsite Field Work: Project Installation, Implementation/ Testing/ Troubleshooting, and Problem Resolution.	
5		**Field Visit–IV**: Final onsite Project Installation, Implementation/ Testing/ Troubleshooting, and Problem Resolution	
6	**Module3: Engineering Problem–Solution Design & Implementation**	**Problem Understanding & Literature Review:** Problem–solution mapping, Review of similar solutions & literature, Identification of gaps and relevance to community needs	28
7		**Technology Selection & System Design:** Selection of appropriate E&TC technologies, Block diagram and functional flow design, System-level working description	
8		**Component Analysis & Feasibility:** Component identification and working principle, Cost estimation and feasibility analysis, Sustainability considerations (energy, maintenance)	

9		**Ethics, Impact & Design Refinement:** Ethical and social impact assessment, Community feedback on proposed solution, Design refinement and approval	
10		**Modeling & Implementation:** Simulation / software modeling (where applicable), Hardware planning / conceptual prototype, IoT / sensor / communication module planning	
11		**Integration & Performance Evaluation:** Power supply and energy-efficient design, Integration of subsystems, Testing, validation, performance analysis	
12		**Optimization, Validation & Finalization:** Alignment with SDGs, Final improvements and project finalization	
13	**Module4: Documentation, Presentation & Reflection**	Field diary completion, data analysis, Results, Discussion & Conclusion	12
14		Report Finalization, Presentation Preparation	
15		**Evaluation and Viva:** Poster / PPT / Demonstration, Community-Level Feedback	

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET400FP1.1	3	3	–	3	3	–	–	–	–	–	–	3	3	-
3ET400FP1.2	–	3	3	3	3	–	–	–	3	–	–	3	3	-
3ET400FP1.3	–	–	–	–	–	3	3	3	3	3	3	3	3	3
3ET400FP1CO	1	2		2	2	1	1	1	2	1	1	3	3	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: 5	Course Code: **3AL001NC1**		Course Category: **NC**		
Course Name	**Disaster Management and Preparedness**				
Credits	--	Total L:T:P Hours	2:0:0 30 Hrs	Total SL Hours	--
Total Credit Hours	--				
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	--	PA Marks	--	Total Marks	--

Course Description:

Subject Code 3ET001NC1Disaster Management and Preparedness is a Compulsory Non-Credit course for Second Year B. Tech all disciplines.

Course Objectives:

The objective of this course is to provide students with a comprehensive understanding of disasters, their types, impacts, the complete disaster management cycle, and the roles of various agencies in Disaster Risk Reduction.

Course Outcomes:

After completing the course students will be able to:

CO	**Course Outcome**	**Domain Level**
3ET001NC1.1	Identify the concepts of disaster, hazard, vulnerability and risk, and classify disasters to understand the basic nature, causes and profiles of disasters in India.	C-2
3ET001NC1.2	Analyze the disaster management cycle for risk assessment, mitigation, preparedness, response, recovery, and international disaster management frameworks.	C-4
3ET001NC1.3	Apply disaster management practices, including stakeholder roles, national policies, engineers' responsibilities, and preparedness measures for effective disaster risk reduction.	C-3

Course Contents:

Unit 1	**Introduction to Disaster Management:** Concepts and definitions – disaster, hazard, vulnerability, risk, severity, frequency, exposure, capacity, and impact; classification of disasters- Natural disasters: earthquakes, tsunami, landslides, mining, Hydro-Meteorological Disasters: floods, draught, cyclones, coastal erosion. Biological Disaster: epidemics, pest attacks, forest fire, Manmade disasters: Industrial pollution, artificial flooding in	10 hrs

	urban areas, nuclear radiation, chemical spills, transportation accidents, vulnerability profile of India, ecological fragility; principles of disaster prevention and mitigation	
Unit 2	**Disaster Management Cycle and Framework:** Pre-Disaster – Risk Assessment and Analysis, Risk Mapping, zonation and Microzonation, Prevention and Mitigation of Disasters, Early Warning System; Preparedness, Capacity Development. Awareness During Disaster – Evacuation, Disaster Communication, Search and Rescue, Emergency Operation Centre, Incident Command System, Relief and Rehabilitation. Post-disaster – Damage and Needs Assessment, Restoration of Critical Infrastructure, Early Recovery, Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Framework of Action Phases of disaster management; vulnerability and capacity assessment, post-disaster environmental response	12 hrs
Unit 3	**Disaster Management practices:** Roles and responsibilities of government, community, local bodies, NGOs, and other stakeholders, National Policy on Disaster Management Act 2005 Mega Disasters of India and Lessons Learnt, Disaster Management practices at working and residential places. Key responsibility of engineers in disaster reduction techniques, medical preparedness aspect of disaster.	8 hrs

Textbooks:

1. Sharma, S. C. (2022). Disaster Management, Khanna Publication.
2. Subramanian, R. (2024). Disaster Management. Vikas Publication.

Reference Books:

1. Gaur, R. C. (2018). Environmental Engineering and Disaster Management. New Age International.
2. Pradeep Sahni, 2024, Disaster Risk Reduction in South Asia, Prentice Hall.
3. Mondal, D. (2022). Disaster Management. New Delhi: CBS Publishers & Distributors
4. Manual on natural disaster management in India, M C Gupta, NIDM, New Delhi
5. An overview on natural & man-made disasters and their reduction, R K Bhandani, CSIR, New Delhi
6. Natural Disaster Management Policy , 2009,GOI
7. H.N. Shrivastava& G.D. Gupta, Management of Natural Disasters in developing Countries, Daya Publishers , Delhi
8. S.L. Goyal, Encyclopedia of disaster Management, Vol I,II & III Disaster Managemnt Policy and administration, Deep & Deep, New Delhi,2006
9. Coppola D P, Introduction to International Disaster Management, Elsevier Science (B/H), London, 2007

10. Disaster Mitigation in Asia & Pacific, Asian Development Bank

Course Assignments

Internal Assessment at Institute level will be based on following assignments:

1.	Study of Recent Disasters (at local, state and national level)
2.	Preparation of Disaster Risk Management Plan of an Area or Sector
3.	A Case study on Disaster Management

E Recourses:

1. https://onlinecourses.swayam2.ac.in/ntr25_ed61/preview

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3AL001NC1.1	3	2	-	-	-	3	2	-	-	-	3	-	-	-
3AL001NC1.2	3	3	-	-	-	3	3	-	-	-	3	2	2	-
3AL001NC1.3	3	3	-	-	-	3	3	-	-	3	3	1	2	2
3AL001NC1.CO	3	3	-	-	-	3	3	-	-	1	3	1	2	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**3ET211DH1**	Course Category:	**DH**
Course Name	**Fundamentals of Artificial Intelligence**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 3ET211DH1 Fundamentals of Artificial Intelligence is a Double Minor/Honours Course offered by the Department of Electronics & Telecommunication Engineering for Second Year B.Tech. students of all disciplines.

Course Objectives:
The objective of this course is to introduce the basic concepts of Artificial Intelligence, intelligent systems, problem-solving techniques, knowledge representation and applications of AI in engineering and everyday life.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET211DH1.1	Explain the basic concepts, history and applications of Artificial Intelligence.	C-2
3ET211DH1.2	Apply simple search techniques to solve AI problems.	C-3
3ET211DH1.3	Explain methods of knowledge representation and expert systems.	C-2
3ET211DH1.4	Describe the fundamentals of machine learning techniques.	C-2
3ET211DH1.5	Identify AI applications in engineering and communication systems.	C-3
3ET211DH1.6	Discuss ethical issues and future trends in Artificial Intelligence.	C-2

Course Contents:

Unit 1	**Introduction to Artificial Intelligence:** Introduction to Artificial Intelligence, History and Evolution of AI, Characteristics of AI, Types of AI, Intelligent Systems, Intelligent Agents, Applications of AI in Daily Life, Applications of AI in Engineering.	7 Hrs
Unit 2	**Problem Solving Techniques:** Problem Definition; State Space Representation; Problem Formulation; Breadth First Search (BFS); Depth First Search (DFS); Heuristic Search; Best-First Search; Simple Examples.	8 Hrs
Unit 3	**Knowledge Representation and Expert Systems:** Knowledge Representation Concepts; Propositional Logic; Predicate Logic; Semantic Networks; Frames; Rule-Based Systems; Expert Systems and their Architecture; Applications of Expert Systems.	8 Hrs

Unit 4	**Machine Learning Fundamentals:** Introduction to Machine Learning, Artificial Intelligence vs Machine Learning, Supervised Learning; Unsupervised Learning; Classification, Applications of Machine Learning.	7 Hrs
Unit 5	**Applications of Artificial Intelligence:** Natural Language Processing, Computer Vision, Robotics, AI in Agriculture, AI in Healthcare, AI in Electronics & Communication Engineering, AI in Smart Cities	7 Hrs
Unit 6	**Ethics and Future Trends in AI:** Ethical Issues in AI, Bias and Fairness, Privacy and Security, Responsible AI, Introduction to Generative AI, Future Trends in AI, Career Opportunities in AI	8 Hrs

Text Books:

1. E. Balagurusamy, Artificial Intelligence McGraw Hill Education (India).
2. S. Kaushik, Artificial Intelligence, Cengage Learning India.
3. N. P. Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press India.

References:

1. V. S. Janakiraman and K. Sarukesi, Foundations of Artificial Intelligence and Expert Systems, Macmillan India.
2. R. Rajesh, Artificial Intelligence, Tata McGraw-Hill Education.
3. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Education.

E Resources:

1. NPTEL – Artificial Intelligence
2. SWAYAM – Artificial Intelligence
3. Spoken Tutorial – IIT Bombay
4. AICTE Learning Portal
5. Google AI Learning Resources

Mapping of COs with POs and PSOs

COs	**POs**											**PSOs**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
3ET211DH1.1	3	2	–	–	2	–	–	–	2	–	2	3	2	–
3ET211DH1.2	3	3	2	2	3	–	–	–	2	–	2	3	3	2
3ET211DH1.3	3	3	2	2	2	–	–	–	2	–	2	3	2	2
3ET211DH1.4	3	2	2	2	2	–	–	–	2	–	2	3	2	2
3ET211DH1.5	3	3	3	2	3	1	–	–	3	–	3	3	3	2
3ET211DH1.6	2	2	–	2	2	2	2	2	3	2	3	3	2	2
3ET211DH1CO	3	3	2	2	2	1	1	1	2	1	2	3	2	2

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**3ET211DH2**	Course Category:	**DH**
Course Name	**Solid State Electronics for VLSI**			
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours **45 Hrs**
Total Credit Hours	**90 Hrs**			
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks **40**
EE Marks	**--**	PA Marks	**--**	Total Marks **100**

Course Description:

Subject Code 3ET211DH2 Solid State Electronics for VLSI is a Double Minor/ Honours Course offered by the department of Electronics & Telecommunication Engineering for Second Year B. Tech., of all discipline.

Course Objectives:

The objective of the course is to build foundational knowledge of solid-state devices and semiconductor processes, and to apply these concepts in integrated circuit and VLSI design.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
3ET211DH2.1	Explain crystal structures, quantum concepts, energy bands to identify semiconductor classifications.	C-2
3ET211DH2.2	Analyze carrier transport, recombination, to determine continuity relations in semiconductors.	C-4
3ET211DH2.3	Examine PN junction operation to understand diode characteristics, and breakdown mechanisms.	C-3
3ET211DH2.4	Interpret metal–semiconductor contacts and optoelectronic to explain device behavior.	C-3
3ET211DH2.5	Describe BJT operation to understand characteristics and high-frequency limitations.	C-2
3ET211DH2.6	Summarize basic semiconductor process steps relevant to integrated circuits.	C-3

Course Contents:

Unit 1	**Crystal Structure & Quantum Basis of Semiconductors:** Crystal lattices, unit cells, Miller indices, diamond structure of Si; crystal defects; quantum mechanics basics; Bloch theorem; band theory; density of states; effective mass.	8 Hrs

Unit 2	**Semiconductor Carrier Physics:** Intrinsic & extrinsic semiconductors; Fermi–Dirac statistics; drift, diffusion; scattering; mobility; continuity equation; recombination (SRH, radiative, Auger); quasi-Fermi levels; carrier lifetime.	9 Hrs
Unit 3	**PN Junctions and Diodes:** PN junction formation and depletion region, Built-in potential and equilibrium conditions, Current-voltage characteristics of PN junction, Zener diode: breakdown mechanism and applications,	9 Hrs
Unit 4	**Metal–Semiconductor & Optoelectronic Devices:** Schottky barriers, ohmic contacts; heterojunctions; photodiodes, LEDs, solar cells; PIN diode; avalanche photodiode; tunnel diode; introduction to quantum devices.	8 Hrs
Unit 5	**Bipolar Junction Transistors (BJTs):** BJT structure and principle of operation, Modes of operation: cutoff, active, saturation, Input-output characteristics of BJT, Current gain (α, β) and relationships, BJT as amplifier, BJT as switch: digital applications, Limitations of BJTs in VLSI scaling.	6 Hrs
Unit 6	**Semiconductor Technology Overview:** Wafer preparation; bulk crystal growth; diffusion & implantation overview; thin-film deposition; evolution of IC technologies toward CMOS and FinFETs.	5 Hrs

Text Books:

1. Neil H.E. Weste, David Harris, CMOS VLSI Design: A Circuits and Systems Perspective (4th Edition), Pearson Education
2. Ben G. Streetman, Sanjay Kumar Banerjee, Solid State Electronic Devices (7th Edition), PHI Learning
3. R.K. Verma, Ashish Chaudhury, Solid State Electronics Ram Prasad Publications
4. K. Lal Kishore, V.S.V. Prabhakar, VLSI Design I.K. International Publishing House.

Reference Books:

1. Simon M. Sze, VLSI Technology McGraw Hill Education India
2. Morris Mano, Digital Logic and Computer Design Pearson Education

E Resources :

1. NPTEL Online Courses, Solid State Devices and Digital VLSI Design video lectures
2. VLSI Resources Portal Tutorials on fabrication, MOSFETs, CMOS circuits, vlsiresources.com

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
3ET211DH2.1	3	2	–	2	1	–	–	–	–	–	2	3	2	–
3ET211DH2.2	3	3	2	2	2	–	–	–	–	–	2	3	2	–
3ET211DH2.3	3	3	2	2	2	–	–	–	–	–	3	3	2	–
3ET211DH2.4	3	2	2	2	2	–	–	–	–	–	2	3	1	–
3ET211DH2.5	3	3	2	2	2	–	–	–	–	–	3	3	1	–
3ET211DH2.6	3	2	-	2	2	2	1	–	–	2	3	3	1	1
3ET211DH2.CO	3	3	2	2	2	1	1	-	-	1	3	3	2	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	5	Course Code:	4ET212PC1	Course Category:	PCC
Course Name	**Electromagnetic Fields**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 4ET212PC1Electromagnetic Fields is a compulsory Program Core Course for Second Year B. Tech. in Electronics & Telecommunication Engineering.

Course Objectives:

The objective of the course is to familiarize the student to the concept and calculations pertaining to electric and magnetic field, Boundary conditions, Maxwell's equations and EM wave propagation in electromagnetic theory.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ET212PC1.1	Explain coordinate systems and its use for solving the problems of electromagnetic fields.	C-2
4ET212PC1.2	Apply the basics of electrostatics to obtain the electric field intensity for static conditions.	C-3
4ET212PC1.3	Apply the basics of magnetostatics to obtain the magnetic field intensity for static conditions.	C-3
4ET212PC1.4	Use boundary conditions and Maxwell's equations to solve problems in electrostatics and magnetostatics.	C-3
4ET212PC1.5	Use EM wave equations in different media to calculate attenuation, skin depth and apply Poynting's theorem to calculate power flow in EM fields.	C-3
4ET212PC1.6	Explain the scalar, vector magnetic potentials and mechanism of radiation from a current element to calculate the radiation resistance and total power radiated.	C-2

Course Contents:

Unit 1	**Vector Analysis and Co-ordinate Systems:** Introduction to Vector Analysis, Product of vectors, Cartesian, Cylindrical, Spherical Co-ordinate systems. Transformation of Vectors. Types of integral used in Electromagnetic theory. Gradient, Divergence, Curl, Divergence Theorem and Stokes Theorem	10 Hrs
Unit 2	**Electrostatics:** Coulombs Law, Electric field intensity, Types of charge distributions. Electric field intensity due to Line charge, Surface charge, Volume charge. Electric flux, Electric flux density, Gauss's law. Electrostatic potential, Relation between potential V and field intensity E'	7 Hrs
Unit 3	**Magnetostatics:** Magnetic field intensity, Magnetic flux density. Biot- Savarts law. Magnetic field intensity due to infinite, finite and circular current carrying conductor. Amperes-Circuital law.	7 Hrs
Unit 4	**Boundary Conditions and Maxwell's Equations:** Electric Boundary condition between conductor and dielectric, two perfect dielectrics. Magnetic boundary condition. Maxwell's equations for static & time varying field.	7 Hrs
Unit 5	**Electromagnetic Wave Propagation:** Electromagnetic wave equations for free space, lossy dielectric medium and perfect conductor. Attenuation constant, phase constant, propagation constant. Skin depth. Poynting theorem.	7 Hrs
Unit 6	**Radiation:** Scalar magnetic potential, vector magnetic potential, retarded vector magnetic potential. Power radiated and radiation resistance of current element, half wave dipole.	7 Hrs

Text Books:

1. W. H. Hyat, Engineering Electromagnetics, Tata McGraw Hill
2. E. C.Jorden and K. G. Balmain, Electromagnetic waves and Radiating Systems, Prentice Hall of India
3. M.N.O. Sadiku, Principles of Electromagnetics, Oxford University Press

Reference Books:

1. J. D. Kraus, Electromagnetics, McGraw Hill International Edition
2. S. Bhooshan, Fundamentals of Engineering Electromagnetics, Oxford University Press
3. T. V. S. Arun Murthy, Electromagnetic Fields (Theory & Problems), S. Chand

E Resources :

1. Swayam online course on 'Electromagnetic Fields in 3D'
2. E Book: P. Lorrain, D. R. Corson and F. Lorrain, 'Electromagnetic Fields and Waves' Link: https://hostnezt.com

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4ET212PC1.1	3	3	-	-	-	-	-	-	-	-	-	3	2	-
4ET212PC1.2	3	3	2	-	-	-	-	-	-	-	-	3	2	-
4ET212PC1.3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
4ET212PC1.4	3	3	2	-	-	-	-	-	-	-	-	3	2	-
4ET212PC1.5	2	2	2	2	-	-	-	-	-	-	-	2	1	-
4ET212PC1.6	3	2	1	-	-	-	-	-	-	-	-	3	1	-
4ET212PC1CO	3	3	2	1	-	-	-	-	-	-	-	3	2	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	5	Course Code:	4ET213PC1	Course Category:	PCC
Course Name	**Analog & Digital Electronics**				
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 4ET213PC1Analog & Digital Electronics is a compulsory Program Core Course for Second Year B. Tech. Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to introduce the fundamentals of analog and digital circuits and their applications with emphasis on integrated circuits to develop analytical and digital logic development capability.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcomes	Domain Level
4ET213PC1.1	Describe basics of operational amplifier IC 741 to demonstrate its performance parameters.	C-2
4ET213PC1.2	Demonstrate linear and non-linear application circuits of op-amp. to analyze their performance.	C-4
4ET213PC1.3	Illustrate operation of linear ICs of timer, voltage regulator and PLL to understand their applications.	C-2
4ET213PC1.4	Explain number system conversions and binary codes to demonstrate arithmetic operations using 1's and 2's complements.	C-2
4ET213PC1.5	Use logic gates to implement combinational logic circuits.	C-3
4ET213PC1.6	Demonstrate applications of flip flops to implement sequential logic circuits like registers and counters.	C-2

Course Contents:

Unit 1	**Introduction to Operational Amplifier:** Basics of differential amplifier, configurations, OP-amp block diagram, Op-amp IC 741, parameters, transfer characteristics.	5 Hrs
Unit 2	**Linear and non liner applications of op-amp:** Op-amp as Inverting, non-inverting amplifier, scaling/ summing amplifier, Integrator, differentiator, Comparator, Schmitt trigger, clipper.	5 Hrs

Unit 3	**Linear ICs:** IC 555, internal schematic, IC 555 applications- Astable, Monostable multivibrator. Voltage regulator IC 78XX, 79XX. PLL IC 565- Internal schematic, parameters.	5 Hrs
Unit 4	**Number Systems and Binary Codes:** Decimal, Binary, Octal, Hexadecimal number systems and their conversions. BCD, Octal, Hexadecimal, Excess-3, Grey Code. Arithmetic operations using 1's and 2's complement. Introduction to Logic gates and Boolean Algebra.	5 Hrs
Unit 5	**Combinational Logic Design:** Introduction to Karnaugh Map. Design of Multiplexer, De-multiplexer, Decoder, Encoder, Comparator, Code Converters. Combinational logic design using ROM.	5 Hrs
Unit 6	**Sequential Logic Design:** Introduction to Flip flops, Shift registers and their types. Design of Asynchronous and Synchronous counters. Ring counter, Johnson Counter.	5 Hrs

Text Books:

1. Ramakant Gayakwad, Op-Amps & Linear Integrated Circuits,Prentice-Hall India
2. D. Roy Choudhury & S. B. Jain, Linear Integrated Circuits, New Age International Publishers.
3. M. Morrios Mano, Digital Design, Prentice-Hall India
4. Anand Kumar, Switching Theory and Logic Design, Prentice-Hall India
5. R. P. Jain, Modern Digital Electronics, TMH

Reference Books:

1. K.R. Botkar, Integrated Circuits, Khanna Publications.
2. Adel S. Sedra & Kenneth Carless Smith, Microelectronic Circuits, Oxford University Press.
3. Samuel C. Lee, Digital Circuits and Logic Design, PHI
4. Charles H. Roth, Fundamentals of Logic Design, Jaico Publication
5. G. K. Kharate, Digital Electronics, Oxford University Press

E Resources :

1. Swayam online course: 'Integrated Circuits'. https://onlinecourses.nptel.ac.in/noc24_ee73/preview
2. E-book: James M. Fiore, Operational Amplifiers & Linear Integrated Circuits: Theory and Application / 3E' https://www2.mvcc.edu/users/faculty/jfiore/books/OperationalAmplifiersAndLinearICs_3E.pdf
3. Swayam online course: Digital Electronics
4. E Book: Digital Electronics Principals, Devices and Applications, A. K. Maini

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4ET213PC1.1	3	3	2	-	-	-	-	-	-	-	-	2	-	-
4ET213PC1.2	3	3	2	1	-	-	-	-	-	-	1	3	1	-
4ET213PC1.3	3	3	2	1	-	-	-	-	-	-	1	3	1	-
4ET213PC1.4	3	3	2	-	-	-	-	-	-	-	-	2	-	-
4ET213PC1.5	3	3	2	2	-	-	-	-	-	-	1	3	1	-
4ET213PC1.6	3	3	2	2	-	-	-	-	-	-	1	3	1	-
4ET213PC1CO	3	3	2	1	-	-	-	-	-	-	1	3	1	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**4ET214PC1**	Course Category:	**PCC**
Course Name	**Network Analysis**				
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 4ET214PC1 Network Analysis is a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of the course is to introduce students to the foundational principles of electrical circuit analysis, including nodal and mesh techniques, and apply network theorems, evaluate network functions using pole-zero analysis, and model two-port networks for practical engineering applications.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ET214PC1.1	Apply elementary network theorems such as source transformation, node, and mesh analysis to solve electrical circuit problems.	C-3
4ET214PC1.2	Analyze DC networks using Superposition, Thevenin's, Norton's, and Maximum Power Transfer theorems to determine circuit parameters.	C-4
4ET214PC1.3	Apply network theorems to AC circuits including mesh and node analysis and superposition theorem for effective circuit analysis.	C-3
4ET214PC1.4	Apply initial and final value theorems to evaluate RL, RC, and RLC networks using Laplace transforms including with and without initial conditions.	C-3
4ET214PC1.5	Apply concept of network functions, poles and zeros to determine time-domain behavior of networks.	C-3
4ET214PC1.6	Apply concept of two-port networks to determine two-port network parameters and conditions for reciprocity and symmetry.	C-3

Course Contents:

Unit 1	**Elementary Network Theorems**: Sources of electrical energy: Dependent and independent sources, Source transformation, Node and mesh analysis.	5 Hrs
Unit 2	**Network Theorems (Dc Networks)**: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem.	5 Hrs
Unit 3	**Network Theorems (Ac Circuits)**: Mesh analysis, Node Analysis, Superposition Theorem.	5 Hrs
Unit 4	**Laplace Transform And Its Application**: Initial and Final value theorems. Evaluation of RL, RC and RLC networks using Laplace transform and inverse Laplace transform with and without initial conditions.	5 Hrs
Unit 5	**Network Functions**: Concept of complex frequency, Ports and terminal pairs, Network functions, poles and zeros, driving points and transfer functions of ladder network structures, Time domain behavior from pole-zero plot of immittance function (by partial method).	5 Hrs
Unit 6	**Two-Port Networks**: Open circuit impedance, short circuit admittance, ABCD and hybrid parameters of Two port networks. Conditions for reciprocity & symmetry of a two port networks.	5 Hrs

Text Books:

1. Ravish R. Singh, Network Analysis & Synthesis, Tata McGraw Hill Education (India) Private Limited.
2. D.Roy Choudhary, Networks and Systems, 2nd Edition, New Age International Publishers.

Reference Books:

1. Van Valkenburg , Network analysis, Prentice hall of India, 2000.
2. A William Hayt, Engineering Circuit Analysis, 8th Edition, McGraw-Hill Education.
3. Sudhakar, A., Shyammohan, S. P. Circuits and Network, Tata McGraw-Hill New Delhi, 1994.

E Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ee14/

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
4ET214PC1.1	3	3	-	-	-	-	-	-	-	-	-	2	2	-
4ET214PC1.2	3	3	2	-	-	-	-	-	-	-	-	2	3	-
4ET214PC1.3	3	3	-	-	-	-	-	-	-	-	-	2	3	-
4ET214PC1.4	3	3	-	2	-	-	-	-	-	-	-	3	2	-
4ET214PC1.5	3	3	-	2	2	-	-	-	-	-	-	3	3	-
4ET214PC1.6	3	3	2	2		-	-	-	-	-	-	2	3	1
4ET214PC1CO	3	3	1	1	1	-	-	-	-	-	-	2	3	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**4ET215MD1**	Course Category:	**MDM**
Course Name	**Digital Electronics**				
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**--**	PA Marks	**--**	Total Marks	**50**

Course Description:

Subject Code 4ET215MD1Digital Electronics is a Multi Disciplinary Minor Course for Second Year B. Tech.

Course Objectives:

The objective of the course is to provide the basic knowledge of digital circuit and its design, enabling them to simplify logic expressions and design combinational logic circuits.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ET215MD1.1	Explain number system conversions and the rules of Boolean algebra to simplify logic expressions.	C-2
4ET215MD1.2	Describe the operation of logic gates and method of minimization technique to simply the hardware requirements of digital circuits.	C-2
4ET215MD1.3	Use logic gates and flip flops to implement combinational circuits and sequential circuits.	C-3

Course Contents:

Unit 1	**Number System and Boolean Algebra:** Decimal, Binary, Octal and Hexadecimal number systems and their conversions. BCD code, Grey Code, Excess 3 Code. Boolean Algebra, Boolean Laws, De-Morgan's Theorem, Simplifications of logic expressions using Boolean Algebra.	10 Hrs
Unit 2	**Logic Gates and Karnaugh Map:** Logic gates, Universal Gates, Realization of logic gate using Universal gates. SOP and POS form of logic expressions. Realization of logic expressions using gates. Simplification of logic expressions using Karnaugh Map upto 4 variables.	10 Hrs
Unit 3	**Combinational & Sequential Logic Circuits:** Combinational logic circuits such as Adder, Subtractor, Multiplexer, De-multiplexer. Flip Flops, Asynchronous counters, Introduction to registers.	10 Hrs

Text Books:

1. M. Morrios Mano, Digital Design, Prentice-Hall India
2. Anand Kumar, Switching Theory and Logic Design, Prentice-Hall India
3. R. P. Jain, Modern Digital Electronics, TMH

Reference Books:

1. Samuel C. Lee, Digital Circuits and Logic Design, PHI
2. Charles H. Roth, Fundamentals of Logic Design, Jaico Publication
3. G. K. Kharate, Digital Electronics, Oxford University Press

E-Resources:

1. Swayam online course: Digital Electronics
2. E Book: A. K. Maini, Digital Electronics Principals, Devices and Applications,

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4ET215MD1.1	2	2	1	-	-	-	-	-	-	-	-	3	2	-
4ET215MD1.2	3	3	2	-	1	-	-	-	-	-	-	2	2	-
4ET215MD1.3	3	3	3	2	2	-	-	-	-	-	2	3	3	-
4ET215MD1CO	3	3	2	1	1	-	-	-	-	-	1	3	3	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**4SH216OE1**	Course Category:	**OE**
Course Name	**Quantitative and Logical Reasoning**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 4SH216OE1Quantitative and Logical Reasoning is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:

The Objective of the Course is to develop quantitative aptitude, logical reasoning, problem-solving efficiency, and decision-making skills for placements, competitive exams, and real-life applications

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH216OE1.1	Apply arithmetic and numerical techniques to solve quantitative problems accurately.	C-3
4SH216OE1.2	Solve algebraic and equation-based problems using simplification and approximation methods to improve problem-solving efficiency.	C-3
4SH216OE1.3	Analyze logical reasoning problems using structured and critical thinking approaches to improve decision-making skills.	C-4
4SH216OE1.4	Interpret and analyze data using graphical and tabular methods for decision making for strategic planning.	C-4
4SH216OE1.5	Solve complex logical puzzles and advanced reasoning problems efficiently for competitive examination success.	C-3
4SH216OE1.6	Demonstrate effective aptitude test strategies integrating quantitative and logical reasoning skills for career advancement opportunities.	C-3

Course Contents:

Unit 1	**Number System & Arithmetic Foundations:** Number system fundamentals; LCM and HCF applications; divisibility rules; percentage calculations; ratio and proportion; averages; profit and loss; simple and compound interest; speed mathematics and shortcut techniques.	7 Hrs
Unit 2	**Algebra, Equations & Simplification Techniques:** Linear and quadratic equations; algebraic expressions; simplification and approximation; indices and surds; inequalities; time and work; pipes and cisterns; time, speed and distance; mixtures and alligation.	7 Hrs
Unit 3	**Logical Reasoning: Analytical & Critical Thinking:** Coding–decoding; blood relations; direction sense; series and pattern recognition; analogies; ranking and ordering; syllogisms; statement and assumption; statement and conclusion; cause–effect reasoning.	7 Hrs
Unit 4	**Data Interpretation & Analytical Aptitude:** Tables; pie charts; line graphs; bar graphs; caselets; data sufficiency; DI shortcut techniques; approximation in data interpretation; comparative and predictive data analysis.	8 Hrs
Unit 5	**Advanced Logical Reasoning & Puzzle Solving:**Seating arrangements (linear, circular, and complex); floor-based puzzles; scheduling puzzles; selection-based puzzles; Venn diagrams; logical grouping; critical reasoning frameworks	8 Hrs
Unit 6	**Placement Aptitude Mastery & Test Strategies:** Integrated quantitative and logical reasoning practice; decision-making and elimination strategies; speed improvement techniques; mock placement aptitude patterns (TCS, Infosys, Wipro, Accenture, Capgemini); common error analysis; test-taking strategies; aptitude and reasoning simulations.	8 Hrs

Text Books:

1. R. S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Publishing
2. Arun Sharma, Logical Reasoning and Data Interpretation, McGraw Hill

Reference Books:

1. Arun Sharma, How to Prepare for Quantitative Aptitude, McGraw Hill Education.
2. R.S. Aggarwal, A Modern Approach to Logical Reasoning, S. Chand Publication
3. M.K. Pandey, Analytical Reasoning, published by BSC Publishing Co. Pvt. Ltd.
4. Rajesh Verma, Fast Track Objective Arithmetic, Arihant Publications

E Resources:

1. NPTEL – Quantitative Aptitude & Logical Reasoning Courses
2. IndiaBIX – Quantitative and Logical Reasoning Practice
3. CareerRide – Aptitude Preparation Modules
4. PrepInsta / HackerEarth – Placement Aptitude Practice Platforms

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4SH216OE1.1	3	3	2	–	–	–	–	–	–	–	–	3	2	1
4SH216OE1.2	3	3	2	–	–	–	–	–	–	–	–	1	3	1
4SH216OE1.3	–	3	3	–	–	–	–	–	–	–	–	3	-	1
4SH216OE1.4	–	3	2	–	–	–	–	–	–	–	–	1	2	1
4SH216OE1.5	–	3	3	–	–	–	–	–	–	–	–	3	3	1
4SH216OE1.6	–	3	2	–	–	–	–	–	–	2	3	3	2	1
4SH216OE1 CO	1	3	3	–	–	–	–	–	–	1	1	2	2	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**4SH216OE2**	Course Category:	**OE**
Course Name	**Critical Thinking & Decision Making**				
Credits	**03**	Total L:T:P Hours	3:0:0 **45 Hrs**	Total SL Hours	**45 Hrs**
Total Credit Hours	**90 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:

Subject Code 4SH216OE2 Critical Thinking & Decision Making is a compulsory Open Elective Course for Second Year B. Tech All Branch Students.

Course Objectives:

The objective of this course is to develop critical thinking and decision-making competencies by strengthening analytical reasoning and structured problem-solving skills applicable to professional and real-world situations.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH216OE2.1	Apply critical thinking frameworks to analyze problems systematically.	C-3
4SH216OE2.2	Evaluate information, assumptions, and arguments for logical consistency and validity.	C-5
4SH216OE2.3	Analyze complex situations and identify feasible alternatives for decision making.	C-4
4SH216OE2.4	Design rational and ethical decision-making strategies under uncertainty to ensure sustainable organizational outcomes.	C-6 A-3
4SH216OE2.5	Apply quantitative and qualitative tools to support decision-making processes.	C-3
4SH216OE2.6	Demonstrate effective decision making in simulated professional and team-based scenarios to resolve workplace challenges effectively	C-3 P-3 A-3

Course Contents:

Unit 1	**Foundations of Critical Thinking:** Concept of critical thinking; elements of reasoning; logical vs illogical thinking; assumptions and inferences; inductive and deductive reasoning; common cognitive biases; barriers to critical thinking.	7 Hrs
Unit 2	**Analytical Reasoning & Problem Framing:** Problem identification and structuring; root cause analysis; issue trees; questioning techniques; systems thinking; analytical reasoning models.	7 Hrs
Unit 3	**Decision Making Models & Techniques:** Rational decision-making model; intuitive decision making; bounded rationality; decision trees; cost–benefit analysis; risk and uncertainty; heuristics.	7 Hrs
Unit 4	**Data-Driven & Ethical Decision Making:** Use of data in decision making; qualitative vs. quantitative data; basic decision matrices; ethical frameworks; professional ethics; social and environmental considerations in decisions.	8 Hrs
Unit 5	**Creativity, Innovation & Strategic Thinking:** Creative thinking techniques; lateral thinking; design thinking approach; scenario planning; strategic decision making; innovation in problem solving.	8 Hrs
Unit 6	**Applied Decision Making & Case Analysis:** Case studies from industry and management; individual and group decision simulations; conflict resolution through decision frameworks; decision-making under pressure; reflection and feedback	8 Hrs

Text Books:

1. Alec Fisher, Critical Thinking, published by Cambridge University Press.
2. John Adair, Decision Making and Problem Solving, Kogan Page.

Reference Books:

1. Daniel Kahneman, Thinking, Fast and Slow published by Farrar, Straus and Giroux.
2. Rolf Dobelli, The Art of Thinking Clearly, Sceptre.
3. John S. Hammond, Ralph L. Keeney, Howard Raiffa, Smart Choices, published by Harvard Business School Press.
4. Ken Watanabe, Problem Solving 101, Portfolio.

E Resources:

1. NPTEL – Critical Thinking & Decision Making Courses
2. Coursera – Critical Thinking and Decision-Making Modules
3. Harvard Business Review – Decision Making Articles
4. MIT Open Course Ware – Decision Analysis

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4SH216OE2.1	2	3	2	–	–	–	–	–	–	–	–	3	2	1
4SH216OE2.2	–	3	3	–	–	–	–	–	–	–	–	1	3	1
4SH216OE2.3	–	3	2	–	–	–	–	–	–	–	–	3	-	1
4SH216OE2.4	–	3	3	–	–	2	3	–	–	–	–	1	2	1
4SH216OE2.5	–	2	2	–	2	–	–	–	–	–	–	3	3	1
4SH216OE2.6	–	2	2	–	–	2	–	2	2	–	2	3	2	1
4SH216OE2 CO	1	3	3	-	1	1	1	1	1	-	1	2	2	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**4ET217PC1**	Course Category:	**PCC**
Course Name	**Analog & Digital Electronics Lab**				
Credits	**01**	Total L:T:P Hours	0:0:2 **30 Hrs**	Total SL Hours	-- --
Total Credit Hours	**30 Hrs**				
SEE Marks	**25**	SEE Time	--	CIA Marks	--
EE Marks	--	PA Marks	**25**	Total Marks	**50**

Course Description:

Subject Code 4ET217PC1Analog & Digital Electronics Lab is a compulsory Program Core Course Lab for Second Year B. Tech. Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to perform practicals on Linear Integrated Circuits and Digital ICs to demonstrate their practical applications in domain of analog and digital electronics.

Course Outcomes:

After completing the course students will be able to:

CO	**Course Outcome**	**Domain Level**
4ET217PC1.1	Demonstrate ability to perform experiments based on op-amp and linear ICs to understand their linear and nonlinear applications.	C-3, P-5
4ET217PC1.2	Demonstrate timerIC 555, Voltage regulator IC and PLL ICto analyze their performance in applications and illustrate combinational logic circuits using digital ICs.	C-3
4ET217PC1.3	Use digital ICs to construct sequential logic circuits.	C-6, P-7

List of Practicals:

Minimum eight practicals from the list mentioned below.

1. Demonstrate op-amp as inverting amplifier.
2. Demonstrate op-amp as non- inverting amplifier and voltage follower.
3. Verify op-amp as practical integrator..
4. Verify op-amp as practical differentiator.
5. Verify op-amp as Schmitt trigger.
6. Demonstrate IC 555 as Astable multivibrator.
7. Demonstrate IC 555 as Monostable multivibrator.
8. Verify the operation of 8:1 Multiplexer IC 74151.
9. Verify the operation of 1:8 De-multiplexer IC 74138.
10. Verify the operation of 4 bit Comparator IC 7485.
11. Design and implementation of 4 bit Binary to Grey code converter using

logic gates.

12. Verify the operation of 4 bit asynchronous counter.
13. Verify the operation of Universal shift register.

E Resources:

1. Virtual Lab: Digital Electronics:https://de-iitr.vlabs.ac.in

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
4ET217PC1.1	3	1	-	2	-	-	-	3	2	-	-	3	1	-
4ET217PC1.2	3	1	1	-	-	-	-	-	-	-	-	2	1	-
4ET217PC1.3	3	1	-	1	-	-	-	3	3	-	-	3	1	-
4ET217PC1CO	3	1	-	1	-	-	-	2	2	-	-	3	1	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	5	Course Code:	4ET218PC1	Course Category:	PCC
Course Name	Network Analysis Lab				
Credits	01	Total L:T:P Hours	0:0:2	Total SL Hours	--
Total Credit Hours	30 Hrs		30 Hrs		
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	25	PA Marks	25	Total Marks	50

Course Description:

Subject Code 4ET218PC1 Network Analysis Lab is a compulsory Program Core Course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to perform practicals on the concepts of circuit analysis techniques, input–output characteristics of electrical Two-Port networks and frequency response and dynamic behavior of RLC circuits using simulation tools.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ET218PC1.1	Apply fundamental circuit analysis techniques (Node, Mesh, Superposition, Thevenin, Norton, Maximum Power Transfer) to DC and AC electrical networks to verify results experimentally.	C-3, P-4 A-2
4ET218PC1.2	Experimentally determine Two-Port Network parameters (Z, Y, h, ABCD) to validate input–output characteristics of electrical networks.	C-4 P-4 A-3
4ET218PC1.3	Interpret frequency response and dynamic behavior of RLC circuits using simulation tools, to extract network parameters like impedance and voltage transfer ratio.	C-4, P-4, A-3

List of Practicals:

Minimum eight practicals from the list mentioned below.

1. Verification of Node & Mesh Analysis for electric circuit (DC).
2. Verification of Node & Mesh Analysis for electric circuit (AC).
3. Verification of Superposition theorem for a given network.
4. Verification of Thevenin's & Norton's theorem for a given network.
5. Verification of Maximum Power Transfer theorem for a given network.
6. Verification and Calculation of and verify open circuit (Z) Impedance& Short circuit (Y) Admittance parameters of a given Two Port network.

7. Verification and Calculation of Transmission (ABCD) & Hybrid (h) parameters of a given Two Port network.
8. Calculation of driving point Impedance & Voltage Transfer Ratio for a given network.
9. Frequency response of R-L-C series Circuit using simulation Tool.
10. Study of series R-L-C circuit behaviour using simulation Tool.

E Resources:

1. http://vlabs.iitkgp.ac.in/asnam/#, Analog Signals, Network and Measurement Laboratory

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4ET218PC1.1	3	3	-	-	3	-	-	-	2	-	2	3	3	-
4ET218PC1.2	3	3	-	-	3	-	-	-	2	-	2	3	3	-
4ET218PC1.3	3	3		3	3	-	-	-	2	-	2	3	3	3
4ET218PC1.CO	3	3	-	1	3	-	-	-	2	-	2	3	3	1

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	5	Course Code:	4ET219VS1		Course Category:	SEC
Course Name		Python Programming Lab				
Credits		02	Total L:T:P Hours	0:0:4 60 Hrs	Total SL Hours	--
Total Credit Hours		60 Hrs				
SEE Marks		--	SEE Time	--	CIA Marks	--
EE Marks		--	PA Marks	50	Total Marks	50

Course Description:

Subject Code 4ET219VS1 Python Programming Lab is a compulsory Engineering Course for Second Year B. Tech in Electronics & Telecommunication Engineering.

Course Objectives:

The objective of the course is to develop basic and practical programming skills using Python by applying fundamental constructs, data structures, and object-oriented concepts. It also enables students to work with computer vision libraries like OpenCV and perform database operations using MongoDB for real-time applications.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ET219VS1.1	To install and configure Python, OpenCV, and MongoDB software on Windows/Ubuntu systems which will enable them to develop basic applications integrating image processing with database operations.	C-3, P-4
4ET219VS1.2	To apply basic Python programming constructs, this will allow them to develop efficient and modular software applications.	C-3, P-5
4ET219VS1.3	To design and develop integrated applications using Python libraries such as OpenCV and MongoDB, which will help students to create image processing solutions with database management.	C-6, P-6

List of Practicals:

Minimum ten practicals from the list mentioned below.

1. To study and install Python software on Windows/Ubuntu Operating System.
2. To study Python software command and Write a Python program:
    a. To display “Hello JDIET_ABR!!!”

b. To perform Arithmetic operation such as: Addition, Subtraction, Division
c. and Multiplication.

3. Write a program to implement conditional Statements in Python programming.
4. Write a program to implement Looping Statements in Python programming.
5. Write a Python program to demonstrate Dictionary, List and Tuple comprehension.
6. Write a Python program to demonstrate the use of function.
7. Write a Python program to demonstrate the use of class.
8. To study OpenCV for computer vision and install OpenCV python, NumPy, SciPy and Matplotlib libraries on Windows/Ubuntu Operating System.
9. Write an OpenCV Python program of loading and displaying a 'JDIET'
   a. college image on screen.
10. Write an OpenCV Python program to capture videos through webcam and
    a. perform desired operations on that video
11. To study MongoDB database and installation of MongoDB for Python on
    a. Window Operating System.
12. Write a Python program to insert and update data in MongoDB database.

Text Books:

1. Mr. Rupesh Nasre, Python Programming, All India Council for Technical Education (AICTE) October, 2022.

Reference Books:

1. Dr. Adrian Rosebrock, Practical Python and OpenCV: An Introductory, Example Driven Guide to Image Processing and Computer Vision, Publishing Ltd, 3rd Edition, 2016.
2. Joseph Howse, Prateek Joshi & Michael Beyeler, OpenCV: Computer Vision Projects with Python, Packet Publishing Ltd, 3rd Edition, 2016.

E Resources:

1. https://www.w3schools.com/python/python_mongodb_getstarted.asp
2. https://www.mongodb.com/resources/languages/pymongo-tutorial
3. https://nptel.ac.in/courses/106106182

Mapping of COs with POs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
4ET219VS1.1	3	2	2	1	3	1	1	1	1	3	2	2	2	1
4ET219VS1.2	3	1	2	1	3	1	1	2	2	2	1	2	3	1
4ET219VS1.3	3	3	3	2	3	1	1	2	2	2	3	1	3	2
4ET219VS1CO	3	2	3	2	3	1	1	2	2	3	2	2	3	2

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**4SH220AE1**	Course Category:	**AEC**
Course Name	**Technical Writing**			
Credits	**02**	Total L:T:P Hours	1:0:2 **45 Hrs**	Total SL Hours	**15 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	--	PA Marks	**50**	Total Marks	**50**

Course Description:

Subject Code 4SH220AE1 Technical Writing is common Ability Enhancement Course for Second Year B. Tech.

Course Objectives:

The objective of the course is to enhance students' ability to write effective technical documents, professional correspondence, and research-oriented content with clarity, accuracy, and ethical standards.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH220AE1.1	Apply principles of technical writing in engineering documents.	C-3 P-2 A-2
4SH220AE1.2	Apply technical writing skills to prepare professional documents.	C-4 P-2 A-2
4SH220AE1.3	Create ethical, well-structured technical and research documents using IEEE referencing for professional and academic communication.	C-3 P-3 A-3

Course Contents:

Unit 1	**Fundamentals of Technical Writing:** Nature and importance of technical communication, characteristics of technical writing, audience analysis, technical vocabulary, grammar and style, clarity and conciseness, paragraph structure, coherence, technical descriptions, instructions and manuals.	7 Hrs
Unit 2	**Professional and Research Writing:** Technical reports and documentation, structure of reports, abstracts and summaries, research papers, project proposals, resumes and cover letters, business emails, documentation ethics, plagiarism, referencing styles (IEEE), editing and proofreading.	8 Hrs

List of Practicals:

Minimum eight practicals from the list mentioned below.

1. Analysis of Technical Communication to Identify the nature, purpose of given technical documents and evaluate their effectiveness.
2. Editing technical text for clarity and brevity
3. Technical description of an engineering device/system
4. Writing step-by-step technical instructions
5. Preparation of structured technical reports
6. Resume and cover letter drafting
7. Technical report writing based on laboratory work, case study, or project work
8. Abstract and executive summary writing for technical documents
9. Referencing and citation using IEEE format
10. Editing, proofreading, and plagiarism check of technical documents

Text Books:

1. Rizvi A. M. & Patnaik P., Effective Technical Communication, McGraw Hill Education (India), New Delhi (Second Edition).
2. Verma S., Technical Communication for Engineers, Vikas Publishing House Pvt. Ltd., New Delhi (First Edition).
3. Misra P. & Tyagi K., Advanced Technical Communication, PHI Learning Pvt. Ltd., New Delhi (Second Edition).

Reference Books:

1. Chauhan G. S., Kashiramka S. & Thimmesha L., Technical Communication, Cengage Learning India Pvt. Ltd., New Delhi (First Edition).
2. Alred G. J., Brusaw C. T. & Oliu B., Handbook of Technical Communication, Oxford University Press, New Delhi (Second Edition).
3. IEEE Editorial Style Manual, IEEE Standards Association, IEEE, USA (Latest Edition).
4. Joseph G. & Joseph B., Grammar and Usage for Technical Communication, Cambridge University Press India, Delhi (First Edition).

E Resources :

1. NPTEL–SWAYAM, IIT Roorkee,Technical Communication for Engineers.
2. https://owl.purdue.edu
3. https://ieeeauthorcenter.ieee.org

Mapping of COs with POs & PSOs:

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4SH220AE1.1	-	-	-	-	-	-	-	-		3	-	3	3	2
4SH220AE1.2	-	-	-	-	-	-	-	-	3	3	-	2	1	2
4SH220AE1.3	-	-	-	-	-	-	-	3		3	3	2	2	2
4SH220AE1 CO	-	-	-	-	-	-	-	1	1	3	1	2	2	2

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	5	Course Code:	4SH221EM1	Course Category:	EEM
Course Name	**Fundamentals of Book Keeping and Accounting**				
Credits	**02**	Total L:T:P Hours	1:0:2 **45 Hrs**	Total SL Hours	**15 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	--	SEE Time	--	CIA Marks	--
EE Marks	--	PA Marks	**50**	Total Marks	**50**

Course Description:

Subject Code 4SH221EM1 Fundamentals of Book Keeping and Accounting is an Ability Enhancement Course for Second Year B.Tech students that introduce basic accounting principles, bookkeeping processes, and financial statements for business applications.

Course Objectives:

The objective of the course is to develop students' skills in recording and analyzing financial transactions and to enable effective use of accounting information for decision-making.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4SH221EM1.1	Apply basic principles of bookkeeping and accounting for recording and maintaining financial transactions accurately.	C-3 P-2 A-2
4SH221EM1.2	Analyze financial statements such as income statement, balance sheet, and cash flow statement for supporting financial understanding and business decision-making.	C-4 P-2 A-2
4SH221EM1.3	Apply accounting tools and techniques for evaluating financial performance and improving business efficiency.	C-3 P-3 A-3

Course Contents:

Unit 1	**Foundation of Bookkeeping and Accounting** Definition, objectives, and importance of accounting, Difference between accounting and bookkeeping, accounting equation, double entry system, Debit vs credit, accrual vs cash accounting, Terminology- depreciation, armotisation, CapEx vs OpEx, Source of Document (invoice, receipt, Purchase Order), Work Flow (Journal, posting to the ledger), Preparing trial balance, Software Integration- A brief overview of ERP (SAP/ oracle and tools like a tally/ quick book).	8 Hrs

Unit 2	**Financial Statements & Decision Making** Income Statement, Balance Sheet, Cash flow Statement. Ratio Analysis (Current Ratio, Debt to equity, ROI), Cost Accounting (Fixed vs Variable, Break-even), Taxation Basics (Corporate IT)	7 Hrs

List of Practicals:

Minimum eight practicals from the list mentioned below.

1. Categories a list of items (Laptop, Office Rent Deposit, Cash, Bank Loan, Software Licenses) into Assets, Liabilities, or Equity.
2. Use the Double-Entry System to record buying raw materials, paying technician wages, and receiving a client advance.
3. Identify discrepancies like uncashed cheques, bank charges, or direct deposits from clients.
4. Compare the Straight-Line Method vs. the Written Down Value (WDV) method (as per Indian Income Tax rules).
5. Distinguish between Direct Costs (raw materials, factory power) and Indirect Costs (office salary, marketing).
6. Analyze the Annual Report of an Indian tech giant (e.g., L&T or Tata Motors).
7. Calculate the Current Ratio (liquidity), Debt-to-Equity (solvency), and Return on Investment (ROI).
8. Input Fixed Costs (Rent, Machinery) and Variable Costs (Material per unit) into a spreadsheet to find the Break-Even Point.
9. Value the remaining stock after several purchases and sales using the First-In, First-Out (FIFO) method.
10. Enter 5 basic transactions into a trial version of Tally Prime or a cloud-based tool like Zoho Books.

Text Books:

1. S.N. Maheshwari S.K. Maheshwari& S.K. Maheshwari., Financial Accounting, Vikas Publishing House (Eleventh Edition)
2. N. Ramachandran, Ramkumar Kakani., Financial Accounting for Management, McGraw Hill Education (Sixth Edition)

Reference Books:

1. R. L. Gupta & U. K. Gupta., Financial Accounting, Sultan Chand & Sons, (Ninth revised Edition)
2. Dr. Santanu Chakrabarty & Dr. Nilanjan Singha Roy., Accounting & Finance for engineering, Lawpoint Publications (Second Edition)
3. Bhushan Kumar Goyal., Accounting for Everyone, Taxmann Publications Pvt. Ltd (First Edition)

E-Resources:

1. SWAYAM, Financial Accounting / Business Accounting
2. National Digital Library of India, https://ndl.iitkgp.ac.in
3. Tally Education, https://tallyeducation.com

Mapping of COs with POs & PSOs:

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4SH221EM1.1	2	2	-	-	-	-	-	-	-	-	-			
4SH221EM1.2	3	3	-	-	-	-	-	-	-	3	-			
4SH221EM1.3	2	3	-	-	3	-	-	-	-	3	-			

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code: **4CE222VE1**		Course Category: **VEC**		
Course Name	**Environmental Science**				
Credits	**02**	Total L:T:P Hours	2:0:0 **30 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**60 Hrs**				
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**--**	PA Marks	**--**	Total Marks	**50**

Course Description:

Subject Code 4CE222VE1 Environmental Science is a common Value Education course for Second Year B. Tech Electronics & Telecommunication Engineering.

Course Objectives:

The objective of this course is to develop understanding of environmental systems, natural resource management, ecological balance, and sustainable development practices to promote awareness and responsibility toward environmental protection and societal well-being.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4CE222VE1.1	Analyze renewable and non-renewable natural resources and associated problems to promote sustainable utilization for future generations.	C-4
4CE222VE1.2	Analyze food chains, webs, and ecological pyramids to evaluate ecological interactions and succession processes.	C-4
4CE222VE1.3	Examine shift from unsustainable to sustainable development to promote responsible resource planning for society.	C-3

Course Contents:

Unit 1	Renewable and non-renewable resources Environmental Science, Definition, scope and importance, Need for public awareness, Renewable and non-renewable resources, Natural resources and associated problems. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable life styles.	10 hrs

Unit 2	**Ecosystem:** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem.	10 hrs
Unit 3	**Social Issues & Environment:** From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions, Environment Protection Act. Air (Prevention and Control of Pollution) Act., Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, public awareness.	10 hrs

Text Books:

1. Suresh K. Dhameja, Environmental Studies, Katson Books
2. Benny Joseph, Environmental Studies, McGraw Hill Education

Reference Books:

1. Gilbert M. Masters & Wendell Ela, Introduction to Environmental Engineering and Science, Pearson Education
2. William Cunningham & Mary Cunningham, Environmental Science, McGraw Hill

E Recourses:

1. https://www.vlab.co.in/broad-area-civil-engineering

Mapping of COs with Pos& PSOs

CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
4CE222VE1.1	3	2	-	-	-	2	2	-	-	-	-	-	-	-
4CE222VE1.2	3	2	-	-	-	3	2	-	-	-	-	-	1	-
4CE222VE1.3	3	2	-	-	-	3	3	-	-	-	-	-	1	-
4CE222VE1.CO	3	2	-	-	-	3	3	-	-	-	-	-	1	-

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**4ET223DH1**	Course Category:	**DH**
Course Name	**Introduction to Machine Learning**				
Credits	**04**	Total L:T:P Hours	4:0:0 **60 Hrs**	Total SL Hours	**60 Hrs**
Total Credit Hours	**120 Hrs**				
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks	**40**
EE Marks	**--**	PA Marks	**--**	Total Marks	**100**

Course Description:
Subject Code 4ET223DH1 Introduction to Machine Learning is a Double Minor/Honours Course offered by the Department of Electronics & Telecommunication Engineering for Second Year B.Tech. students of all disciplines.

Course Objectives:
The objective of this course is to provide students with the fundamentals of Machine Learning, basic learning algorithms, data handling techniques and engineering applications without requiring advanced mathematics or programming.

Course Outcomes:
After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ET223DH1.1	Explain the concepts and importance of Machine Learning.	C-2
4ET223DH1.2	Classify different Machine Learning techniques.	C-2
4ET223DH1.3	Apply basic Machine Learning methods for simple problems.	C-3
4ET223DH1.4	Explain commonly used Machine Learning algorithms.	C-2
4ET223DH1.5	Identify Machine Learning applications in engineering.	C-3
4ET223DH1.6	Discuss ethical issues and future trends in Machine Learning.	C-2

Course Contents:

Unit 1	**Introduction to Machine Learning:** Introduction to Machine Learning , AI vs ML, Need of Machine Learning, Applications, Data and Features ML Process.	10
Unit 2	**Types of Machine Learning:** Supervised Learning, Unsupervised Learning, Reinforcement Learning, Training and Testing Data, Model Evaluation Concepts	10
Unit 3	**sic Machine Learning Algorithms:** assification, Regression, Clustering, Decision Tree, K-Means Clustering, Simple Examples	10
Unit 4	**Machine Learning in Engineering:** ML in Agriculture, ML in Healthcare, ML in Electronics, ML in Communication Systems, ML in Smart Cities, Industrial	10

	Applications	
Unit 5	**Machine Learning Tools:** Introduction to Python, Google Colab, Scikit-Learn (Overview), TensorFlow (Overview), Data Visualization, Simple Demonstrations	10
Unit 6	**Future Trends:** Deep Learning, Neural Networks (Introduction), Generative AI, AI Chatbots, Ethics, Privacy, Career Opportunities	10

Text Books:

1. R. Rajesh, Machine Learning, McGraw Hill Education India.
2. S. Sridhar & M. Vijayalakshmi, Machine Learning, Oxford University Press.
3. E. Balagurusamy, Artificial Intelligence, McGraw Hill Education.

References:

1. N. P. Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press India.
2. Aurélien Géron, Hands-On Machine Learning, O'Reilly.
3. Tom M. Mitchell, Machine Learning, McGraw Hill.

E Resources :

1. NPTEL – Machine Learning
2. SWAYAM – Machine Learning
3. Google Colab Tutorials
4. Kaggle Learn

Mapping of COs with POs and PSOs

COs	POs											PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
4ET223DH1.1	3	2	-	-	2	-	-	-	2	-	2	3	2	-
4ET223DH1.2	3	3	2	2	2	-	-	-	2	-	2	3	2	2
4ET223DH1.3	3	3	3	2	3	-	-	-	2	-	3	3	3	2
4ET223DH1.4	3	2	2	2	2	-	-	-	2	-	2	3	2	2
4ET223DH1.5	3	3	3	2	3	1	-	-	3	-	3	3	3	2
4ET223DH1.6	2	2	-	2	2	2	2	2	3	2	3	3	2	2
4ET223DH1CO	3	3	2	2	2	1	1	1	2	1	3	3	2	2

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level: **5**	Course Code:	**4ET223DH2**	Course Category:	**DH**
Course Name	**VLSI Design Fundamentals**			
Credits	**03**	Total L:T:P Hours	4:0:0 **60 Hrs**	Total SL Hours **60 Hrs**
Total Credit Hours	**120 Hrs**			
SEE Marks	**60**	SEE Time	**3 Hrs**	CIA Marks **40**
EE Marks	**--**	PA Marks	**--**	Total Marks **100**

Course Description:

Subject Code 4ET223DH2 VLSI Design is a Double Minor/ Honours Course offered by the department of Electronics & Telecommunication Engineering for Second Year B. Tech., of all discipline.

Course Objectives:

The objective of the course is to build foundational knowledge of VLSI and semiconductor processes, and to apply these concepts in integrated circuit and VLSI design.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
4ET223DH2.1	Explain MOS structures, MOS capacitors, and MOSFET threshold concepts to understand operation of MOSFETs.	C-2
4ET223DH2.2	Explain MOSFET I–V characteristics, small-signal models, and short-channel effects to analyse the MOSFET behaviour.	C-2
4ET223DH2.3	Design and evaluate CMOS inverters and logic circuits to determine the performance metrics.	C-3
4ET223DH2.4	Understand basic IC fabrication steps (oxidation, lithography, doping, metallization) to demonstrate process flow.	C-2
4ET223DH2.5	Apply λ-based rules and standard cell methodologies to develop CMOS layouts.	C-3
4ET223DH2.6	Evaluate MOS transistor delay models and sources of power dissipation to apply optimization techniques for efficient VLSI design	C-3

Course Contents:

Unit 1	**MOS Capacitor & MOSFET Fundamentals:** MOS structure; MOS capacitor operation (accumulation/depletion/inversion); C–V characteristics; surface potential; threshold voltage; body effect; short-channel effects (DIBL, mobility degradation); intro to FinFET and GAAFET.	10 Hrs
Unit 2	**MOSFET Modeling & Characteristics:** Linear & saturation I–V models; channel length modulation; MOSFET capacitances; mobility reduction; subthreshold behavior; small-signal model; mismatch and variability.	8 Hrs
Unit 3	**CMOS Inverter & Logic Design:** CMOS inverter structure; VTC; noise margins; delay parameters; power dissipation; CMOS NAND/NOR; transmission gates; sequential circuits (latch, FF); PVT variation impacts.	10 Hrs
Unit 4	**VLSI Fabrication Technology:** CMOS fabrication; well engineering; LOCOS & STI; oxidation (Deal–Grove); lithography (DUV/EUV); RIE; ion implantation; metallization; BEOL; CMP; reliability (NBTI, HCI, TDDB, EM)	10 Hrs
Unit 5	**Layout & Design Rules:** Stick diagrams; Euler path; λ-based design rules; inverter layout; NAND/NOR layout; parasitic extraction; standard cell design; memory cell layout; DRC/LVS introduction.	10 Hrs
Unit 6	**Delay, Power & Timing Optimization:** RC delay model; Elmore delay; interconnect delay; logical effort; path effort calculations; buffer sizing; low-power techniques (clock gating, power gating); multi-Vth; IR drop; clock tree basics	12 Hrs

Text Books:

1. Neil H.E. Weste, David Harris, CMOS VLSI Design: A Circuits and Systems Perspective (4th Edition), Pearson Education
2. Ben G. Streetman, Sanjay Kumar Banerjee , Solid State Electronic Devices (7th Edition), PHI Learning
3. R.K. Verma, Ashish Chaudhury, Solid State Electronics Ram Prasad Publications
4. K. Lal Kishore, V.S.V. Prabhakar, VLSI DesignI.K.International Publishing House.

Reference Books:

1. Simon M. Sze, VLSI Technology McGraw Hill Education India
2. Morris Mano, Digital Logic and Computer Design Pearson Education

E Resources :

1. NPTEL Online Courses, Digital VLSI Design video lectures
2. VLSI Resources Portal Tutorials on fabrication, MOSFETs, CMOS circuits, vlsiresources.com
3. Cadence & Synopsys Online Training Resources

Mapping of COs with POs & PSOs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
4ET223DH2.1	3	2	–	2	2	–	–	–	–	–	2	3	2	–
4ET223DH2.2	3	3	2	2	3	–	–	–	–	–	3	3	3	1
4ET223DH2.3	3	3	3	3	3	1	–	–	–	–	3	3	3	2
4ET223DH2.4	3	2	2	2	2	2	2	–	–	2	3	3	2	3
4ET223DH2.5	3	3	3	2	3	1	1	–	–	2	3	3	3	2
4ET223DH2.6	3	3	3	3	3	1	2	–	–	3	3	3	3	3
4ET223DH2.CO	3	3	2	3	3	1	1	-	-	1	3	3	3	2

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**5ET224EC1**	Course Category:	**EC**
Course Name	**Microprocessors/Microcontrollers based Product Design**				
Credits	**04**	Total L:T:P Hours	2:0:4 **90 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**120 Hrs**				
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**25**	PA Marks	**25**	Total Marks	**100**

Course Description:

Subject Code 5ET224EC1 Microprocessors/Microcontrollers based Product Design is an Exit Course-1 (L5) for award of UG Certificate in Electronics & Telecommunication Engineering.

Course Objectives:

The objective of the course is to builds foundational skills in 8086 microprocessor and STM32 microcontrollers and develops Embedded C competency for interfacing sensors and peripherals, enabling students to design basic embedded electronic products.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
5ET224EC1.1	Understand the 8086 microprocessor architecture and its addressing modes, instruction set, and assembler directives which make them able to write modular assembly language programs.	C2
5ET224EC1.2	Understand the architecture, features, and memory organization of STM32 ARM Cortex microcontrollers, which helps them to develop embedded applications through GPIO interfacing and peripheral programming in Embedded C	C2, P7
5ET224EC1.3	Interface and program various peripherals such as displays, motors, relays, ADCs, and DACs using STM32 microcontroller to develop basic embedded product prototypes.	P7

Course Contents:

Unit 1	**Introduction to Microprocessor:** Introduction to 8086–Microprocessor architecture, Addressing modes, Instruction set and assembler directives, Assembly language programming, Modular Programming, Linking and Relocation, Stacks, Procedures, Macros, Interrupts and interrupt service routines, Byte and String Manipulation.	10 Hrs

Unit 2	**Introduction to STM32 Microcontrollers & Programming in Embedded C:** Differences between Microprocessors and Microcontrollers. Introduction and features of STM32 ARM cortex family. STM32 Architecture and GPIO Registers, Memory organization/map. Setting up the Tool Chain for programming Development board of STM32, IO Interfacing and GPIO Programming.	10 Hrs
Unit 3	**Interfacing and Programming using Embedded C with STM32 Microcontrollers:** LED, Seven Segment Display, LCD display, Keyboard, Stepper Motor, DC motor, Relays, ADC & DAC.	10 Hrs

List of Practicals:

Minimum ten practicals from the list mentioned below.

1. To study DEBUG command and install Emulator for 8086 Microprocessor.
2. To write an assembly program to display the string 'JDIET, YTL' on screen.
3. To write an assembly program to scan and display the characters 'ABR_75'.
4. To study and set up the Tool Chain for programming and development board of STM32.
5. To implement embedded C program to toggle led.
6. UART Serial Communication: Send and Receive data with STM32 UART.
7. To implement embedded C program to display alphanumerical characters on seven segment display.
8. To interface a relay with a STM32 to control high-voltage appliances.
9. To implement embedded C program to display 'Hello ABR' on LCD display.
10. To demonstrate interfacing of STM32 with 4x4 matrix keypad and LCD".
11. To interface a stepper motor with STM32 and verify its operation using different excitation sequences (full-step and half-step).
12. Implement embedded C program with STM32 that make use of the real-time clock (RTC).

Text Books:

1. A.K. Ray and K.M. Bhurchandi, Advanced Microprocessors and Peripherals, TMH, 3rd Edition, 2012.
2. Muhammad Ali Mazidi, Shujen Chen and Eshragh Ghaemi, STM32 Arm Programming for Embedded Systems Using C Language with STM32 Nucleo, Microdigitaled, 2018.
3. Majid Pakdel, Advanced Programming with STM32 Microcontrollers, Elektor Verlag, 2020.
4. Ariel Lutenberg, Pablo Gomez and Eric Pernia, A Beginner's Guide to Designing Embedded System Applications on Arm Cortex-M Microcontrollers, Arm Education Media, UK, Copyright © 2022 Arm Limited.

Reference Books:

1. Douglas V Hall, Microprocessors and Interfacing, Programming and Hardware, Tata McGraw-Hill, 2012.
2. Warren Gay, Beginning STM32: Developing with Free RTOS, Libopencm3 and GCC, 2020.
3. Barry B. Brey, The Intel Microprocessor: Architecture, Programming and Interfacing, 6e, Pearson Education, PHI, 2003.
4. Carmine Noviello, Mastering STM32, Lean Publishing, 2018.

E Resources :

1. https://www.st.com/content/st_com/en/support/learning/stm32-education.html

Mapping of COs with POs and PSOs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
5ET224EC1.1	3	1	1	1	2	1	1	1	3	1	2	3	2	1
5ET224EC1.2	3	1	2	1	3	1	1	2	2	2	3	1	2	1
5ET224EC1.3	2	1	1	2	3	2	1	1	3	2	2	2	1	2
5ET224EC1CO	3	1	2	2	3	2	1	2	3	2	3	2	2	2

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Level:	**5**	Course Code:	**5ET225EC1**	Course Category:	**EC**
Course Name	**Signal Processing with MATLAB**				
Credits	**04**	Total L:T:P Hours	2:0:4 **90 Hrs**	Total SL Hours	**30 Hrs**
Total Credit Hours	**120 Hrs**				
SEE Marks	**30**	SEE Time	**2 Hrs**	CIA Marks	**20**
EE Marks	**25**	PA Marks	**25**	Total Marks	**100**

Course Description:

Subject Code 5ET225EC1 Signal Processing with MATLAB is an Exit course (L-5) for award of UG Certificate in Electronics & Telecommunication Engineering.

Course Objectives:

The objective of the course is to provide fundamental knowledge of discrete-time signal processing and MATLAB-based analysis. It focuses on designing FIR/IIR filters, performing multi-rate DSP operations, and applying DSP concepts to real-world systems.

Course Outcomes:

After completing the course students will be able to:

CO	Course Outcome	Domain Level
5ET225EC1.1	To analyze and perform operations on discrete-time signals, including convolution, correlation, and transformations, using MATLAB, which will enable them to interpret signal behaviour and processing results.	C-4, P-3, A-2
5ET225EC1.2	To design, realize, and evaluate FIR and IIR digital filters using appropriate structures and MATLAB tools, which will help them to assess filter performance.	C-5, P-4, A-3
5ET225EC1.3	To apply concepts of multi-rate DSP, sampling rate conversion, and DSP processor architecture to practical signal processing applications such as speech, RADAR, and SONAR, which will allow them to implement and analyze real-world signal processing systems.	C-3, P-3, A-2

Course Contents:

Unit 1	**Introduction to Discrete Time Signals[DTS]:** Discrete Time Signal, Signals δ(n) and u(n) its representations (Graphical, Functional, Tabular and Sequence), Basic Signal Operations, Sampling of Signal, Linear Convolution and	10 Hrs

	Circular Convolution, Auto and Cross Correlation.	
Unit 2	**Finite (FIR) and Infinite Impulse Response (IIR) filters:** Difference between FIR and IIR system, Realization of basic structure of FIR system:Direct form and Cascade, Realization of basic structure IIR system: Direct form-I, Direct Form-II, Cascade & Parallel.	10 Hrs
Unit 3	**Multirate Digital Signal Processing:** Sampling, Sampling rate conversion, multi-rate filter bank. Overview and application of DSP processor TMS320C54XX.Applications of DSP (Only Block Diagram): Speech Signal.	10 Hrs

List of Practicals:

Minimum ten practicals from the list mentioned below.

1. To study MATLAB commands.
2. Write a MATLAB program to generate standard discrete time signals and plot them.
3. Write a MATLAB program to implement shifting of discrete time signal.
4. Write a MATLAB program to implement folding of discrete time signal.
5. Write a MATLAB program to evaluate the linear convolution between two sequences.
6. Write a MATLAB program to perform auto correlation and cross correlation of the given discrete time sequence.
7. Write a MATLAB program to find N-point DFT using a Fast Fourier transform (FFT) algorithm.
8. Write a MATLAB program to evaluate the impulse response of the system.
9. Write a MATLAB program to verify the Decimation & Interpolation of given sequence.
10. Write a MATLAB program to implement Sampling Rate Conversion.
11. Using MATLAB determine the partial fraction expansion & Pole Zero plot of following transfer function.
12. Design of FIR filters of Low pass and high pass filter using MATLAB commands.

Text Books:

1. Nagoorkani, Digital Signal Processing, Tata McGraw Hill Education, Second Edition 2017.
2. S. Salivahanan and A. Vallavaraj, Digital Signal Processing, Tata McGraw-Hill Education,2001.

Reference Books:

1. Oppenheim & Schafer, Discrete time Processing , PHI.
2. Proakis & Manolakis D.G., Digital Signal Processing, PHI.
3. Mitra S. K., Digital Signal Processing, TMH.
4. Roman Kuc, Digital Signal Processing, MGH.

5. Ifeacher E.C., Jervis B.W., Digital Signal Processing, Addison Wesley.
6. P. P. Vaidyanathan, DSP and Multi-rate Systems, PHI.

E Resources :

1. https://www.mathworks.com/learn/training/signal-processing-with-matlab.html
2. https://www.udemy.com/course/digital-signal-processing-with-matlab-applications/

Mapping of COs with POs

CO	PO											PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**1**	**2**	**3**
5ET225EC1.1	3	1	2	2	3	1	1	1	1	1	2	3	2	1
5ET225EC1.2	3	2	3	2	3	1	1	1	1	2	1	3	3	1
5ET225EC1.3	3	3	3	3	3	2	1	2	2	2	3	3	3	2
5ET225EC1CO	3	2	3	3	3	2	1	2	2	2	2	3	3	2

Correlation levels- 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)