ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. TECH. SCHEME OF EXAMINATION & SYLLABUS 2024-25

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SEMESTER V

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				Minimum Passing Marks	No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total		
1.	PCC	**24ET501T**	Analog and Digital Communication	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
2.	PCC	**24ET501P**	Analog and Digital Communication Lab	**-**	**-**	**2**	**1**	**…**	**25**	**25**	**50**	**25**	**…**
3.	PCC	**24ET502T**	Digital Signal Processing	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
4.	PCC	**24ET502P**	Digital Signal Processing Lab	**-**	**-**	**2**	**1**	**…**	**25**	**25**	**50**	**25**	**…**
5.	PCC	**24ET503T**	Antenna Theory and Techniques	**2**	**-**	**-**	**2**	**10**	**10**	**30**	**50**	**23**	**1.5**
6.	PCC	**24ET504P**	Electronic Workshop – II Lab	**-**	**-**	**2**	**1**	**…**	**25**	**25**	**50**	**25**	**…**
7.	PEC	**24ET505T**	Program Elective -I	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
8.	MDM	**24ET531M**	MDM – III (Refer MDM Basket)	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**45**	**3**
9.	VSC	**24ET506P**	Technical Skill Development - II	**2**	**-**	**-**	**2**	**-**	**50**	**-**	**50**	**25**	**-**
10.	SEC	**24ET541P**	Career Development – V	**-**	**-**	**2**	**1**	**-**	**50**	**-**	**50**	**25**	**-**
			Total	**16**	**-**	**8**	**20**	**90**	**265**	**345**	**700**	**-**	**-**

Multidisciplinary Minor – III	
24ET531M	Introduction to Microcontrollers

Program Elective- I	
24ET505T(i)	Computer Communication Networks
24ET505T(ii)	VLSI Technology

		July 2026	**NEP 2.1**	**Applicable for 2026-27**
Chairman - BoS	**Dean – Academics**	**Date of Release**	**Version**	

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET501T	Analog & Digital Communication	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. To study basic components of digital communication systems. 2. To understand the designing aspects of optimum receivers for digital modulation techniques. 3. To study the analysis of error performance of digital modulation techniques. 4. To study the designing of digital communication systems under given power, spectral and error performance constraint.	After completion of the course students will be able to, 1. Explain the working principles of basic building blocks of analog communication system. 2. Explain the working principles of basic building blocks of a digital communication system. 3. Demonstrate and elaborate the concept of source and wave form coding techniques 4. Illustrate digital modulation techniques 5. Demonstrate and elaborate the concept of channel coding and decoding techniques, and describe spread spectrum analysis.

UNIT- I: Analog communication **[9 Hrs]**

Base band & Carrier communication, Introduction of modulation, Equation of modulation, Generation of AM (DSBFC) and its spectrum, Modulation Index, Power relations applied to sinusoidal signals, Comparison of AM, FM and PM, Pulse Analog modulation: PAM PWM & PPM.

Unit –II:- Digital modulation basics **[9 Hrs]**

Model of digital communication system, Gram Schmitt Orthogonalization procedure, signal space concept, Geometric interpretation of signals. PCM – Generation & reconstruction, Bandwidth requirement of PCM, Differential PCM, Delta Modulation & Adaptive DM. (Only Block diagram treatment).

Unit –III:-Source Encoding **[9 Hrs]**

Source coding Theorem, Shannon Fano Coding, Huffman coding-Z encoding algorithm, Rate distortion theory for optimum quantization, scalar & vector quantization. Waveform coding methods: ADPCM, Adaptive Sub-Band & Transform coding, LP & CELP coding.

UNIT- IV: Digital Modulation techniques **[9 Hrs]**

Coherent Binary: QPSK, MSK, Gaussian MSK, DPSK, Memory less modulation methods, linear modulation with Memory, nonlinear modulation methods with memory: CPFSK, CPM.Binary: QPSK, MSK, Gaussian MSK, DPSK, CPFSK, CPM.

Unit -V: Error detection and Correction **[9 Hrs]**

Introduction to Galois field, Construction of Galois field GF (2 m) & its basic properties. Types of error control: Forward error correction (FEC), Automatic repeat request system (ARQ). Convolution encoding and decoding distance properties, Viterbi algorithm and Fano algorithm. Spread - Spectrum methods: - Study of PN sequences, direct sequence methods, Frequency hop methods, slow and fast frequency hop.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Digital communication	Simon Haykin	3	WEP
2	Error Control Coding	Shu Lin & Daniel	2	TMH
3.	Analog and Digital Communication	B.P. Lathi, Zhi Ding	4	Oxford Publication

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Communication Systems	Simon Haykin	4	John Wiley & Sons
2	Principles of Communication Systems	Taub & Schilling	3	Tata McGraw-Hill

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET501P	Analog and Digital Communication Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To study the concept of communication based on RF-AF in digital domain. 2. To study the role of sampling factor for analyzes the digital communication systems 3. To study & design the digital communication systems. 4. To study line coding and its application.	After completion of the course students will be able to, 1. Test the concept of the analog communication-based systems and techniques 2. Examine and analyze the digital communication-based circuit design 3. Design and conduct experiments for testing digital communication circuits and systems. 4. Analyze the different coding technique for design and modeling of digital communication. 5. Formulate and solve digital communication circuits and systems problems

Minimum 8 practical based on the syllabus.

Sr.No.	List of the experiment
1	To generate Amplitude Modulated wave using different techniques and plot its waveform.
2	To generate Frequency Modulated wave using different techniques and plot its waveform.
3	To study generation of SSB-SC using balanced modulator
4	To study generation of DSB-SC signal.
5	To Study and perform Error Detection and Correction codes.
6	To study the performance of adaptive Delta modulator/Demodulator circuits.
7	To study and observe the effect of signal Distortion using EYE-Diagram.
8	To Study and perform generation & reception of BPSK & perform its spectral analysis.
9	To Study and perform generation & reception of FSK & perform its spectral analysis.
10	To Study and perform generation & reception of QPSK & perform its spectral analysis.
11	To Study and perform generation & reception of MSK & perform its spectral analysis.
12	To Study and perform generation & reception of DPSK & perform its spectral analysis.
13	Write and execute Scilab/Matlab code for generation of BPSK / Prepare Simulink Model for BPSK.

Text Books

S.N	Title	Authors	Edition	Publisher
1.	Digital communication	Simon Haykin	3	WEP
2.	Error Control Coding	Shu Lin & Daniel	2	TMH

Reference Book: Lab Manual

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET502T	Digital Signal Processing	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. To study basics of digital signal processing like Nyquist criterion, aliasing 2. To study various transforms and their applications 3. To study design of filters and its realization 4. To study behavior of discrete time systems using z transform.	After completion of the course students are able to, 1. Represents and classify discrete time signal and systems in time domain. 2. Analyze the discrete time systems and compute the response to any input by applying concept of z transform. 3. Describe the concept of Fourier Transform and apply the same for Discrete time signals. 4. Develop structures of IIR filters and design IIR filters using various design techniques like impulse invariance and bilinear 5. Design FIR filter using various windowing techniques for given desired response

UNIT- I: Digital Signal and Systems	**[9 Hrs]**
Basic elements of DSP and its requirement, Advantages of Digital over analog signal processing, sampling theorem, Multirate signal processing concept, Interpolation and decimation, Discrete time signals & systems: Discrete time signals & systems, classification of discrete time signals and systems, LTI systems, linear convolution, Correlation	
Unit –II:- Z Transform	**[9 Hrs]**
The Z-transform: Definition, properties of the region of convergence for the Z-transform, Z-transform properties, Inverse Z-transform	
Unit –III:- Discrete Fourier Transform	**[9 Hrs]**
Discrete Fourier Trans form Definition and properties of DFT, IDFT, Relation between DFT and Z–Transform, Radix- 2 FFT algorithms, Linear filtering methods based on DFT, circular convolution, Frequency analysis of discrete time signals using DFT.	
UNIT- IV: FIR filters	**[9 Hrs]**
Filter design methods – Impulse invariance, bilinear transformation, characteristics & designing of Butterworth, frequency transformations, IIR filter structures- Direct form I-II, transpose form, parallel form, cascade, Lattice and Lattice-ladder structures.	
Unit -V: IIR filters	**[9 Hrs]**
FIR Filter Design & Realization: Symmetric and antisymmetric FIR filters, design of FIR filters using windows (Rectangular, Bartlett, Hanning, Hamming & Blakman), FIR filter structures.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Digital Signal Processing, Principles, algorithms	J.G. Proakis, D.G. Manolakis	1	Pearson Education
2	Discrete Time Signal Processing	A.V. Oppenheim, R.W.	1	Pearson Education
3	Theory and Application of DSP	Rabiner Gold	2	PHI

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Digital signal processing- A practical approach	E. C. Ifeachar, B. W. Jarvis	2	Pearson Education
2	Digital Signal Processing	S. salivahanan, A Vallavaraj,	2	McGraw Hill

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET502T	Digital Signal Processing Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To understand principle & working of digital signal processing for various applications. 2. To understand Z transforms and discrete time Fourier transforms for the analysis of digital signals and systems. 3. To design and implement FIR & IIR filter and analysis of their frequency response	The student will be able to, 1. To develop programs for basic DSP operations like convolution, correlation using MATLAB. 2. To design FIR filters using MATLAB 3. To develope programs for various transforms like z transfrom ,DFT etc.using MATLAB 4. To apply the concepts learnt in DSP for applications like audio processing, image processing

Expt. No.	Title of the experiment
1	To plot and represent following basic discrete time signals using MATLAB functions:Unit impulse,unit step,ramp,exponential and sine wave representation
2	To plot linear convolution of discrete signals using MATLAB functions.
3	Write a program to compute autocorrelation of an audio signal
4	To plot the poles and zeroes of the given transfer function.
5	To find inverse Z-transform of given transfer function.
6	To compute FFT & IFFT of discrete time signals.
7	To demonstrate Multirate processing of speech signal
8	To study filter windowing techniques.
9	To study FIR low pass filter.
10	To compute circular convolution using MATLAB functions.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Digital Signal Processing, Principles, algorithms	J.G. Proakis, D.G. Manolakis	1	Pearson Education
2	Discrete Time Signal Processing	A.V. Oppenheim, R.W.	1	Pearson Education
3	Theory and Application of DSP	Rabiner Gold	2	PHI

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S.N	Title	Authors	Edition	Publisher
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FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET503T	Antenna and Wave Propagation	2	-	0	2	10	10	30	50

Course Objectives	Course Outcomes
1. To acquaint students with various basics of radiating elements, antennas, their principle of operation, analysis and their applications. 2. The student will able to understand the features of Antenna array, Micro-strip antenna and reflector antenna.	After completion of the course students are able to, 1. Design & analyze the wired antenna parameters. 2. Design and characterize antenna arrays. 3. Analyze and design microstrip, aperture and reflector antennas.

UNIT- I: Linear wire antennas **[10Hrs]**

Retarted Potential, Infinitesimal dipole, its radiation field, radiation resistance, near field, far field directivity, finite length dipole, half wave length dipole, Monopole and their application, folded dipole.

Unit –II:- Antenna Array **[10Hrs]**

Array of two isotropic point sources, non – isotropic sources, principle of pattern multiplication, linear arrays of n elements, broadside, End fire, radiation Pattern, directivity, Beam width and null directions, array factor, Antenna analysis using Binomial Array & Dolph-Tschebyscheff.

Unit –III:- Microstrip and Reflector antennas **[10 Hrs]**

Radiation Mechanism of Microstrip antenna, feeding methods, Rectangular & circular patchAntenna Simple reflectors, the design of a shaped Cylindrical reflector, Radiation patterns of Reflector Antennas, Dual shaped Reflector Systems, Plane reflector, Corner reflector, parabolic reflector, horn antenna, aperture antenna.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Antenna Theory analysis and design	Costantine A. Balanis		John Wiley ublication
2	Antennas and Wave Propagation	J.D. Kraus, R.J. Marhefka and Ahmad S. Khan,	4th	TMH, New Delhi
3	Electromagnetic Waves and Radiating Systems	E.C. Jordan and K.G. Balmain,	2nd	PHI, ed., 2000.
4	Electromagnetic Waves	R. K. Shevgaonkar		Mc Graw -Hill

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Antenna & Wave Propagation	Sisir K Das		Mc Graw Hill
2	Antenna and wave Propagation	Harish A. R		Oxford University Press
3	Antennas and Radio wave Propagation	R.E. Collins		Mc Graw -Hill

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET504P	**Electronic Workshop – II Lab**	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To develop hands-on skills in designing and building electronic circuits using modern embedded platforms like STM32. 2. To enable students to interface sensors and implement embedded programming for real-time applications. 3. To introduce AI-based concepts such as intelligent decision-making, pattern recognition, and automation in embedded systems.	After completion of the course students are able to, 1. To design, simulate, and implement embedded electronic systems using STM32 microcontrollers. 2. To demonstrate the ability to interface various sensors and develop real-time smart monitoring and control applications. 3. Will apply AI concepts in embedded systems to develop innovative mini-projects addressing multidisciplinary engineering problems

This laboratory course focuses on hands-on learning of electronics using modern embedded platforms such as ARM Cortex-based STM32. Students will develop practical skills in circuit building, sensor interfacing, and embedded programming. The lab integrates AI-based concepts such as intelligent decision-making, pattern detection, and automation using microcontrollers. Learners will work on real-time applications including smart monitoring and control systems. Emphasis is given to simulation, hardware implementation, and problem-solving. The course culminates in an innovative mini-project combining AI concepts with STM32 for smart system design relevant to multidisciplinary engineering applications.

(Any 8 experiments on above mentioned Technology with one mini project on above mentioned technology)

Reference Book: Lab Manual

ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

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B. Tech. Scheme of Examination & Syllabus 2024-25

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET505T(i)	PE - I Computer Communication Networks	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. To understand the basic concept of computer communication network 2. To recognize the computer network layer 3. To describe IP addressing scheme & Hardware aspect of network communication. 4. To clarify network security & administration	After completion of the course students will be able to, 1. Illustrate the requirement of theoretical & practical aspect of computer network. 2. Explain the different wired & wireless LAN standards. 3. Classify various protocols used in network layer, application layer for routing, streaming and transport layer for reliable and unreliable data communication. 4. Explain and analyze the concept of computer network security using different tools 5. Explain and analyze the concept of computer network security using different tools

Unit 1: Introduction to Computer Networks	**[9 hrs]**
Uses of computer Network, Network Software-design Issues for layers, Service primitives and relationship of services to Protocols, Reference models-OSI &TCP/IP, Network architectures introduction. ADDRESSING: Physical Addresses, Logical Addresses, Port Addresses, Specific Addresses.	
Unit -II Physical and Data Link layer	**[9 hrs]**
Physical layer-Data rate limits, Transmission media, switching systems, Datagram Switching & Virtual circuit switching, Structure of circuit and packet switch, cable modem, SONET basics, Selection of IEEE std 802.1. DIGITAL-TO-ANALOG CONVERSION: Aspects of Digital-to-Analog Conversion, Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Quadrature Amplitude Modulation. Data link layer: Framing, Flow & Error control Protocols, Multiple access techniques random access, and controlled access. Block coding: Error Detection, Error Correction.	
Unit -III Transport Layer and Network Layer	**[9 hrs]**
Transport layer: Process to process delivery, Connection oriented & Connectionless Transport, UDP, TCP, congestion control and Quality of Service. Network Layer: IPv4ADDRESSES: Address Space, Notations, Classful Addressing, Classless Addressing, Network Address Translation (NAT), IPv6 ADDRESSES: Structure, Address Space, Address mapping-ARP, RARP & DHCP, IPv4: Datagram, Fragmentation, Checksum, Options. IPv6: Advantages, Packet Format, Extension Headers	
Unit -IV Application Layer	**[9 hrs]**
Application layer : Application layer protocols and applications like Ping, FTP, telnet, http (www), SMTP, SNMP, Trace route, TFTP, BOOTP, DNS, NFS, RPC, X-server, E-mail, Introduction to streaming Audio/Video,P2P file sharing	
UNIT- V: Basics of Network Security and Network administration	**[9 hrs]**
Network security: Introduction to Cryptography, Secret key algorithm, public key algorithm, Secret key algorithm, public key algorithm, Basics of Security Requirements/Services/Dimensions. IP Security (lP Sec): Two Modes, Two Security Protocols, Security Association, Internet Key Exchange (IKE), Virtual Private Network. Network Administration: UTP Cabling for PC-to-PC communication, Network tester, network monitoring, Protocol Analyzer,	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Data Communications and Networking	Behrouz A. Forouzan	4th	Tata McGraw Hill
2	Computer Networks	Andrew Tenenbaum	4th	Pearson Education
3	Computer Networking- A top-Down Approach featuring the Internet	Kurose & Ross	3rd	Pearson Education
4	Computer Networks and Cryptography	William Stallings	3rd	Pearson Education.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	TCP/IP protocol Suit	Behrouz A. Forouzan	3rd	Tata McGraw Hill Publications
2	TCP/IP illustrated Volume - I & II	Stevens		Pearson education.

		July 2026	NEP 2.1	Applicable for 2026-27
Chairman - BoS	Dean – Academics	Date of Release	Version	

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET505T(ii)	PE - I VLSI Technology	3	-	0	3	20	20	60	100

Course Objectives	Course Outcomes
1. Understand the fundamental concepts of crystal growth, wafer preparation, and wafer cleaning processes used in VLSI fabrication. 2. Explain and evaluate the principles and techniques of epitaxy and oxidation in semiconductor manufacturing. 3. Compare and differentiate various lithography, etching, and thin film deposition processes used in IC fabrication. 4. Analyze the mechanisms of diffusion and ion implantation for doping control in semiconductor devices. 5. Describe and apply metallization and packaging techniques for reliable VLSI system integration.	On completion of the course students will be able to, 1. Interpret the basics of crystal growth, wafer preparation, and wafer cleaning. 2. Evaluate the process of epitaxy and oxidation. 3. Differentiate the lithography, etching, and deposition processes. 4. Analyze the process of diffusion and ion implantation. 5. Express the basic processes involved in metallization and packaging.

Unit I: Introduction to IC Technology	**[9 Hrs]**
IC Classification: SSI, MSI, LSI, VLSI. **Crystal Growth and Wafer Preparation:** Electronic Grade Silicon, Czochralski Crystal Growth, Silicon Shaping, Processing Considerations. **Wafer Cleaning Technology:** Basic Concepts, Wet Cleaning, Dry Cleaning.	
Unit II: Epitaxy and Oxidation	**[9 Hrs]**
Epitaxy: Vapor-Phase Epitaxy (VPE), Molecular Beam Epitaxy (MBE), Silicon on Insulators (SOI), Epitaxial Evaluation. **Oxidation: Growth** Kinetics, Thin Oxides, Oxidation Techniques and Systems, Oxide Properties.	
Unit III: Lithography and Thin Film Deposition	**[9 Hrs]**
Lithography: Optical Lithography, Electron Beam Lithography, Photomasks, Wet Chemical Etching **Dielectric and Polysilicon Film Deposition:** Deposition processes of: Polysilicon, Silicon Dioxide (SiO_2), Silicon Nitride (Si_3N_4)	
Unit IV: Diffusion and Ion Implantation	**[9 Hrs]**
Diffusion: Models of diffusion in solids, Fick's 1-Dimensional Diffusion Equation, Diffusion of impurities in: Silicon, Silicon Dioxide Diffusion equations and profiles, Diffusion furnaces, Solid, Liquid, and Gaseous sources, **Ion Implantation:** Ion Implantation Technique, Range Theory, Implantation Equipment.	
Unit V: Metallization and Packaging	**[9 Hrs]**
Metallization: Metallization applications, Metallization choices, Physical Vapor Deposition (PVD), Vacuum Deposition, Sputtering apparatus **Packaging of VLSI Devices:** Package types, Packaging design considerations, VLSI assembly technologies, Package fabrication technologies, CMOS fabrication steps.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	VLSI Technology	S. M. Sze	2nd Edition	McGraw-Hill
2	VLSI Fabrication Principles	S. K. Gandhi	2nd Edition	Wiley-India Pvt. Ltd.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Silicon VLSI Technology: Fundamentals, Practice and Modeling	J. D. Plummer, M. D. Deal, Peter B. Griffin,	2nd Edition	Pearson Education Publication
2	Fabrication Engineering at the Micro and Nano Scale,	Stephen A. Campbell	2nd Edition	Oxford University Press

		JULY 2026	NEP 2.1	Applicable for 2026-27
Chairman - BoS	Dean – Academics	Date of Release	Version	

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET506P	Technical Skill Development – II	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To familiarize students with Microchip microcontrollers, development boards, and embedded system fundamentals. 2. To develop hands-on skills in programming, interfacing, and debugging embedded hardware using Microchip platforms. 3. To enable students to design and implement real-world embedded applications using sensors, actuators, and communication interfaces.	After successful completion of the course, students will be able to: 1. Configure and program Microchip microcontrollers using appropriate development tools and IDEs. 2. Interface peripherals such as sensors, displays, motors, and communication modules with embedded systems. 3. Design, test, and demonstrate embedded system projects for industrial and IoT applications.

Course Content Summary

This skill development course provides practical exposure to Microchip microcontrollers and embedded system design through hands-on experiments and application development. Students will learn the fundamentals of embedded hardware and software, including microcontroller architecture, programming, peripheral configuration, and debugging techniques. The course emphasizes interfacing of sensors, actuators, displays, and communication modules using various Microchip development boards available in the laboratory. Learners will gain experience in developing real-time embedded applications, implementing data acquisition and control systems, and exploring IoT-based solutions. The course culminates in the design and implementation of a mini-project that integrates hardware and software components to address a real-world engineering problem.

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(Any 8 experiments on above mentioned Technology with one mini project on above mentioned technology)

Reference Book: Lab Manual

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET541P	Career Development – V	-	-	2	1	50	-	50

Course Objectives	Course Outcomes
To enhance students' aptitude, analytical reasoning, communication, teamwork, and professional presentation skills required for competitive examinations, higher education, and workplace success.	**CO1.** Students will be able to solve problems related to time and work, pipe and cisterns, geometry, mensuration, and analytical puzzles using logical and quantitative reasoning skills. **CO2.** Students will be able to apply concepts of time, speed, and distance and solve coding-decoding and direction sense problems accurately using analytical thinking. **CO3.** Students will be able to perform SWOC analysis, set SMART goals, and deliver effective self-introductions with confidence and professional communication skills. **CO4** Students will be able to conduct company profile presentations and participate effectively in table topic group discussions demonstrating teamwork, critical thinking, and spontaneous speaking skills. **CO5.** Students will be able to demonstrate improved verbal ability, grammar, vocabulary, reading comprehension, and active classroom participation for professional communication.

Unit I (15marks)	**[7Hrs]**
Time and Work, Chain Rule, Pipe and Cistern, Geometry and mensuration **Puzzles:-** Analytical puzzle, Tabular Puzzle, Box or Floor based Puzzle, Rank based Puzzle	
Unit II (10marks)	**[7Hrs]**
Time Speed and Distance:- Basic Problems, Average Speed, Relative Speed, Problems on Trains, Boats and Streams, Escalators, Directions sense Problems Coding and Decoding	
Unit III (5marks)	**[5Hrs]**
SWOC Analysis and SMART Goal Setting - for Personal and Professional Development **Self-Elevator Pitch –** Self Introduction, Confidence Building, and Professional Communication Skills (5marks)	
Unit IV (10marks)	**[6Hrs]**
Company Profile Group Presentation – Research, Team Coordination, and Presentation Techniques (5marks) **Table Topic Group Discussion –** Critical Thinking, Spontaneous Speaking, and Team Interaction	
Unit V (10marks)	**[3Hrs]**
Verbal Ability Quiz – Grammar, Vocabulary Building, and Reading Comprehension for Professional Communication **Continuous Assessment -** Attendance, Individual Engagement & Team Dynamics	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude By R. S. Aggarwal	R.S. Aggarwal		
2	Quantitative Aptitude	Shripad Deo		Allied Publication
3	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Aggarwal		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude for CAT by Arun Sharma	Arun Sharma		
2	Developing Communication Skills	Krishna Mohan & Meera Banerji	2002	
3	Professional Communication Skills	Alok Jain	2006	S Chand & Company Ltd.
4	Personality Development & Soft Skills	Barun Mitra	2019	Cambridge University Oress

FIFTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET531M	Introduction to Microcontrollers	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. To introduce the fundamental concepts of microcontrollers and embedded systems, enabling students from diverse disciplines to understand their role in modern technological applications. 2. To develop basic programming skills for microcontrollers using beginner-friendly platforms (e.g., Arduino/ESP32), focusing on logical thinking rather than complex coding. 3. To enable students to interface simple input and output devices such as sensors and actuators for real-world problem-solving applications.	After completion of the course students will be able to, 1. Understand basic concepts of microcontrollers 2. Identify components and architecture 3. Develop simple programs 4. Interface basic sensors and devices 5. Understand IoT-based applications

UNIT- I: Basics of Embedded Systems & Microcontrollers	**[9 Hrs]**
Introduction to Embedded System (daily life examples), Microprocessor vs Microcontroller (Overview of Microcontrollers (Arduino, ESP32), Applications in different fields, Mechanical (automation), Electrical (control systems), Civil (smart infrastructure), Biomedical (health devices)	
Unit –II:- Microcontroller Architecture & Components	**[9 Hrs]**
Basic block diagram of microcontroller, CPU, Memory (RAM, ROM, Flash), Input/Output Ports, Analog vs Digital signals, Sensors and Actuators (simple introduction)	
Unit –III:- Programming Basics	**[9 Hrs]**
Introduction to Embedded C / Arduino Programming, Structure of a program (setup & loop), Variables, data types, operators, Simple programs, Wokwi and Tinkercad usage,LED blinking, Button input, Introduction to IDE (Arduino IDE / Wokwi simulation)	
UNIT- IV: Interfacing & Applications	**[9 Hrs]**
Interfacing LED, Buzzer, Switch, Interfacing Sensors, Temperature sensor, Ultrasonic sensor, Display basics (LCD/OLED), Mini Applications: - Smart light system, Distance measurement, Temperature monitoring	
Unit -V: IoT & Smart Systems	**[9 Hrs]**
Introduction to IoT Microcontroller, Internet (basic concept), ESP32 overview (WiFi, Bluetooth), Simple IoT applications: -Smart home, Traffic system, Health monitoring	

Text Books

S.N	Title	Authors	Edition	Publisher
1	The 8051 Microcontroller and Embedded Systems: Using Assembly and C	Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay	2	Pearson Education
2	Embedded C Programming and the Microcontroller	Michael J. Pont	2	Pearson Education
3	Programming Arduino: Getting Started with Sketches	Simon Monk	2	McGraw-Hill Education

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Embedded Systems: Architecture, Programming and Design	Raj Kamal	3	McGraw Hill Education