IV SEMESTER

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1.	PCC	**24ET401T**	Electromagnetic Fields	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
2.	PCC	**24ET402T**	Analog Circuits & Design	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
3.	PCC	**24ET402P**	Analog Circuits & Design Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**-**
4.	PCC	**24ET403T**	Microcontroller & Applications	**2**	**-**	**-**	**2**	**10**	**10**	**30**	**50**	**1.5**
5.	PCC	**24ET403P**	Microcontroller & Applications Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**-**
6.	VSC	**24ET404P**	Technical Skill Development – I	**-**	**-**	**4**	**2**	**-**	**50**	**-**	**50**	**-**
7.	VEC	**24ET405T**	Value Education Course	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
8.	SEC	**24ET441P**	Career Development – IV	**-**	**-**	**2**	**1**	**-**	**50**	**-**	**50**	**-**
9.	ELC	**24ET406P**	Micro Project II*****	**-**	**-**	**2**	**1**	**-**	**50**	**-**	**50**	**-**
10	MDM	**24ET431M**	Multidisciplinary Minor – II	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
			Total	**14**	**-**	**12**	**20**	**90**	**290**	**320**	**700**	

*** Field Project or Community engagement project in the major discipline**

MDM -II	
24ET431M	Communication Systems

IV SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
24ET401T	Electromagnetic Fields	3	-	-	3	MSE	CA	ESE	Total
						20	20	60	100

Course Objectives	Course Outcomes
1. To familiarize the students with the different concepts of electrostatic, magneto-static and time varying electromagnetic systems. 2. Explain fundamental laws of electromagnetic fields and evaluate the different physical quantities of electromagnetic fields.	Students are able to, 1. Apply different techniques of vector calculus to understand different concepts of electrostatic field theory 2. Apply the vector calculus to understand the behavior of static magnetic Field 3. Illustrate the concepts of time varying Electric, Magnetic and Electromagnetic fields required to understand the concepts of Electronic Communication. 4. Apply and justify the concepts of electromagnetic waves, means of transporting energy or information, in the form of radio waves 5. Illustrate the use of wave-guides for the transmission of electromagnetic waves at higher frequencies.

UNIT- I: Vector calculus & Electrostatic Field	**[10 Hrs]**
Vector Analysis, Co-ordinate Systems & Transformation. Differential length, surface and volume. Electrostatic fields, Coulomb's law, different Charge Distribution, Electric field for different charge distributions. Electric flux density, Gauss's law and applications. Divergence and divergence theorem. Work done, potential difference and potential gradient	
Unit –II:- Unit -II Magnetostatic fields	**[10 Hrs]**
Lenz's law, Faraday's law. Displacement current, Maxwell's equations for time varying fields & their physical significance, Retarded Potential. Poisson's & Laplace equations, Uniqueness theorem. Poynting vectors & Poynting theorem. Electric and magnetic boundary conditions	
Unit –III:- Varying Fields and Boundary Condition	**[9Hrs]**
Lenz's law, Faraday's law. Displacement current, Maxwell's equations for time varying fields & their physical significance, Retarded Potential.Poisson's & Laplace equations, Uniqueness theorem. Poynting vectors & Poynting theorem. Electric and magnetic boundary conditions	
UNIT- IV: Electromagnetic Wave Propagation	**[8Hrs]**
Maxwell's equation in phasor form, Uniform plane wave, Wave equation, Propagation constant, attenuation constant, phase constant. Solution of wave equation in free space, intrinsic impedance, frequency, wavelength, velocity, wave equations & their solutions in conducting & dielectric media, Skin effect, Depth of Penetration. Reflection and refraction of uniform plane wave at normal incidence plane, reflection at oblique incident angle.	
Unit -V: Waveguides	**[8 Hrs]**
Introduction, Rectangular Waveguide. TE, TM and TEM waves in rectangular waveguide. Wave propagation in the waveguide. Power Transmission and attenuation	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Elements of Electromagnetic	Mathew N.O. Sadiku	4	Oxford University Press
2	Engineering Electromagnetics	W.H Hayt. and J.A. Buck	--	McGraw Hill Publications
3	Electromagnetic Waves and Radiating System	E.C. Jordan and K.C.Balamin		PHI Publications.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Electromagnetic with application	Krause	5	TMH
2	Elements of Engineering Electromagnetics	Rao	--	Pearson education.

IV SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
24ET402T	Analog Circuits & Design	3	-	-	3	MSE	CA	ESE	Total
						20	20	60	100

Course Objectives	Course Outcomes
1. To study the basic characteristic, construction, open loop & close loop operations of Op-Amp. 2. To study linear and nonlinear applications of Op- Amp. **1.** To study the design of Electronic Circuits for Oscillator, Multivibrator and Active Filters	After completion of the course students are able to, 1. Explain the building blocks, characteristics, and operational concepts of OP- Amps. 2. Apply OP-Amp concepts to design linear for practical applications. 3. Analyze non-linear OP-Amp circuits and data conversion systems, using IC- based implementations. 4. Design power supply systems and sinusoidal oscillators using OP-Amps. 1. Develop active filter circuits using OP-Amps and evaluate their performance in signal processing applications.

Unit- I: Op-Amp Fundamentals **[10Hrs]**

Block diagram of OP-Amp (Basic Building Blocks), Basic differential Amplifier using transistor and its operation, current mirror circuit, OP-Amp parameters, characteristic and Definition, Ideal OP-Amp, Equivalent circuit, Voltage Transfer curve, concepts of virtual short and ground. Inverting and non-inverting configurations and design.

Unit –II: - OP-Amp Linear Applications **[09 Hrs]**

Voltage follower, summing amplifier, scaling and averaging amplifier, Bridge Amplifiers using opamp, Instrumentation amplifier and applications, Integrator and differentiators (Practical considerations and design), Peak detector, Log and antilog amplifiers using OP-Amp, V to I and I to V converter circuit.

Unit –III:- OP-Amp Non-Linear Applications **09Hrs]**

Comparators, Schmitt trigger, Comparator IC such as LM 339, Clipper and Clamper, PLL, Multivibrators: Astable & Monostable multivibrator circuits using IC 555, Sample/Hold circuits,D/A (R/R) & A/D conversion circuits (Successive Approximation Method), design of ADC using 0804 ICs.

UNIT- IV: Design power supply and Oscillators **[09 Hrs]**

Linear power supply design: Op-Amp based series voltage regulator (design steps). Current limiting and thermal shutdown concepts. Switching power supplies: Buck, Boost, Buck–Boost converter design fundamentals. Introduction to PWM control (TL494 / LM3524). Oscillator design using Op-Amps, Function generator design using Op-Amps.

Unit -V: Design of Active Filters **[8Hrs]**

Advantages of active filters, Design of Butterworth Active Filter, Design of Active filter of LPF, HPF, BPF and switched capacitor filter. Design of relay driver circuit using transistor and op-amp, Introduction to Design of IGMF filter, Applications of active filters in signal conditioning and communication systems.

Text Books

Title	Authors	Edition	Publisher
Operational Amplifier and Applications	R. Gayakwad.	3	PHI
Electronic Devices and Circuits	David Bell	5	Oxford Higher Education
Designing with Op-Amps	Franco	-	McGraw Hill

Reference Books

Title	Authors	Edition	Publisher
Linear Integrated Circuits Mannal I, II, and III	--	3	National Semiconductor
Linear Applications Handbook	--		National Semiconductors
Operational Amplifier	Dailey		McGraw Hill

IV SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET402P	Analog Circuits & Design Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To study and verify the basic characteristic of Op-Amp. 2. To verify linear and nonlinear applications of Op-Amp	After completion of the course students are able to, 1. To explain the basic differential amplifier using transistor, ideal op amp and basic feedback configurations. 2. To demonstrate and evaluate practical integrator, differentiator circuits, instrumentation amplifier, logarithmic & anti logarithmic amplifier circuits. 3. To explain & evaluate practical applications. 4. To explain & design Hartley, Colpitts, Crystal oscillators 5. To Analyze design active Butterworth filters up to 6th order

Experiment No	Title of Experiment
1	Study and measurement of Op-Amp parameters (Input offset voltage, Bias current, Slew rate, CMRR).
2	Design and verification of Inverting and Non-Inverting amplifier circuits.
3	Design of Summing, Scaling, and Averaging amplifier using Op-Amp.
4	Design and testing of Voltage follower and Instrumentation amplifier.
5	Design and analysis of Integrator and Differentiator circuits with practical considerations.
6	Implement Peak detector, Log and Antilog amplifier circuits.
7	Design of V-to-I and I-to-V converter using Op-Amp.
8	Study and implementation of Comparator and Schmitt Trigger circuits.
9	Study of Comparator IC LM339 and its applications.
10	Implementation of Astable and Monostable multivibrator using IC 555.
11	Design and testing of Sample and Hold Circuit.
12	Study and implementation of DAC (R-2R) and ADC using IC 0804.
13	Design of Op-Amp based series voltage regulator.
14	Study of Buck, Boost, and Buck–Boost converter fundamentals.
15	Design of active filters: LPF, HPF, BPF and Butterworth filter.

Text Books

Sr no.	Title	Authors	Edition	Publisher
1	Operational Amplifier and Applications	R. Gayakwad.	3	PHI
2	Electronic Devices and Circuits	David Bell	5	Oxford Higher Education
3	Designing with Op-Amps	Franco	-	McGraw Hill

Reference Books

Sr no.	Title	Authors	Edition	Publisher
1	Operational Amplifier	Dailey		McGraw Hill

VI SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET403T	Microcontroller & Applications	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
1. Introduce ESP32 architecture and basic programming setup. 2. Develop skills to interface sensors and actuators with ESP32. 3. Understand IoT connectivity, protocols, and cloud data handling. 4. Build simple IoT applications using ESP32 for real-time monitoring and control.	By the end of this course, students will be able to: 1. Interface a range of sensors, actuators, and communication modules for embedded applications. 2. Develop real-time IoT systems using Wi-Fi, cloud communication, and serial protocols. 3. Design and implement application-oriented projects involving microcontrollers and wireless technologies.

Unit- I: Introduction to ESP32 Microcontroller & Programming Essentials	**[9Hrs]**
:-ESP32 Architecture & Features, Introduction to ESP32 SoC: Wi-Fi + Bluetooth features, Pin diagram, CPU features, GPIO overview, Peripheral blocks: ADC, DAC, PWM, UART, SPI, I2C, Touch inputs, Programming Environment Setup, Installing ESP32 board in Arduino IDE, Understanding COM ports, Boot & EN buttons, First program upload process	
Unit –II:- Sensors and actuators interfacing	**[11 Hrs]**
Interfacing Environmental Sensors DHT11/DHT22 temperature & humidity sensor, Displaying values on serial monitor and OLED,Motion, Distance & Orientation Sensors, Ultrasonic distance measurement (HC-SR04), Introduction to motion sensing using MPU6050 accelerometer/gyroscope, Actuators, Relay interfacing for device control, Servo motor control (angular positioning), DC motor basics and control fundamentals	
Unit –III:- IoT Connectivity & Applications	**10 Hrs]**
Wi-Fi Connectivity & IoT Platforms, Connecting ESP32 to Wi-Fi network, Uploading sensor data to ThingSpeak (HTTP/MQTT concepts), Real-time IoT dashboard demonstration, Communication Protocols (3 hrs), UART, SPI, I2C basics, RS232 serial communication demonstration, Overview of LoRa modules (long-range IoT), Mini Application Development:- Applications of ESP32 in IoT (smart home, industrial, healthcare), IoT weather monitoring node, Smart home automation using relay, Distance monitoring system with cloud logging, Motion-based alert system	

Text Books

S.N	Title	Authors	Edition	Publisher
1	ESP 32 development using Arduino IDE	Iain Hendry	E book	-
2	ESP 32 Technical Reference Manual- Version 5.5	Express if Systems	E book	-

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Internet of Things projects using ESP32	Agus Kurniawan	**1st**	Packt Publishing Ltd.
2	ESP 32 Basic Starter Kit	-		LAFVIN
3	59 Experiments with Arduno IDE and python	Dogan Ibrahim	**1st**	Elektor Publications
4	ESP 32 web Server with Arduino IDE	Rui Santos, Sara Santos		

IV SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET403P	**Microcontroller & Applications Lab**	**-**	**-**	**2**	**1**	**25**	**25**	**50**

Course Objectives	Course Outcomes
1. To familiarize students with ESP32 programming and basic interfacing of sensors and actuators. 2. To develop skills in data acquisition, device control, and communication using ESP32 peripherals. 3. To enable students to build simple IoT applications using cloud connectivity and serial protocols.	Students are able to, 1. Apply ESP32 fundamentals to configure GPIO, ADC, PWM, and communication interfaces for sensor and actuator interfacing. 2. Acquire and visualize sensor data using serial and OLED displays for system monitoring. 3. Control electromechanical actuators using suitable driver circuits for speed, direction, and position control. 4. Develop basic IoT applications by connecting ESP32 to Wi-Fi and sending data to cloud dashboards.

Min 8 practical's based on the below list.

Experiment No.	Experiment Title
1	Introduction to ESP32 Programming Environment
2	GPIO Basics – Onboard LED Blink & Pin Configuration
3	Interfacing an External LED & Switch with ESP32
4	Digital Input–Output Control: Push Button–Based LED ON/OFF
5	PWM Control – LED Brightness & Buzzer Tone Generation
6	Reading Analog Inputs using ADC (Potentiometer / Analog Sensors)
7	DHT11/DHT22 Interfacing – Temperature & Humidity Reading
8	Ultrasonic Sensor (HC-SR04) – Distance Measurement & Serial Display
9	OLED (SSD1306) Display Interfacing – Text & Basic Graphics
10	Displaying Sensor Data (DHT, Ultrasonic, ADC) on OLED
11	MPU6050 Interfacing – Basic Accelerometer & Gyroscope Readings
12	Displaying MPU6050 Motion Data on OLED
13	Relay Interfacing & Device ON/OFF Control
14	DC Motor Basics – Speed & Direction Control (Driver Interface)
15	Servo Motor Angular Position Control
16	Stepper Motor – Steps, Speed & Direction Control
17	Introduction to Serial Communication Protocols (UART Basics)
18	UART-based Data Monitoring / RS232 Communication Demo
19	I2C Communication – Theory & OLED Reference
20	SPI Communication – Sensor/Module Interfacing Concept
21	Wi-Fi Connectivity with ESP32
22	Sending Data to ThingSpeak (HTTP or MQTT)
23	IoT Dashboard Visualization (ThingSpeak / Node-RED Basics)
24	LoRa Module Interfacing – Transmitter/Receiver Concept Demo
25	GSM Module AT Commands – SMS Send/Receive Demo

Text Books

S.N	Title	Authors	Edition	Publisher
1	ESP 32 development using Arduino IDE	Iain Hendry	E book	-
2	ESP 32 Technical Reference Manual- Version 5.5	Express if Systems	E book	-

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Internet of Things projects using ESP32	Agus Kurniawan	**1st**	Packt Publishing Ltd.
2	ESP 32 Basic Starter Kit	-		LAFVIN
3	59 Experiments with Arduino IDE and python	Dogan Ibrahim	**1st**	Elektor Publications
4	ESP 32 web Server with Arduino IDE	Rui Santos, Sara Santos		

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 & TELECOMMUNICATION ENGINEERING

SEMESTER IV

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET404P	Technical Skill Development - I	-	-	2	1	-	25	25	50

Course Objectives	Course Outcomes
1. To introduce the fundamentals of database systems and DBMS architecture 2. To understand relational data models and formal query languages 3. To develop skills in writing SQL queries for data definition and manipulation 4. To explain indexing, storage structures, and transaction management 5. To provide an overview of advanced and modern database technologies	After successful completion of the course, learners will be able to: 1. Explain DBMS concepts, architecture, and relational data models 2. Apply relational algebra and SQL to retrieve and manipulate data 3. Design databases using ER modeling and normalization techniques 4. Analyze indexing, storage methods, and transaction management mechanisms **5.** Use advanced SQL features and identify emerging database technologies

Unit No.	Details / Contents
1	**Unit I : Introduction** History and motivation for database systems; components of database systems; DBMS functions; Database Architecture, Data Abstraction, Data Independence, Formal relational query languages: Relational Algebra, Tuple Relational calculus, Domain Relational Calculus. Database query languages: Overview of database languages; Introduction to SQL: SQL Data Definition, Basic Structure of SQL Queries, Set Operations, Null values, Aggregate functions.
2	**Unit II: Storage and file structure** Data dictionary storage, Basic concepts of indexing, Ordered indices, B+ Tree index files, B+ Tree indexing, B+ Tree Extensions, Multiple Key Access, Hashed files; signature files; Database efficiency and tuning ,Bitmap Indices, Index Definition in SQL.
3	**Unit III: Data Models** Entity Relationship Model, Development of ER Diagrams, Extended Entity Relationship Model, Relational database design: Database design; Codd's Relational Database Rules, functional dependency; normal forms; multi-valued dependency; join dependency; SQL: Nested Sub-queries Join Expressions, Views, Integrity Constraints
4	**Unit IV: Transactions** Failure and recovery; concurrency control in SQL, Overview of Query Processing, Measures of Query cost, Evaluation of relational algebra expressions, Query equivalence, Query optimization.
5	**Unit V: Advanced SQL** Dynamic SQL and Embedded SQL, Functions and Procedures, Triggers. Overview of OODBMS & Distributed DBMS, Introduction to NoSQL Database

Note : (DBMS OFFERED THROUGH CODE TANTRA)

		July 2025	NEP 2.1	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

IV SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET405T	Value Education Course	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
Development of a holistic perspective through self-exploration and development of clarity about harmony between self, family, society and nature.	**At the end of the course, students will be able to:** 1. Demonstrate awareness about self and their surroundings and its interdependence. 2. Understand concepts of aspirations and happiness. 3. Recognize and explain the nine universal values in relationship and their application in visualizing a harmonious society. 4. Discuss concepts of conservation of nature and harmony and reusability. 5. Identify the scope of eco-friendly systems for enriching institutions.

Unit I : Introduction **[9Hrs]**

Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority , Understanding Happiness and Prosperity correctly- A
critical appraisal of the current scenario , Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit II : Understanding Harmony **[9Hrs]**

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' , Understanding the needs of Self ('I') and 'Body' - happiness and physical facility , Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
,Understanding the characteristics and activities of 'I' and harmony in 'I' , Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail , Programs to ensure Sanyam and Health.

Unit III : Values in relationships **[9Hrs]**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship , Understanding the meaning of Trust; Difference between intention and competence , Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship , Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals , Visualizing a universal
harmonious order in society- Undivided Society, Universal Order- from family to world family.

Unit IV : Co-existing with nature **[9Hrs]**

Understanding the harmony in Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature , Understanding Existence as Coexistence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature
(film "Home" can be used), pollution, depletion of resources and role of technology etc.

Unit V : Holistics approach for engineers **[9Hrs]**

Natural acceptance of human values , Definitiveness of Ethical Human Conduct , Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order , Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. , Case studies of typical holistic technologies, management models and production systems , Strategy for transition from
the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations ,Sum up

Text Books

S.N	Title	Authors	Edition	Publisher
1	Human Values and Professional Ethics	Gaur, Sangal, Bagaria	2010	Excel Books, New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Jeevan Vidya: Ek Parichaya	A. Nagaraj	1999	Jeevan Vidya Prakashan, Amarkantak
2.	Human Values	A.N. Tripathi	2004	New Age Intl. Publishers, New Delhi
3.	The Story of My Experiments with Truth	M.K.Gandhi	2009	Fingerprint! Publishers

IV SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET441P	Career Development -IV	-	-	2	1	50	--	50

Course Objectives	Course Outcomes
1. The sole objective of imparting aptitude training is to make students able to critically evaluate various real-life situations by resorting to an analysis of key issues and factors. 2. This Aptitude Training helps them to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions. 3. To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.	1. Students shall understand the concepts of Quadratic Equation, AP, GP, and HP. 2. Students shall understand the concepts of Averages and Mixture and allegations 3. Students shall understand the concepts of Blood relations 4. Students shall understand the concepts of cubes and Dice problem. 5. Students shall understand the concepts of clocks and Calendars.

Unit I	**[5Hrs]**
Aptitude: Quadratic Equation Arithmetic progression, Geometric progression, Harmonic progression Imax: Critical Thinking, Interview Simulation, Engineering Leadership, Spatial Reasoning	
Unit II	**[5Hrs]**
Aptitude: Average Mixture and Allegation Imax: Interactive Interview Training, Start-Up & Entrepreneurship,	
Unit III	**[5Hrs]**
Aptitude: Blood Relation :- Family Tree, Coding Blood Relation, Pointing to a Person Problem Imax: Engineering Ethics, Employability, Engineering Judgment	
Unit IV	**[5Hrs]**
Aptitude: Cubes and Dice Problems:- Number of cuts to be made, Number of colorful Faces of Cubes, Hidden Dice Number Imax: Disposition for Innovation, Disposition for Start up	
Unit V	**[4Hrs]**
Aptitude: Clocks :- Angle made by Hour hand, Minutes hand, Mirror and water Image of Clock, Behind and Ahead time concept Calendars:- Day on Specific date, Coded Calendars Problems, Calendars repetition Imax: Creating A Winning Resume, Patriotism Self - respect & Start - up	

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		

IV SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24ET406P	Micro Project II	-	-	2	1	50	--	50

Course Objectives	Course Outcomes
1. To apply basic electronics and communication concepts to design a simple practical project. 2. To develop hands-on skills in circuit building, microcontrollers, and hardware–software integration. 3. To encourage creativity, teamwork, and problem-solving through mini-project development.	1. Students will design and implement a working prototype for a real-life application. 2. Students will analyze and validate project performance through testing and documentation. 3. Students will demonstrate teamwork, report writing, and effective project presentation skills.

1. Introduction to Microproject
- Purpose and relevance of microprojects
- Guidelines, problem identification, and topic selection

2. Project Planning & Design
- Defining project objectives and expected outcomes
- Preparing block diagrams, flowcharts, and system design
- Component selection: sensors, actuators, microcontrollers, communication modules

3. Hardware Implementation
- Circuit design and prototyping
- PCB/interfacing on breadboard or development boards (Arduino/ESP32/8051 etc.)
- Testing and troubleshooting methods

4. Software Development
- Embedded C / Micro Python / Arduino IDE programming

5. Project Integration & Testing
- Performance measurement and validation
- Data analysis and result interpretation

6. Documentation & Presentation
- Preparing project report (problem statement → design → implementation → results)
- Oral presentation and demonstration of the working mode

All projects based on ESP32, ESP8266 , Node MCU etc.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Internet of Things projects using ESP32	Agus Kurniawan	**1st**	Packt Publishing Ltd.
2	ESP 32 Basic Starter Kit	-		LAFVIN

Reference Books

S.N	Title	Authors	Edition	Publisher
1	ESP 32 development using Arduino IDE	Iain Hendry	E book	-
2	ESP 32 Technical Reference Manual- Version 5.5	Express if Systems	E book	-

VI SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24ET431M	MDM- II: Communication Systems	3	-	-	3	15	15	70	100

Course Objectives	Course Outcomes
1. Understand the fundamental concepts, elements, and types of communication systems. 2. Explain the principles and techniques of analog and digital communication **3.** Analyze the characteristics and applications of various transmission media and explore modern communication technologies	After completion of this unit, the student will be able to: 1. Apply the basic concepts, elements, and types of communication systems, including signal, noise, bandwidth, and propagation characteristics. 2. Review of signals and systems, Need of modulation, Amplitude Modulation (AM). 3. Explain the fundamental concepts and need for digital communication. 4. Describe the working principles and characteristics of various wired and wireless transmission media. 5. Explain the fundamental concepts of modern communication technologies, including optical communication, satellite and GPS systems

UNIT- I: Fundamentals of Communication	**[10 Hrs]**
Need and elements of a communication system, Types of communication: Analog and Digital, Block diagram of a basic communication system, Electromagnetic spectrum and frequency bands used, Concepts of signal, noise, and bandwidth, Signal propagation, Multipath propagation	
Unit –II: - Analog Communication	**9 Hrs]**
Review of signals and systems, Need of modulation, Amplitude Modulation (AM): principle, types, applications, Types of Amplitude modulation, Frequency Modulation (FM) and Phase Modulation (PM): basic concepts, Comparison of AM, FM, and PM, Demodulation techniques of AM, Overview of radio and television broadcasting systems	
Unit –III: - Digital Communication	**[9 Hrs]**
Need for digital communication, Sampling and quantization (concept only), Pulse Code Modulation (PCM) and Delta Modulation (DM) – basic ideas, Introduction to digital modulation schemes: ASK, FSK, PSK (qualitative overview), Constellation diagram representation, Advantages of digital over analog communication.	
UNIT- IV: Transmission Media and Systems	**[9 Hrs]**
Wired media: Twisted pair, Coaxial cable, Optical fiber (basic working principles), Wireless communication: Concept of radio waves, microwaves, and satellite communication, Introduction to mobile communication systems , cellular structure, hand off, Basic idea of Wi-Fi and Bluetooth communication.	
Unit -V: Modern Communication Technologies	**[8 Hrs]**
Overview of optical communication systems, Basics of satellite and GPS systems, Introduction to data communication and networking (concept of packets, switching), Emerging trends: IoT, 5G, and wireless sensor networks (conceptual understanding).	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Communication Systems. 2009.	Simon	5th Edition	Wiley
2	Modern Digital and Analog Communication Systems	B.P.Lathi,	4th Edition,	Oxford Press, 2011
3	Online NPTEL Course: *Introduction to Communication Systems*			

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Electronic Communication System	Wayner Tomasi	5th Edition,	Pearson Education,
2	Electronic Communications	D.Roody, J.Coolen,	4th edition	PHI 2006.