Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot		Total Marks	Contact Hr./week			Total Credits
			Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251201	DC	Electronics Engineering Materials	25	25	20	30	-	-	100	2	1	-	3

Electronics Engineering Materials (14251201)

Course Objectives: To introduce the student with different materials and their characteristics used in manufacturing various electrical and electronics equipment.

UNIT 1: Introduction to Engineering Materials: Classification of materials: metals, polymers, ceramics, composites, semiconductors, Crystal structure: lattice types (SC, BCC, FCC), Miller indices, crystal imperfections, Mechanical properties: stress–strain, hardness, toughness, ductility, fatigue.

UNIT 2: Electrical & Dielectric Materials: Conductors, resistors, insulators: properties and uses, Dielectric materials: polarization, dielectric constant, dielectric loss, Ferroelectric and piezoelectric materials, Applications: capacitors, insulators, sensors, actuators, energy storage devices.

UNIT 3: Semiconductor Materials & Processing: Classification: intrinsic & extrinsic semiconductors, Band structure, energy gap, carrier concentration, Doping: n-type and p-type, mobility, diffusion, Semiconductor materials: Si, Ge, GaAs, SiC, GaN, Semiconductor fabrication basics: oxidation, diffusion, deposition, photolithography.

UNIT 4: Semiconductor Devices & Applications: PN junction, diode characteristics & applications, Zener diode, rectifiers, voltage regulators, BJT & FET materials and behaviour, LED, LASER diode: materials, working and applications, Photoconductors, photodiodes, solar cells, Sensors and transducers based on semiconductor materials.

UNIT 5: Advanced Materials (Dynamic-Jan-June 2026): Smart materials, shape memory alloys, piezoelectric materials, Nano-materials: CNT, graphene, nanocomposites, Bio-materials and eco-friendly materials.

Textbooks

1. Materials Science and Engineering – William D. Callister
2. Electronic Materials and Devices – S.O. Kasap
3. Engineering Materials – V. Raghavan

References

1. Semiconductor Devices – S. M. Sze
2. Electronic Materials – Sedha
3. Materials Science – Van Vlack

COURSE OUTCOMES

CO1: Discuss the basic classification, structure and mechanical properties of engineering materials.
CO2: Describe electrical, dielectric, magnetic and optical material properties important in engineering applications.
CO3: Understand semiconductor materials, band theory, doping and material-dependent device behavior.
CO4: Analyze applications of semiconductor devices such as diodes, transistors, LEDs, sensors and photovoltaics.
CO5: Compare and evaluate advanced materials including composites, smart materials and nanomaterials for modern engineering needs.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	1	1	1	-	1	1	1	3	2	1
CO2	3	3	3	2	1	1	-	-	2	1	1	3	2	2
CO3	3	3	3	2	2	1	-	-	2	1	1	3	2	2
CO4	3	3	2	1	2	1	1	-	2	1	1	3	2	2
CO5	3	3	2	1	1	1	1	-	1	1	1	3	2	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot		Total Marks	Contact Hr./week			Total Credits
			Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251202	DC	Electronic Circuits	25	25	20	30	-	-	100	2	1	-	3

Electronic Circuits (14251202)

Course Objective: To understand different semiconductor circuits and grab the way to design circuits and perform measurements of circuit parameters.

Unit I: BJT as an Amplifier: BJT as an amplifier and switch, Small signal models and analysis (CB, CE, CC), Frequency response of CE amplifier, Calculation of cut off frequencies.

Unit II: MOSFET as an Amplifier: Small signal models and analysis (Common Gate, Common Source, Common Drain). Frequency response of CS amplifier, Calculation of cut off frequencies.

Unit III: Feedback Circuits and Oscillators: General feedback structure, Properties of negative feedback, Four basic feedback topologies and their analysis. Principleof sinusoidal oscillators, Types of oscillators: RC phase shift, Wein bridge, Hartley, Colpitts, Clapp and crystal oscillator.

Unit IV: Power Amplifiers: Introduction to power amplifier, Classification of power amplifier, Operation and efficiency of: Series fed class A, Transformer coupled class A, Class B push pull, Crossover distortion, Class AB push pull, Class C power amplifier.

Unit V: Multistage amplifier(Dynamic-Jan-June 2026): Cascade amplifier, Cascade configuration, Darlington pair and Bootstrapping technique.

Text Books:

1. Microelectronic Circuits: Theory and Application: Sedra& Smith,7th Edition, Oxford University Press.
2. Electronics Devices and Circuits: Boylested&Nashelsky,11th Edition, Pearson Education India

Reference Books:

1. Electrical Engineering material: A.J Dekker, 1st Edition, Prentice Hall of India.
2. Micro Electronics: Millman, & Grabel,2nd Edition, McGraw Hill Education
3. Integrated Electronics: Millman&Halkias, McGraw Hill Education.

Course Outcomes

After the completion of this course students will be able to:

CO1: Evaluate the small-signal behaviour and frequency response of BJT amplifiers including the determination of cut-off frequencies.
CO2: Analyze small-signal response of MOSFET and C-V characteristics MOS capacitor.
CO3: Examine different feedback topologies and oscillator circuits.
CO4: Evaluate the performance, efficiency, and distortion characteristics of power amplifiers
CO5: Analyze multistage amplifier configurations such as cascade, Darlington pair, bootstrapped, and cascade circuits.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2	2	1	2	3	2	_	1	2	2
CO2	3	3	3	1	2	2	1	2	3	2	-	2	3	3
CO3	3	3	2	2	2	2	1	2	3	1	1	2	3	2
CO4	3	3	2	2	2	2	1	1	3	2	1	2	3	3
CO5	3	3	3	2	2	2	1	2	3	2	1	3	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot		Total Marks	Contact Hr./week			Total Credits
			Minor Evaluation I	Minor EvaluationII	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251203	DC	Signals and Systems	25	25	20	30	-	-	100	2	1	-	3

Signals and Systems (14251203)

Course objective: Coverage of continuous and discrete-time signals and systems, their properties and representations and methods that is necessary for the analysis of continuous and discrete-time signals and systems.

Unit-1 Introduction: Mathematical description of continuous and discrete-time signals, Signal definition and classification; complex exponential and sinusoidal signals, Standard signals: unit step, signum, ramp, impulse, impulse train, rectangular, triangular, sinc, and Gaussian pulses, Even/odd signals; periodic and non-periodic signals; signal energy and power, Basic signal operations: amplitude scaling, time shifting, differentiation, and integration, System modeling and system properties: homogeneity, additivity, linearity, time invariance, causality, stability, memory, and nonlinearity, Continuous and discrete-time LTI systems.

Unit 2 Fourier Series and Fourier Transform: Fourier Transform: Exponential Fourier series, and Trigonometric Fourier series, properties of Fourier series, Introduction to Fourier transform, Fourier Transforms of elementary functions. Properties of Fourier Transform.

Unit 3: Z Transforms: Introduction to Z-transform, relation between Laplace and Z-transform, relation between Fourier transform and Z-transform, ROC, properties of ROC, Properties of Z-transform, Inverse Z-transform, Unilateral Z-transform.

Unit-4 Continuous and Discrete system analysis: The Convolution Integral, and Convolution Sum, Impulse Response, Convolution and Properties, System Interconnections, Stability and Impulse Response, Response of Systems to Standard Systems, Realization of Differential Equations, Analysis of discrete time LTI system using Z-transform, Analysis of continuous time LTI system using Laplace transform.

Unit-5 Signals for Intelligent and Cyber-Physical Systems(Dynamic-Jan-June 2026): Speech and audio basic, Signals in cyber-physical systems, Image signal fundamentals, Signals in autonomous vehicles, Signal visualization using Python, Real-time signal processing.

Text Books:
1. Alan V. Oppenheim, Alan S. Willsky and S. Hamid Nawab, Signals and Systems, 2nd Edition, Pearson Education India.
2. Simon Haykin and Barry Van Veen,Digital Signals and Systems, 2nd Edition, Wiley India Pvt. Ltd.
3. B. P. Lathi, Signal Processing and Linear Systems, 1st Edition, Berkeley–Cambridge Press, 1998.

Reference Books:
1. Hwei P. Hsu, Signals and Systems (Schaum's Outlines), 2nd Edition, Tata McGraw Hill Education.
2. Douglas K. Lindner, Introduction to Signals and Systems, International Edition, McGraw Hill, 1999.
3. J. Nagrath, S. N. Sharan, R. Ranjan and S. Kumar, Signals and Systems, Tata McGraw Hill Publishing Company Ltd., New Delhi.
4. R. F. Ziemer, W. H. Tranter and D. R. Fannin, Signals and Systems: Continuous and Discrete, 4th Edition, Prentice Hall, 1998.

Course Outcomes

After the completion of this course students will be able to:

CO1. Describe continuous and discrete time signals mathematically.

CO2. Determine the spectral characteristics of signals using Fourier series and Fourier transform.

CO3. **Apply** z-transform for analysis of discrete time signals.
CO4. **Evaluate** the performance parameters of LTI systems.
CO5. **Explain** basic speech, audio, and image signals and their real-time processing in cyber-physical systems

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	1	1	2	2	2	3	1	3	2	1
CO2	3	3	3	3	3	2	2	2	3	3	2	3	3	3
CO3	3	3	3	3	3	3	2	1	3	3	3	3	3	3
CO4	3	3	3	3	2	3	2	1	3	3	3	3	3	3
CO5	3	3	2	1	2	3	2	1	2	3	1	3	2	2

1 - Slightly; 2 - Moderately; 3 – Substantially

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot		Total Marks	Contact Hr./week			Total Credits
			Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251204	DC	Digital Circuits and Systems	25	25	20	30	-	-	100	2	1	-	3

Digital Circuits and Systems (14251204)

Course Objective: To understand the concept of digital systems, design & analyze the combinational and sequential logic circuits.

Unit I: Boolean algebra and Logic Minimization: Minimization of Boolean functions, Canonical & standard form, Minimization techniques: Karnaugh's map method and Quine-McCluskey's method, Universal gates, NAND/NOR implementation of Boolean functions.

Unit II: Combinational Logic Circuits: Half & Full Adders and Subtractors, Serial and parallel adder, Carry look-ahead adders; Multiplexers; De-multiplexers; Encoders; Priority Encoder; Decoders; Code Converters; Parity generators and Checkers

Unit III: Sequential Circuits: Latches, Flip Flops- SR, JK, D & T Flip Flop and Race around condition, Master-Slave and edge triggered; Shift Registers; Counters: Synchronous and Asynchronous, design of ripple counter. Johnson counter, ring counter, sequence generator, Finite state Machine (Moore and Mealy).

Unit IV: Logic Families and PLDs: RTL, DTL, TTL, ECL, HTL and CMOS logic etc. Comparison of various logic families, Programmable Logic Devices (PLDs): Programmable Logic Array (PLA), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLDs) .

Unit V: Emerging digital trends and its necessity(Dynamic-Jan-June 2026): Advanced Logic: Optimization and Synthesis**,** Low-power and High speed CMOS design principles, Modern Memory and Storage Concepts.

Text Books:

1. Digital Design: M. Mano,4th Edition, Prentice Hall of India.
2. Logic & Computer Design Fundamental: M.Mano, 5th Edition, Pearson Education India.
3. Digital Circuits and Design: S. Salivahanan,5th Edition, Oxford University Press.

Reference Books:

1. Digital Electronics: W.H. Gothman, Prentice Hall of India.
2. Digital System Principles & Applications: R.J. Tocci,11th Edition, Pearson Education India.
3. Pulse, Digital & Switching Waveforms: Millman&Taub, McGraw Hill Education.

Course Outcomes
After the completion of this course, students will be able to:
CO1. Apply Boolean algebra to formulate and implement logic functions using basic and universal gates.
CO2. Design and analyze combinational circuits, including adders, subtractors, multiplexers, decoders, and code converters.
CO3. Design and evaluate sequential circuits such as flip-flops, counters, and shift registers.
CO4. Analyze logic families and explain Programmable Logic Devices and its classifications.
CO5. Apply emerging digital design concepts such as low-power CMOS techniques, high-speed logic, and programmable logic devices (FPGA/CPLD) in modern embedded and computing systems.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	1	2	1	2	1	2	2	3	3	3
CO2	3	3	3	3	2	3	1	2	2	1	3	3	2	2
CO3	3	3	3	3	2	2	1	-	1	2	1	2	3	3
CO4	3	3	2	2	2	2	2	-	2	1	1	2	3	3
CO5	3	3	3	2	3	3	1	1	1	1	2	3	2	3

1 - Slightly; 2 - Moderately; 3 – Substantially

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot		Total Marks	Contact Hr./week			Total Credits
			Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251205	BSC	Linear Algebra & Differential Equations	25	25	20	30	-	-	100	2	1	-	3

Linear Algebra & Differential Equations (14251205)

Objective of Course

- To understand the concept Matrices and its applications
- To comprehend the various aspect of algebraic structures
- To learn various methods to solve first-order differential equations effectively
- To understand techniques for solving higher-order linear differential equations.
- To study the formulation and solution methods for partial differential equations.

Unit1: Linear Algebra-I

Matrix, Rank of Matrix, Echelon form, Normal form of matrix, Solution of simultaneous equation by elementary transformation, Consistency of equation, Eigen values and Eigenvectors, Normalized eigenvector, Cayley Hamilton theorem and its application to finding inverse of matrix.

Unit2: Linear Algebra-II

Introduction to Groups and its properties, Vector spaces, linear dependent vectors and linear independent vectors, linear combination of vectors, linear span of a set of vectors, basis and dimension of a vector space.

Unit3: First Order Ordinary Differential Equations

Ordinary differential equations of first order and first Degree: Separation of variables, Transformation of some equations in which variables are separable, Homogeneous Equations, Equations reducible to Homogenous form, Exact Differential Equations, Linear Differential Equation, Bernoulli's Equation.

Unit-4 Second and Higher Order Differential Equations

Linear higher order differential equation with constant coefficients, Determination of complementary Function (C.F.), Determination of Particular Integral (P.I.), Homogeneous linear differential equation: Cauchy Euler Equations, Legendre's Linear Equation .

Unit-5: Partial Differential Equations(Dynamic-Jan-June 2026):

Order and Degree of Partial Differential Equations, Classification of First order PDE, Origin of Partial Differential Equations, Linear Partial Differential Equations of order one: Lagrange's Method, Non-Linear Partial differential equations of order one: Four standard forms, Homogeneous Linear PDE with constant coefficient.

Course Outcome

After completing this course, student will be able to:
CO1: Solve matrix problems and apply eigenvalue/eigenvector concepts.
CO2: Analyze vector spaces and determine basis and dimension.
CO3: various types of first-order differential equations using appropriate methods.
CO4: Solve higher-order linear differential equations and apply them to real-life problems.

CO5: Formulate and solve partial differential equations using standard techniques.

Recommended Books:

1. E. Kreyszig. *Advance Engineering Mathematics*, John Wiley & Sons, 10th Edition (2011).
2. S. Lipschutz and M. Lipson, *Linear Algebra* (4th Edition), Schaum's Outline series, Mc- Graw Hill. (2009).
3. B. S. Grewal. *Higher Engineering Mathematics*, Khanna Publishers, 43rd Edition (2015)..
4. B.V. Ramanna. *Higher Engineering Mathematics*, McGraw Hill Education, 1st Edition (2017).
5. G. F. Simmons. *Differential Equations with Applications and Historical Notes* (2nd ed.). McGraw-Hill. (1991).
6. P. J. Olver .*Introduction to Partial Differential Equations*. Springer. (1993).

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	1	1	2	1	2	1	2	2	2	2	3
CO2	1	3	3	3	2	3	1	2	2	1	3	3	2	2
CO3	3	3	3	3	2	2	1	-	1	2	1	2	3	3
CO4	3	3	2	2	2	2	2	-	2	1	1	2	3	3
CO5	3	3	3	2	3	3	1	1	1	1	2	3	2	3

1 - Slightly; 2 - Moderately; 3 – Substantially

Subject Code	Category Code	Subject Name	Theory Slot				Practical Slot		Total Marks	Contact Hr./week			Total Credits
			Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251206	DLC	Digital Logic Design Lab					70	30	100	-	-	2	1

Digital Logic Design Lab (14251206)

Course Objective: Develop skills in designing and verification of logic gates, combinational digital circuits and sequential digital circuits.

List of Experiment

1. Identification and verification of the truth tables for logic gates – AND, OR, NOT.
2. Identification and verification of the truth tables for logic gates EX-OR, EX- NOR, NAND, NOR
3. Design and verification of half adder and full adder
4. Design and verification of half subtractor and full subtractor
5. Design and verification of R-S Flip-Flop
6. Design and verification of J-K Flip-Flop
7. Design and verification of parity generator/checker
8. Design and verification of ripple counter using J-K Flip-Flop.
9. Design and verification of 2 and 4-bit left/right shift registers.
10. Design and verification of SISO, SIPO, PISO and PIPO shift registers.

Course Outcomes:
After completing the lab, students will be able to
CO1. **Verify** the truth table of basic and universal gates.
CO2. **Design** adder &subtractor circuits.
CO3. **Verify** the truth table of flip-flops.
CO4. **Design** various types of Counters.
CO5. Design different types of shift registers.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	1	1	1	2	2	3	2
CO2	3	3	3	3	3	1	1	1	1	1	2	2	3	3
CO3	3	2	3	3	3	1	1	1	1	1	2	2	3	3
CO4	3	3	2	3	3	1	1	1	1	1	2	2	3	3
CO5	3	2	2	3	3	1	1	1	1	1	2	3	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

Subject	Category	Subject Name	Theory Slot	Practical Slot	Total	Contact	

Code	Code								Marks	Hr./week			Total Credits
			Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251207	DLC	Problem Solving through Python Programming					70	30	100	-	-	2	1

Problem Solving through Python Programming (14251207)

Course Objectives: Develop skills in modular programming and dividing the code into logical modules using Python.

List of Experiments

1. Write python programming to declare various data type and display its data type.
2. Write a Python program to read a list of numbers and sort them in ascending and descending order.
3. Write python programming to perform addition and subtraction and display the result.
4. Write python programming to perform multiplication and division and display the result.
5. Write a Python program to create a list, perform list operations (append, insert, pop, remove), and display the updated list.
6. Write a python programming to perform logical operations and display the result.
7. Write a Python program to read marks of students, store them in a list, and compute the average, highest, and lowest marks.
8. Write python programming to declare array and display its different index position.
9. Write python programming to declare a string then (a) Capitalize it, (b) convert into title format, (c) Swap the case of string.
10. Write a python programming to declare a string use slice object to slice the given sequence to perform addition, subtraction, multiplication and division of integer and floating values.

Course Outcomes
After completing the lab, students will be able to:
CO1. **Write** basic programs in Python.
CO2. **Perform** arithmetic calculations, evaluate logical expressions, and manipulate strings using built-in Python operations and functions.
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Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	2	1	1	1	1	1	2	2	3	2
CO2	3	3	3	3	3	1	1	1	1	1	2	2	3	3

1 - Slightly; 2 - Moderately; 3 – Substantially

Subject	Category	Subject Name	Theory Slot	Practical Slot	Total	Contact	

Code	Code								Marks	Hr./week			Total Credits
			Minor Evaluation	Minor Evaluation II	Quiz/ Assignment Marks	Major Evaluation	Continuous Evaluation/Lab work & Sessional	Major Evaluation		L	T	P	
14251209	PBL	Micro Project-II					70	30	100	-	-	2	1

Micro Project-II (14251209)

Course Objectives: To design an application-based project

1. LED Blinking Circuit – Blink an LED using a 555 timer or microcontroller.
2. Light-Activated Switch – Use an LDR to turn devices on/off based on light intensity.
3. Water Level Indicator – Monitor and display water levels using LEDs and float sensors.
4. Automatic Night Lamp – Automatically turn on a lamp in low light using an LDR.
5. Battery Level Indicator – Indicate battery levels using LEDs and voltage dividers.
6. Clap-Activated Switch – Control devices with a clap using a sound sensor.
7. Temperature-Controlled Fan – Adjust fan speed based on temperature using a thermistor.
8. Rain Detector – Detect rainfall using a rain sensor and trigger an alert.
9. Traffic Light Controller – Simulate traffic signals using LEDs and timers.
10. Digital Thermometer – Measure temperature using a thermistor and display it on an LCD
11. Burglar Alarm System – Trigger an alarm when motion is detected using a PIR sensor.
12. IR Obstacle Detection System – Detect obstacles using IR sensors and LEDs.
13. Soil Moisture Sensor Circuit – Monitor soil moisture to automate irrigation systems.
14. Electronic Dice – Create an electronic dice using LEDs and a random generator circuit.
15. Heartbeat Monitor – Measure and display heart rate using a pulse sensor.
16. DC Motor Speed Controller – Control motor speed using a potentiometer and PWM.
17. Power Supply Regulator Circuit – Design a stable voltage supply using regulators.
18. Solar Mobile Charger – Use solar panels to charge mobile devices.
19. Line Follower Robot – Build a robot that follows a black line using IR sensors.
20. Metal Detector – Detect metallic objects using an inductive sensor circuit.
21. To-Do List Application – Create a task management system for adding, viewing, and deleting tasks.
22. Temperature Converter – Convert temperatures between Celsius, Fahrenheit, and Kelvin.
23. Quiz Application – Develop a multiple-choice quiz with scoring and result display.
24. Random Password Generator – Generate secure random passwords using Python's random module.
25. Dice Rolling Simulator – Simulate the rolling of dice with random number generation.
26. Currency Converter – Convert between different currencies using an API.
27. Simple Chatbot – Build a rule-based chatbot for basic conversation using conditionals.
28. Age Calculator – Calculate age from the user's date of birth.
29. File Renaming Tool – Automate renaming multiple files in a directory.
30. Basic Alarm Clock – Set a timer to trigger an alarm using time and sound libraries.
31. Temperature and Humidity Monitor – Use a DHT11 sensor to display real-time temperature and humidity.
32. Obstacle Avoiding Robot – Employ an ultrasonic sensor to detect and avoid obstacles.
33. Soil Moisture Detection System – Monitor soil moisture levels and trigger a water pump when dry.
34. Motion-Activated Security Alarm – Use a PIR sensor to detect motion and trigger an alarm.
35. Fire Detection System – Detect fire using a flame sensor and sound an alert.
36. Smart Dustbin – Open a dustbin lid automatically using an ultrasonic sensor.
37. Gas Leakage Detection System – Use an MQ-2 sensor to detect gas leaks and trigger a buzzer.

38. Heartbeat Monitoring System – Measure heart rate using a pulse sensor and display the results.
39. Simple Calculator – Perform basic arithmetic operations to understand input/output and operators.
40. Number Guessing Game – Implement a random number guessing game using loops and conditionals.
41. Student Grade Calculator – Calculate grades based on input marks using decision-making statements.
42. Library Management System – Manage book records using file handling and structures.
43. Tic-Tac-Toe Game – Build a two-player game to practice arrays and game logic.
44. Bank Account Management System – Simulate banking operations using classes and OOP concepts.
45. Prime Number Finder – Identify prime numbers in a range using loops and mathematical logic.
46. Contact Management System – Store and manage contacts using structures and file handling.
47. Simple Voting System – Create a voting system with counters and conditional statements.
48. Rock, Paper, Scissors Game – Develop a game using random number generation and control flow.
49. Touch-Activated LED Light Using Transistor and Touch Plates.
50. Three-Level Battery Indicator Using Discrete Transistor Thresholds.
51. LDR-Controlled Automatic Night Lamp Using Transistor Switching
52. Thermistor-Based Temperature Alarm Using Transistor Triggering
53. Water Level Buzzer Using Conductivity Probes and Transistor Driver.
54. Two-Stage Transistor Mini Audio Amplifier for Small-Signal Gain.
55. Siren Generator Using Dual-Transistor Multivibrator Circuit.
56. Analog DC Motor Speed Controller Using Potentiometer and Power Transistor.
57. Reverse Polarity Protection Circuit Using Diode and LED Indicator.
58. Full-Wave Bridge Rectifier Using Four Discrete Diodes.
59. LED Light Chaser Using Dual-Transistor Multivibrator Sequencing.
60. Soil Moisture Detection Circuit Using Probes and Transistor Trigger.
61. Touch-Activated LED Switch Using Skin Resistance Trigger.
62. Delay-ON Timer Circuit Using RC Network and Transistor.
63. Transistor-Based Relay Driver for DC Load Switching.

Course Outcomes:

Students will be able to:

CO1: **Analyze** the electronic components, measuring instruments, and tools.
CO2: **Design** and simulate the schematic, layout using CAD software.
CO3: **Design** and fabricate PCBs for various electronic circuits individually and in a team.
CO4: **Troubleshoot** the program or circuit individually and in a team.
CO5: **Implement** mini project that benefits society.