25EC104: Departmental Workshop (EC)

w. e. f. Academic Year:	**2025-26**
Semester:	**1/2**
Category of the Course:	**Engineering Science**
Prerequisite:	Zeal to learn the subject
Rationale:	The course objective is to equip first-year students with foundational knowledge and practical skills in electronics. By engaging students in activities such as soldering, circuit assembly, and the use of diagnostic tools, the course aims to develop essential skills that are crucial for understanding and implementing electronic systems. Furthermore, the integration of safety practices and standards ensures that students are well-prepared for real-world scenarios, and promoting innovation and problem-solving abilities in the field of electronics.

Course Outcomes:

After Completion of the Course, Student will able to:

	Course Outcome (CO)	**RBT Level (Cognitive Domain)**
CO1	Recall and explain the classification, specifications, packaging, and standard symbols of electronic components, including cost estimation and procurement considerations.	Understand / Remember
CO2	Interpret electronic circuit diagrams using IEEE/BIS symbols and datasheets of discrete and integrated components to support basic circuit design and cost budgeting.	Understand /Apply
CO3	Demonstrate the operation and application of electronic measurement instruments and tools to test, measure, and troubleshoot electronic components and circuits.	Apply/Analyze
CO4	Perform systematic testing and characterization of passive and active electronic components using standard techniques and evaluate their functionality and quality.	Analyze/Evaluate
CO5	Design, assemble, and fabricate electronic circuits on PCBs using various interconnection methods and soldering techniques, ensuring safety and functional integrity.	Create
CO6	Work in a team with good interpersonal skills.	Apply

Teaching and Evaluation Scheme:

Teaching Scheme					**Examination Scheme**				
L	**T**	**P**	**C**	**Hrs/Week**	**IE**	**Theory**	**CIA**	**Practical**	**Total Marks**
-	-	02	01	02	-	-	30	20	50

IE: Internal Evaluation Theory: Theory Exam (End Semester)

CIA: Continuous Internal Assessment Practical: Practical Exam (End Semester)

Detailed Syllabus:

Topic	Hrs	% of Weightage
UNIT: 1 **Identification and Specification of Electronic Components** • Classification of electronic components: Active, Passive, Electrical, Electronic, and Electro-mechanical. • Identification and specifications: ▪ Passive components: Resistors (types, color coding), Capacitors (types, size, markings), Inductors, Pulse Transformer, Opto coupler. ▪ Active components: Diodes, Transistors, ICs, MOSFETs, Thyristors. ▪ Other components: Wires, Cables, Connectors, Fuses, Switches, Solid state Relays, Crystals, Displays, Fasteners, Heat sink. • Packaging and Symbols: Standard notations, industry standards (BIS, IEEE). • Component cost estimation and procurement considerations.	6	20
UNIT: 2 **Electronic Circuit Diagram and Data Sheet Interpretation** • Understanding circuit diagrams and standard IEEE/BIS symbols. • Interpretation of datasheets for discrete components and ICs. • Fundamentals of circuit design and layout considerations. • Estimation of component cost and budgeting for circuit development.	2	7
UNIT: 3 **Testing Instruments and Tools** • Introduction to electronic measurement instruments: ▪ Multimeter, Function Generator, Power Supply, CRO (Cathode Ray Oscilloscope), DSO (Digital Storage Oscilloscope), etc. • Hands-on operation and analysis using the above instruments. • Commonly used tools: ▪ Soldering iron, Disordering pump, Pliers, Cutters, wire strippers, Screwdrivers, Tweezers, Crimping tool, Hot air soldering/disordering station etc.	6	20
UNIT: 4 **Testing and Characterization of Electronic Components** • Techniques for testing electronic components using a multimeter: ▪ Resistors, Capacitors, Diode, Transistor, JFET, ICs etc.	2	6
UNIT: 5 **Interconnection Methods and Soldering Practices** • Methods of interconnecting components: Bread boarding, Wire Wrapping, Crimping. • Soldering techniques: ▪ Types of soldering (soft, hard, wave, reflow). ▪ Selection of soldering materials and flux. ▪ Safety precautions in soldering and disordering.	8	27
UNIT: 6 **Printed Circuit Boards (PCB)–Design and Fabrication** • Types of PCBs: Single-sided, Double-sided, and PTH (Plated Through-Hole). • Practical soldering exercises on connectors and general-purpose	6	20

PCBs.		
Total Hours	**30**	**100**

List of Practical:

1.	To study and use electronic meters such as voltmeters, ammeters, multimeters, and LCR-Q meters.
2	To study and use electronic measuring instruments including power supplies, cathode ray oscilloscopes (CROs), digital storage oscilloscopes (DSOs), and function generators.
3	Familiarization with Electronic Workshop Tools and Accessories : breadboard, solder, cables, relays, switches, connectors, fuses, cutters, pliers, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump, etc.
4.	Identification and Symbol Drawing of Active and Passive Electronic Components.
5.	Study and Interpretation of Datasheets for Electronic Components and Integrated Circuits.
6.	Determination of Resistor, Inductor, and Capacitor Values Using Color Codes
7.	Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
8.	Mounting and Testing of Electronic Circuits on Breadboard.
9.	Soldering and Desoldering of Electronic Components on PCB.
10.	Mini Project.

Text/ Reference Books:

1. S. M. Dhir, “Electronic Components & Materials, Principals, Manufacture & Maintenance”, TATA MC Graw hill publishing company ltd. New Delhi.
2. Owen Bishop, “Electronics-A first Course”, Second Edition, Newnes An Inprint of Elsevier.
3. B. L. Therja, “Basic Electronics Solid State”, S. Chand & Co. Ltd. New Delhi.
4. V.K., Mehta, Rohit Mehta, “Principles of Electronics”, S. Chand and Co. Ltd., New Delhi-110 055.
5. R. S. Khandur, “Printed Circuit Boards, Design Fabrication & Assembly”, New York-M. C. Graw Hill. 2006, ISBN: 9780071464208

E-Resource / Web link:

6. https://download.ni.com/support/manuals/374483a.pdf.
7. https://resources.pcb.cadence.com/i/1180526-pspice-user-guide/52?
8. https://www.tina.com/docs/v12/Tina-v12-manual.pdf.
9. https://www.circuitbasics.com/electronic-tools-and-equipment/
10. https://tooabstractive.com/electronics/electronic-tools-and-their-functions/

Course Outcomes Mapping:

	Curse Outcome	**POs/ PSOs**	**CL Cognitive level**	**Knowledge Category**	**Lab Hours**
CO1	Recall and explain the classification, specifications, packaging, and standard symbols of electronic	PO1, PO2, PSO1	Understand Remember	Factual Conceptual	4

	components, including cost estimation and procurement considerations.				
CO2	Interpret electronic circuit diagrams using IEEE/BIS symbols and datasheets of discrete and integrated components to support basic circuit design and cost budgeting.	PO2, PO3, PO5, PO10, PSO1, PSO2	Understand Apply	Conceptual Procedural	5
CO3	Demonstrate the operation and application of electronic measurement instruments and tools to test, measure, and troubleshoot electronic components and circuits.	PO2, PO4, PO5, PSO1, PSO2	Apply Analyze	Procedural Factual	6
CO4	Perform systematic testing and characterization of passive and active electronic components using standard techniques and evaluate their functionality and quality.	PO2, PO4, PSO1	Analyze Evaluate	Procedural Conceptual	4
CO5	Design, assemble, and fabricate electronic circuits on PCBs using various interconnection methods and soldering techniques, ensuring safety and functional integrity.	PO3,PO5, PO7,PO8, PO9, PO10, PO11, PO12, PSO1, PSO2	Create	Procedural Conceptual Metacognitive	7
CO6	Work in a team with good interpersonal skills.	PO6, PO8, PO9, PO10, PO12	Apply	Metacognitive Procedural	4
Total hour of Instruction					**30**

Mapping of COs with POs & PSOs:

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	3											3	
CO2		3	3		3					3			3	3
CO3		3		3	3								3	3
CO4		3		3									3	
CO5			3		3		3	3	3	3	3	3	3	3
CO6						3		3	3	3		3		

3: High, 2: Medium, 1: Low