Semester - 2

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP

Course Code	Teaching hours per week				Credits	Exam hours	Course type	CIE Marks	ESE Marks
	L	T	P	R					
26ABMEL101	0	0	2	0	2	3	ESC	50	50

1. **Preamble:** This workshop provides first-year engineering students with essential hands-on experience, bridging the gap between theoretical electrical concepts and real-world applications. By focusing on fundamental skills, safety protocols, and basic wiring, the course cultivates the practical competence necessary for all engineering disciplines. This workshop also familiarize the students with basic electronic components, tools, and instruments, and to develop hands-on skills in testing, soldering, PCB fabrication, and assembly of simple electronic circuits following standard safety practices.
2. **Prerequisites:** NIL

Part A (All Experiments are Mandatory)

Experiment No	Syllabus Description: List of Experiments
1	a) Demonstrate the precautionary steps adopted in case of Electrical shocks. b) Identify different types of cables, wires, switches, fuses, fuse carriers, MCB, ELCB and MCCB, familiarize the ratings.
2	Wiring of a simple light circuit for light/ fan point (PVC conduit wiring) and a 6A plug socket with individual control.
3	Wiring of light/fan circuit using two-way switches. (Staircase wiring)
4	Wiring of two lamps controlled by two switches.
5	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.
6	a) Identify different types of batteries with their specifications. b) Familiarize different types of earthing (Pipe, Plate Earthing, Mat Schemes)
7	Visit your college substation and familiarize the supply system, Transformer, HT Panel and Distribution etc.

Part B (Minimum 7 Experiments are mandatory)

Experiment No	Experiments
1	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol and cost of -Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.
2	Drawing of electronic circuit diagrams using BIS/IEEE symbols and Interpret data sheets of discrete components and IC’
3	Familiarization/Application of testing instruments and commonly used tools. - Multimeter, Function generator, Power supply, CRO, DSO. Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and desoldering station.
4	Testing of electronic components using Multimeter - Resistor, Capacitor, Diode, Transistor and JFET
5	Printed circuit boards (PCB) - Types, Single sided, Double sided, PTH, Processing methods. Design and fabrication of a single sided PCB for a simple circuit
6	Inter-connection methods and soldering practice. Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions. Soldering practice in connectors and general-purpose PCB, Crimping.
7	Assembling of electronic circuit/system on general purpose PCB, test and show the functioning - Fixed voltage power supply with transformer. Rectifier Diode/ Zener Diode, Capacitor filter.
8	Assembling of electronic circuits using SMT (Surface Mount Technology) stations
9	Introduction to EDA tools (such as KiCad or XCircuit)
10	Characteristics of BJT

3. **Course Assessment Method (CIE: 50 Marks, ESE: 50 Marks)**

Continuous Internal Evaluation Marks (CIE):

Attendance	Preparation/Pre-Lab Work experiments, Viva and Timely completion of Lab Reports / Record (Continuous Assessment)	Total
5	45	50

End Semester Examination Marks (ESE):

Procedure/ Preparatory work/Design/ Algorithm	Conduct of experiment/ Execution of work/ troubleshooting/ Programming	Result with valid inference/ Quality of Output	Viva voce	Record	Total
10	15	10	10	5	50

Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.

Continuous Assessment with equal weightage for both specializations (45 Marks)

1. Preparation and Pre-Lab Work (10 Marks)

- Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.
- Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.
- Teamwork: Collaboration and participation in group experiments.

2. Lab Reports and Record Keeping (10 Marks)

- Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.
- Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record.

3.Viva Voce (10 Marks)

- Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session.

Evaluation Pattern for End Semester Examination with equal weightage in both specializations (50 Marks)

1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)

- Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.
- Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.
- Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.
- Creativity and logic in algorithm or experimental design.

2. Conduct of Experiment/Execution of Work/Programming (15 Marks)

- Setup and Execution: Proper setup and accurate execution of the experiment or programming task.

3. Result with Valid Inference/Quality of Output (10 Marks)

- Accuracy of Results: Precision and correctness of the obtained results.
- Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output.

4. Viva Voce (10 Marks)

- Ability to explain the experiment, procedure results and answer related questions
- Proficiency in answering questions related to theoretical and practical aspects of the subject.

5. Record (5 Marks)

- Completeness, clarity, and accuracy of the lab record submitted

4. Course Outcomes

At the end of the course students should be able to:

Course Outcomes		Blooms Taxonomy Level
CO1	Explain and identify electrical components, safety measures, and earthing systems.	K2
CO2	Construct and demonstrate residential and commercial wiring circuits using standard procedures and safety practices.	K3
CO3	Apply basic knowledge to understand observations related to power distribution and substation systems.	K3
CO4	Identify various electronic components.	K2
CO5	Operate various measuring instruments.	K3
CO6	Apply the design procedure of simple electronic circuits using breadboards, PCBs and EDA tools.	K3
CO7	Build the ability to work in a team with good interpersonal skills.	K3

Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create

5. Mapping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2						2			
CO2			3		2	2			2	2	
CO3		3		3			2				2
CO4	3					2					3
CO5	3				3	2		2			3
CO6	3		3	1	3	2		2			3
CO7								3	2		3

6. Text Books

Sl No	Title of Book	Name of Author/s	Publisher	Edition and Year
1	Electrical Design Estimating and Costing	K B Raina and S K Bhattacharya	New Age International Publishers	2/e 2024
2	Electrical Systems Design	M K Giridharan	I K International Publishing House Pvt. Ltd	3/e 2022
3	Basic Electrical Engineering	D P Kothari and I J Nagrath	Tata McGraw Hill	4/e 2019
4	Basic Electronics and Linear Circuits	NN Bhargava, D C Kulshreshtha and S C Gupta	Mc Graw Hill	2/e 2017

7. Reference Books

Sl No	Title of Book	Name of Author/s	Publisher	Edition and Year
1	Indian Electricity Rules	CEA, Govt. of India	Govt. Publication	2023
2	Substation Automation Systems	James E. Brady	McGraw Hill	2/e 2021
3	Electrical Wiring, Estimating and Costing	S. Singh, R. Singh	Dhanpat Rai	5/e 2020

8. Video Links or any other Reference Materials

Sl No	Details Like Weblink, Publication Details	Module
1	https://share.google/4UviWjIXofTj31k8u	-
2	https://share.google/IJRedjWtmRaryVNQ0	-