## Semester 1

## 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 | 2.5 | Lab | 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

| Experiment No | Syllabus Description: List of Experiments |
|---|---|
| 1 | a) Demonstrate the precautionary steps adopted in case of Electrical shocks.<br>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.<br>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.<br>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.<br>Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions.<br>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 or LTSPICE) |
| 10 | Characteristics of BJT |

### 3. 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 on breadboard and PCBs and EDA tools. | K3 |

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

### 4. 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 |

### 5. 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 | 3/e 2022 |

| | | | | |
|---|---|---|---|---|
| | | | Publishing House Pvt. Ltd | |
| 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 |

### 6. 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 |

### 7. Video Links or any other Reference Materials

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

### 8. 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/ | Result with valid inference/ Quality of Output | Viva voce | Record | Total |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| | **Programming** | | | | |
| 10 | 15 | 10 | 10 | 5 | 50 |

| **Continuous Assessment with equal weightage for both specializations (45 Marks)** |
|---|
| **1. Preparation / Pre-Lab Work and Conduct of Experiments (20 Marks)** :<br>· Pre-Lab Assignments: Assessment of pre-lab assignments or quizzes that test understanding of the upcoming experiment.<br>· Procedure and Execution: Adherence to correct procedures, accurate execution of experiments, and following safety protocols.<br>· Skill Proficiency: Proficiency in handling equipment, accuracy in observations, and troubleshooting skills during the experiments.<br>· Teamwork: Collaboration and participation in group experiments. |
| **2. Lab Reports and Record Keeping (15 Marks)**<br>· Quality of Reports: Clarity, completeness and accuracy of lab reports. Proper documentation of experiments, data analysis and conclusions.<br>· Timely Submission: Adhering to deadlines for submitting lab reports/rough record and maintaining a well-organized fair record. |
| **3. Viva Voce (10 Marks)**<br>· Oral Examination: Ability to explain the experiment, results and underlying principles during a viva voce session. |
| ***Submission of Record: Students shall be allowed for the end semester examination only upon submitting the duly certified record.*** |

| **Evaluation Pattern for End Semester Examination with equal weightage in both specializations (Internal Evaluation Only) (50 Marks)** |
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|---|
| **1. Procedure/Preliminary Work/Design/Algorithm (10 Marks)**<br>· Procedure Understanding and Description: Clarity in explaining the procedure and understanding each step involved.<br>· Preliminary Work and Planning: Thoroughness in planning and organizing materials/equipment.<br>· Algorithm Development: Correctness and efficiency of the algorithm related to the experiment.<br>· Creativity and logic in algorithm or experimental design. |
| **2. Conduct of Experiment/Execution of Work/Programming (15 Marks)**<br>· Setup and Execution: Proper setup and accurate execution of the experiment or programming task. |
| **3. Result with Valid Inference/Quality of Output (10 Marks)**<br>· Accuracy of Results: Precision and correctness of the obtained results.<br>· Analysis and Interpretation: Validity of inferences drawn from the experiment or quality of program output. |
| **4. Viva Voce (10 Marks)**<br>· Ability to explain the experiment, procedure results and answer related questions<br>· Proficiency in answering questions related to theoretical and practical aspects of the subject. |
| **5. Record (5 Marks)**<br>· Completeness, clarity, and accuracy of the lab record submitted |

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