

**SEMESTER S1**  
**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**  
**WORKSHOP**

(Common to All Groups except for Civil Engineering Branch)

<b>Course Code</b>	<b>GXESL106</b>	<b>CIE Marks</b>	50
<b>Teaching Hours/Week (L: T:P: R)</b>	0:0:2:0	<b>ESE Marks (Internal only)</b>	50
<b>Credits</b>	1	<b>Exam Hours</b>	2 Hrs. 30 Min.
<b>Prerequisites (if any)</b>	None	<b>Course Type</b>	Lab

**Course Objectives:**

1. To create awareness and familiarity with electrical wiring and safety measures to be taken.
2. To Identify various electronic components and to operate various measuring instruments
3. Learn to setup simple electronic circuits on breadboard and PCB

<b>Expt. No.</b>	<b>Experiments</b>
<b>Electrical Workshop (Minimum of 7 Experiments to be done)</b>	
<b>1</b>	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.
<b>2</b>	Wiring of a simple light circuit for light/ fan point (PVC conduit wiring) and a 6A plug socket with individual control.
<b>3</b>	Wiring of light/fan circuit using two-way switches. (Staircase wiring)
<b>4</b>	Wiring of fluorescent lamp and a power plug (16 A) socket with a control switch.
<b>5</b>	Wiring of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.
<b>6</b>	Familiarisation of step up and step-down transformers, (use low voltage transformers) Measurement and representation of voltage and waveform to scale in graph sheet with the help of CRO
<b>7</b>	Familiarisation of rheostats, measurement of potential across resistance elements and introducing the concept of relative potential using a DC circuit.

<b>8</b>	<p>a) Identify battery specifications using different types of batteries. (Lead acid, Li Ion, NiCd etc.)</p> <p>b) Familiarize different types of earthing (Pipe, Plate Earthing, Mat Schemes) and ground enhancing materials (GEM).</p>
<p align="center"><b>ELECTRONICS WORKSHOP</b></p> <p align="center"><b>(Minimum of 7 Experiments to be done)</b></p>	
<b>1</b>	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.)
<b>2</b>	Drawing of electronic circuit diagrams using BIS/IEEE symbols and Interpret data sheets of discrete components and IC's
<b>3</b>	<p>Familiarization/Application of testing instruments and commonly used tools. - Multimeter, Function generator, Power supply, CRO, DSO.</p> <p>Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station</p>
<b>4</b>	Testing of electronic components using multimeter - Resistor, Capacitor, Diode, Transistor and JFET.
<b>5</b>	<p>Printed circuit boards (PCB) - Types, Single sided, Double sided, PTH, Processing methods.</p> <p>Design and fabrication of a single sided PCB for a simple circuit.</p>
<b>6</b>	<p>Inter-connection methods and soldering practice.</p> <p>Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions.</p> <p>Soldering practice in connectors and general-purpose PCB, Crimping.</p>

<b>7</b>	Assembling of electronic circuit/system on general purpose PCB, test and show the functioning (Any two)- Fixed voltage power supply with transformer <ul style="list-style-type: none"> <li>• Rectifier diode</li> <li>• Capacitor filter</li> <li>• Zener/IC regulator</li> </ul> Square wave generation using IC 555 timer in IC base.
<b>8</b>	Assembling of electronic circuits using SMT (Surface Mount Technology) stations.
<b>9</b>	Introduction to EDA tools (such as KiCad or Xcircuit)

**Course Assessment Method**  
(CIE: 50 marks, ESE: 50 marks)

**Continuous Internal Evaluation Marks (CIE):**

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

**End Semester Examination Marks (ESE): (Internal evaluation only)**

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

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

*Pass Criteria:*

- *A student must score a minimum of 50% overall, combining marks from both Continuous Internal Evaluation (CIE) and End Semester Examination (ESE).*
- *In addition, the student must secure at least 40% in the End Semester Examination (ESE).*

*The ESE shall be conducted internally, with evaluation carried out by a panel of faculty members. This panel must include at least one faculty member who was not involved in the Continuous Internal Evaluation (CIE) of the lab course.*

### Course Outcomes (COs)

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

Course Outcome		Bloom's Knowledge Level (KL)
<b>CO1</b>	Demonstrate safety measures against electrical shocks	K2
<b>CO2</b>	Familiarise with transformers, rheostats, batteries and earthing schemes	K2
<b>CO3</b>	Illustrate the connection diagram and identify the suitable accessories necessary for wiring simple electric circuits	K3
<b>CO4</b>	Identify various electronic components	K2
<b>CO5</b>	Operate various measuring instruments	K3
<b>CO6</b>	Apply the design procedure of simple electronic circuits on breadboard and PCB	K3
<b>CO7</b>	Build the ability to work in a team with good interpersonal skills	K3

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

### CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>						3						2
<b>CO2</b>	1					2	1					2
<b>CO3</b>	2					1						2
<b>CO4</b>	3					2						3
<b>CO5</b>	3				3	2			2			3
<b>CO6</b>	3		3	1	3	2	1		2			3
<b>CO7</b>									3	2		2

Text Books				
Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Electrical Design Estimating and Costing	K B Raina and S KBhattacharya	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

### 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