Basic Electrical Lab		Semester	I/II
Course Code	**BBEEL107**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0:0:2:0	SEE Marks	70
Total Hours of Pedagogy	2	Total Marks	100
Credits	1	Exam Hours	03
Examination type (SEE)	**Practical**		

Course outcome (Course Skill Set)

At the end of the course, the student will be able to:

(1)Conduct standard electrical experiments to verify theoretical principles.

(2)Measure key electrical parameters such as resistance, inductance, impedance, power, and power factor with standard methods.

(3)Design and perform experiments to solve practical open-ended electrical problems.

(4)Analyse experimental data from non-routine method to arrive at a solution.

Note:

(i)The laboratory syllabus consists of PART-A and PART-B. While PART-A has 6 conventional experiments, PART-B has 6 typical open-ended experiments. The maximum mark for laboratory course is 100.

(ii) Both PART-A and PART-B are considered for CIE and SEE.

(iii) Students have to answer 1(one) question from PART-A and 1(one) question from PART-B.

(iv a) The questions set for SEE shall be from amongst the experiments under PART-A. It is evaluated for 70 marks out of the maximum 100 marks.

(iv b)The open-ended question set for SEE shall be any other open-ended question and not selected from the experiments under PART-A. It shall be evaluated for 30 marks.

(v) For continuous internal evaluation, during the semester classwork, the typical open-ended questions may be selected from PART-B or there may be any other similar question to enhance the skill of the students.

PART – A
CONVENTIONAL EXPERIMENTS

(1) Verification of Ohm's law and Kirchhoff's laws.

(2) Measurement of low range resistance using voltmeter-ammeter method.

(3) Measurement of earth's resistance by 3-electrode method.

(4) Measurement of resistance, inductance, impedance, power and power factor using voltmeter, ammeter and wattmeter in single-phase AC circuits.

(5) Measurement of three-phase power of an inductive load by 2-wattmeter method, when the load is (a) star connected and (b) delta connected. Calculation of resistance, reactance, impedance and power factor.

(6) Wiring an appropriate electric circuit, understanding the basic principle used for 2-way and 3-way control of load.

PART – B
TYPICAL OPEN-ENDED EXPERIMENTS

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

(1) Creation of short circuit to determine the time taken by a fuse of different length. Documenting the test data and the conclusions.

(2) Trouble shooting experiments in simple DC circuits. The trouble may be due to loose connection, faulty component leading to open circuits or short circuits. Detection of fault and the reasons for that and conclusion.

(3) Measurement of voltage between line and neutral, ground and line, ground and neutral in respect of heathy and unhealthy 3-pin socket. Conclusions arrived for the faulty wiring. Allowable ground voltage.

(4) A 12 V battery is available. It is required to obtain 3 V from the battery to charge a mobile. Create a circuit to obtain the required voltage. Specify all the ratings of the components used.

(5) Only three ammeters and standard resistance are available in the laboratory. Using the same measure the single phase power consumed by an inductive load.

(6) Only three voltmeters and standard resistance are available in the laboratory. Using the same measure the single phase power consumed by an inductive load.

Suggested Learning Resources:

Textbooks:

1. **Manual prepared for the conventional experiments by EEE Departments.**

Web links and Video Lectures (e-Resources):

(1) https://bes-iitr.vlabs.ac.in/List%20of%20experiments.html [Virtual Labs, an ministry of education (MOE) Govt. of India Initiative]

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

(i)Demonstration with hands-on practice.

Perform the experiment step-by-step to reinforce understanding and skill after a demonstration.

(ii)Problem-based learning (PBL)

Students to work individually or in groups to analyse the situation, design solutions, and present their findings.

Assessment of CIE and SEE

The assessment of the practical course is for a maximum of 100 marks. Both CIE and SEE are evaluated for 50 marks each.

(a)CIE Assessment

(i)The CIE marks of 25 shall be based on the work carried out during the laboratory hours. The components considered for assessment of marks shall be based on the experiment conducted under both PART-A and PART-B and the laboratory record.

(ii)The rest 25 marks shall be for the test conducted under PART-A and PART-B.

(iii)The laboratory test (duration 03 hours) at the end of the last week of the semester /after completion of all the experiments (whichever is early), shall be conducted for both PART-A and PART-B.

(iv)PART-A shall be evaluated for a maximum of 15 marks and PART-B for a maximum of 10 marks. Each student has to conduct the PART-A experiment individually. The time allotted for this is 1.5 hours. The question under PART-B may be attempted by an individual or a group of students. The time allotted for this is 1.5 hours.

(v)The evaluation process shall as per University notification.

(b)SEE Assessment

The maximum SEE mark for the final examination is 100 marks. While PART-A carries a maximum of 70 marks, PART-B carries a maximum of 30 marks. The sum total of PART-A and PART-B should be scaled down to 50 marks.

The evaluation process shall as per University notification.

Passing Standard

(i)To become eligible to appear for SEE, the marks secured by a student in CIE must be a minimum of 40 % of 50 marks, i.e., 20 marks.

(ii)For a pass in SEE, the marks secured by a student must be a minimum of 35 % of 50 marks, i.e., 18 marks.

(iii) A student is deemed to have **successfully completed the course** if the **sum total of CIE and SEE is at least 40 out of 100 marks.**■

Rubrics for Practical assessment

Performance Indicators	Excellent	Very Good	Good	Needs Improvement
Fundamental Knowledge (5) (PO1)	The student has an in depth knowledge of the topics related to the course. (5)	Student has ample knowledge of the topics related to course. (4)	Student has good amount of knowledge but not in detail. (3)	Student has some knowledge. (1-2)
Design of Experiment (5) (PO2 & PO3)	Student can conceive more than one design for the problem statement and capable of proving the best suitable design. (5)	Student is capable of discussing few designs for the problem statement but not certain about its suitability.(4)	Student is capable of discussing one of the designs and explain completely. (3)	Student is not capable of completing the design to its logical end. (1-2)
Implementation (5) (PO3 & PO8)	Student is capable of implementing the design with ease to obtain optimal solution. (5)	Student is capable of implementing the design successfully, along with a solution and explanation. (4)	Student is capable of implementing the design with a solution and average explanation. (3)	Student is capable of implementing the design, but unable to justify the result. (1-2)

Result & analysis (5) (PO4)	Student is able to get the expected results with justifications. (5)	Student is able to get the expected results and able to justify only partially. (4)	Student is able to get the expected results and unable to justify (3)	Student is able to get the expected results but unable to justify (1-2)
Demonstration (10) (PO9)	The lab record is well-organized, with clear sections (e.g., introduction, Theory, Method, Results, Conclusions. (9-10)	The lab record is organized, with clear sections, but some sections are not well-defined. (7-8)	The lab record lacks clear organization or structure. Some sections are unclear or incomplete. (5-6)	The lab record is poorly organized with missing or unclear sections. (3-4)