

Government of Karnataka
Department of Technical Education
Board of Technical Examinations, Bengaluru

Course Title: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	Course Code : 15EE02P
Semester : I / II	Course Group : Core
Teaching Scheme (L:T:P) : 0:2:4 (in Hours)	Credits : 3 Credits
Type of course : Tutorial + Practical	Total Contact Hours : 78
CIE : 25 Marks	SEE : 50 Marks
Programme: Mechanical (GL), Mechanical (Instr.), MTT, HPT, WSM, Mechatronics, Printing Technology, Textile Technology, Ceramics, Mining Engg., Metallurgical Engg.	

Pre-requisites : Basic Electrical and Electronics Engineering theory in Diploma curriculum.

Course Objectives : To provide practical knowledge about the DC & AC circuits, different wiring circuits, Battery, Relay, three phase AC motor, Cubical Panel board, semiconductor diodes, rectifiers and basic logic gates.

List of Experiments:

1. Construct a suitable circuit to verify Ohm's law.
2. Rig up and test the wiring circuit to control a lamp and a three pin socket independently.
3. Rig up and test the wiring circuit to control two lamps independently.
4. Construct and test fluorescent lamp circuit.
5. Construct and test the staircase wiring circuit (control from 2 places).
6. Construct and test Meter board wiring using single phase Energy meter, MCB/ELCB, Kit-kat fuse and neutral link.
7. Build and test a circuit to measure power and power factor in a single phase ac circuit.
8. Construct a circuit to measure energy in KWh in a single phase ac circuit.
9. Construct a suitable circuit to start and reverse the direction of three phase induction motor using DOL/ Star-Delta/ Auto-Transformer starter.
10. Test and make a report of the fully charged and discharged conditions of a given Lead-acid battery.
11. Construct a circuit using a single Relay to turn ON a lamp connected to NC and to turn OFF another lamp connected to NO contacts of Relay.
12. Construct a circuit to obtain the forward bias characteristic of a Diode.
13. Construct and test Zener diode as a voltage regulator.
14. Build and test half wave rectifier circuit.
15. Build and test full wave bridge rectifier circuit (without filter).

16. Construct a circuit to verify the truth tables of NOT, AND, OR, NOR and NAND gates.
17. Identify and draw the layout diagram for a simple CUBICAL PANEL BOARD/consisting of bus bars, CB/MCB/ELCB, meters, HRC fuses, magnetic contactors, cables, earthing points.

Reference Books:

1. Experiments in Basic Electrical Engineering by S. K. Bhattacharya, New Age International Publications, 2007 Edition.
2. A Text book on Laboratory courses in Electrical Engg. by S.G. Tarnekar and P. K. Karbanda.

e-Resources:

1. <http://www.scribd.com/doc/39578646/New-First-year-Electrical-lab-manual#scribd>
2. <http://mrcet.ac.in/newwebsite/pdfs/Labmanuals-13/ECE/LabManuals/ DC%20LAB%20%28180%29%20II-I.pdf>

Course Delivery:

The Course will be delivered through Tutorial, classroom interaction, group discussion, practical exercises and assignments.

Tutorial - 1Hr:

Staff-in-charge will

1. Explain the concept of experiment to be conducted.
2. Teach required selection of components/ meters/ equipment/ suitable wires for the experiment to be conducted.
3. Ask students to draw the circuit.
4. Give clear instructions about safety precautions to be followed while conducting experiment.

Conduction/ Execution - 2 Hr:

Student will rig up the circuit diagram and conduct experiment individually under the supervision of the staff-in-charge.

Course Outcomes:

On successful completion of the Course, the student will be able to:

1. Understand Ohm's law
2. Rig-up various wiring circuits individually, including meter board and test.
3. Test and report the ratings of Battery and UPS.
4. Start and reverse the three phase induction motor.
5. Understand the operation of relay, diode circuits and logic gates

Mapping Course Outcomes with Program Outcomes:

Course Outcomes	Program Outcomes (POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
1	M	S							M			
2	M	S							M			
3	M	S							M			
4	S	M							M			
5	S	M							M			

S – Strong Relationship

M- Moderate Relationship

Course Assessment and Evaluation:

	What		To Whom	Frequency	Practical	Evidence Collected	Course Outcomes
Direct Assessment Method	CIE (Continuous Internal Evaluation)	I A Tests	Students	Two IA tests for Practical (Average marks of both the tests to be computed)	10	Blue Books	1 to 5
		Record Writing		Record Writing (Average of Marks allotted for each experiment.)	10	Lab Record	1 to 5
				Assignments	05	Log of Activity	1 to 5
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End of the Course	50	Answer Scripts	1 to 5
Indirect Assessment Method	Student Feedback on course		Students	Middle of The Course	Feed Back Forms		1 to 3
	End of Course Survey			End of The Course	Questionnaire		1 to 5

Note: I.A. test shall be conducted as per SEE scheme of valuation. However the obtained marks shall be reduced to 10 marks. (Any decimals shall be rounded off to next higher digit).

Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Educational Component	% in Weightage
1	Remember	30
2	Understand	40
3	Apply	20
4	Analyze	10

Scheme of Valuation for SEE (Semester End Examination)

Sl. No.	Particulars	Marks
1.	Identification of meters/ equipments/ wires/ tools/ etc.	05
2.	Writing Circuit diagram and Procedure *	10
3.	Conduction	20
4.	Results	05
5.	Viva-voce	10
Total		50
*Question Paper will have any ONE question from the list of experiments.		

Model Question Bank:

Course Title: **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**

Course Code: **15EE02P**

1. Construct a suitable circuit to verify Ohm's law. Also plot Graph.
2. Conduct an experiment to find the Resistance of a given unknown Resistor.
3. Rig up and test the wiring circuit to control a lamp and a three pin socket independently.
4. Rig up and test the wiring circuit to control two lamps independently.
5. Construct and test fluorescent lamp circuit.
6. Construct and test the staircase wiring circuit (control from 2 places).
7. Conduct an experiment to control a lamp from two places.
8. Construct and test Meter board wiring using single phase Energy meter, MCB/ELCB, Kit-kat fuse and neutral link.
9. Conduct a suitable experiment to test the Meter board wiring circuit.
10. Build and test a circuit to measure power and power factor in a single phase ac circuit.
11. Construct a circuit to measure energy in KWh in a single phase ac circuit.
12. Conduct an experiment to measure the single phase energy consumed in KWh for the given electrical load.

13. Construct a suitable circuit to start and reverse the direction of three phase induction motor using DOL starter.
14. Construct a suitable circuit to start and reverse the direction of three phase induction motor using Star-Delta starter.
15. Construct a suitable circuit to start and reverse the direction of three phase induction motor using three phase auto-transformer starter.
16. Test and make a report of the fully charged and discharged conditions of a given Lead-acid battery.
17. Construct and test a circuit using a Relay to turn ON/ OFF a lamp connected to 230 Volts ac supply.
18. Conduct an experiment to control a lamp using a Relay.
19. Construct a circuit using a single Relay to turn ON a lamp connected to NC and to turn OFF another lamp connected to NO contacts of Relay.
20. Conduct an experiment to turn ON a lamp and turn OFF another lamp using a single Relay.
21. Construct a circuit to obtain the forward bias characteristic of a Diode.
22. Conduct an experiment to Plot the forward bias characteristic of a PN Junction Diode.
23. Construct and test Zener diode as a voltage regulator. Also, plot the Graph.
24. Build and test half wave rectifier circuit. Also, trace the input and output waveforms.
25. Build and test full wave bridge rectifier circuit (without filter). Also, trace the input and output waveforms.
26. Construct a circuit to verify the truth tables of NOT and AND gates.
27. Construct a circuit to verify the truth tables of OR, NOR gates.
28. Construct a circuit to verify the truth tables of NAND and AND gates.
29. Conduct an experiment to verify the truth tables of given logic gates.
30. Identify and draw the layout diagram for a simple CUBICAL PANEL BOARD consisting of bus-bars, CB/MCB/ELCB, meters, HRC fuses, magnetic contactors, cables, earthing points.

Lab Equipment Requirement:**Students Intake : 60****Students per Batch : 20**

Sl. No.	Name of Equipment and Specification	Quantity Required
1	Dual Channel 30 V, 2 A continuously variable DC Regulated Power Supply with Current and Overload Protection	05 Nos.
2	+/- 15 V, 2 A, fixed DC Regulated Power Supply	05 Nos.
3	Portable Moving Coil DC Voltmeters a) 0 - 1 V b) 0 - 10 V c) 0 - 30 V	Each 05 Nos.
4	Portable Moving Iron AC Voltmeters a) 0 - 300 V b) 0 - 600 V	Each 05 Nos.
5	Portable Moving Coil DC Ammeters a) 0 - 100 mA b) 0 - 1 A c) 0 - 2 A	Each 05 Nos.
6	Portable Moving Iron AC Ammeters a) 0 - 2 A b) 0 - 5 A c) 0 - 10 A	Each 05 Nos.
7	Watt-meters a) 150/ 300V, 2 A, UPF b) 300/ 600 V, 5/ 10 A, LPF	Each 02 Nos.
8	Rheostats – 25 Ohms, 50 Ohms, 150 Ohms, 220 Ohms (all rated at 3 A)	Each 05 Nos.
9	Rheostat Loads s – 1 KW, 230 V	02 Nos.
10	Wire wound Resistors- 5 Ohms 2 Watts, 25 Ohms 5 Watts, 330 Ohms 2 Watts, 560 Ohms 2 Watts, etc.	Each 05 Nos.
11	Soldering Iron 60 W	05 Nos.
12	Fluorescent lamp sets	10 Nos.
13	Single Phase Energy meter 10 A, 230 V, 50 Hz, Digital type	05 Nos.
14	Multi-meter Digital $\frac{3}{4}$ "	06 Nos.
15	Dual Trace Oscilloscope – 30 MHz	02 Nos.
16	Three Phase Induction Motors : 1 HP – 440 V 50 Hz, 2 HP – 440 V 50 Hz.	Each 02 Nos.
17	Three phase DOL, Star-Delta, Auto transformer starter	Each 02 Nos.
18	UPS 1 KVA	01 Nos.
19	Battery Lead-Acid type, 140 A-hr and Hydrometers	02 Nos.

Sl. No.	Name of Equipment and Specification	Quantity Required
20	I C Trainer kit	05 Nos
21	Digital IC's 7400, 7402, 7404, 7408, 7486 etc	Each 10 Nos.
22	Wooden Wiring board (2x3) ft	10
23	<p>Wiring accessories</p> <p>a) PVC conduit - $\frac{3}{4}$" - 10 lengths</p> <p>b) Cap and casing - $\frac{3}{4}$" - 10 lengths</p> <p>c) Switches Single Pole- 5A, 230 V</p> <p>d) Switches two way – 5 A, 230 V</p> <p>e) 3 Pin Sockets 5A, 230 V</p> <p>f) Bulb Holders – 5 A, 230 V</p> <p>g) 3 Pin Plug 5A, 230 V</p> <p>h) 60 Watts Lamps</p> <p>i) 100 Watts Lamps</p> <p>j) 15 W CFL lamps</p> <p>k) Copper Wires of sizes 1.5 mm², 2.5 mm², 4 mm² – 1 coil each</p> <p>l) Gang boxes (1+1, 2+1, 2+2)</p> <p>m) Kit –Kat fuses 5A, 15 A</p> <p>n) MCB 16 A & 32 A/ 230 V, Single and Double Pole</p> <p>o) ELCB 16 A & 32 A/ 230 V, Double Pole</p> <p>p) Neutral link- 16 A, 230 V</p> <p>q) Screws of assorted sizes</p> <p>r) Testers</p>	Each 10 Nos.
24	<p>Electronic Components</p> <p>a) Diodes - BY 127 and IN 4001</p> <p>b) Zener Diodes – 6.2 V, 5.6 V, 7.8 V</p> <p>c) Relays – solid state Sugar cube type, SPST, Coil 6V, Power circuit 230 V, 5 A.</p> <p>d) Spring Boards</p> <p>e) Bread Boards</p> <p>f) Tag Boards.</p>	Each 10 Nos.
25	Simple PANEL BOARD/ CUBICAL consisting of bus-bars, CB/MCB/ELCB, meters, HRC fuses, magnetic contactors, cables, earthing points.	1 No