

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

Course Title: <b>BASIC ELECTRONICS LAB</b>	Course Code : <b>15EC02P</b>
Semester : <b>I</b>	Course Group : <b>Core</b>
Teaching Scheme (L:T:P) : <b>0:2:4</b> (in Hours)	Credits : <b>3 Credits</b>
Type of course : <b>Tutorial + Practical</b>	Total Contact Hours : <b>78</b>
CIE : <b>25 Marks</b>	SEE : <b>50 Marks</b>
Programme: <b>Computer Science and Engineering.</b>	

**Pre-requisites:** Knowledge of Concepts of Electrical & Electronics Engineering.

**Course Objectives** : To provide practical working knowledge of Electrical and Electronics Engg. and to make the student;

1. Recognise DC and AC supply.
2. Understand the basic concepts of electric circuits.
3. Understand the concepts of basic electronics.

### **Course Outcome:**

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

1. Identify and Measure various electrical parameters.
2. Verify different Laws and understand.
3. Measure the parameters of transformer.
4. Plot characteristics of diode.
5. Understand rectifier and filter circuits.
6. Use Op-Amp as amplifier.

## Course Contents:

### Practical Experiments

1. Identify different AC/DC power supply terminals and tabulate measured voltage between terminals.
2. Measure the value of the resistance by using (i) Analog and Digital Multi-meters and (ii) by Colour coding.
3. Measure current, voltage, resistance, inductance and capacitance using Ammeter, Voltmeter, Multi meter and LCR meters.
4. Generate AC signals using signal generator and measure Amplitude & Time period.
5. Verify ohm's law experimentally.
6. Verify Kirchhoff's current law.
7. Verify Kirchhoff's Voltage law.
8. Find transformation ratio of a single phase transformer.
9. Plot V-I Characteristics of Junction diode (only forward bias).
10. Construct half wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
11. Construct half wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
12. Construct Full wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
13. Construct Full wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
14. Construct Bridge rectifier using PN junction diode without filter and trace input and output voltage waveform
15. Construct Bridge rectifier using PN junction diode with filter and trace input and output voltage waveform
16. Use Op-Amp as inverting amplifier.
17. Use Op-Amp as non-inverting amplifier.

## Resources:

1. Principles of Electronics ,V.K. Mehta & Rohit Mehta, S. Chand Technical Publication
2. A Textbook of Electrical Technology, B.L.Theraja & A.K.Theraja, S. Chand Volume I
3. <http://www.facstaff.bucknell.edu>
4. <http://electrical4u.com/>
5. <http://www.electronics-tutorials>

## 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	Weightage (%)
1	Remembering	20
2	Understanding	20
3	Application/ Analysis	60
<b>Total</b>		<b>100</b>

## Mapping Course Outcomes with Program Outcomes: (Course Outcome linkage to Cognitive Level)

Course Outcome	Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1 Identify and Measure various electrical parameters.	1,2,3,4	2, 3, 8, 9, 10	R/U/A	12
CO2 Verify different Laws and understand.	5,6,7	2, 3, 8, 9, 10	U/A	9
CO3 Measure the parameters of transformer.	8	2, 3, 8, 9, 10	U/A	3
CO4 Plot characteristics of diode.	9	2, 3, 8, 9, 10	U/A	3
CO5 Understand rectifier and filter circuits	10,11,12, 13,14,15	2, 3, 8, 9, 10	U/A	18
CO6 Use Op-Amp as amplifier.	16,17	2, 3, 8, 9, 10	U/A	6

**U-Understanding; A-application/ Analysis; App-Application**

## Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Basic Electronics Lab	-	3	3	-	-	-	-	3	3	3

**LEVEL 3- HIGHLY ADDRESSED, LEVEL 2-MODERATELY ADDRESSED, LEVEL 1-LOW ADDRESSED.**  
METHOD IS TO RELATE THE LEVEL OF PO WITH THE NUMBER OF HOURS DEVOTED TO THE COS WHICH ADDRESS THE GIVEN PO.  
IF  $\geq 40\%$  OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 3  
IF 25 TO 40% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 2  
IF 5 TO 25% OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS ADDRESSED AT LEVEL 1  
IF  $< 5\%$  OF CLASSROOM SESSIONS ADDRESSING A PARTICULAR PO, IT IS CONSIDERED THAT PO IS CONSIDERED NOT-ADDRESSED.

## **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 Assessment and Evaluation:

	What		To Whom	Frequency	Practical	Evidence Collected	Course Outcomes
<b>Direct Assessment Method</b>	<b>CIE (Continuous Internal Evaluation)</b>	I A Tests	Students	Two IA tests for Practical (Average marks of both the tests to be computed)	10	Blue Books	1 to 6
		Record Writing		Record Writing (Average of Marks allotted for each experiment.)	10	Lab Record	1 to 6
				Student Activity	05	Log of Activity	1 to 6
		<b>TOTAL</b>		<b>25</b>			
	<b>SEE (Semester End Examination)</b>	End Exam	Students	End of the Course	50	Answer Scripts	1 to 6
<b>Indirect Assessment Method</b>	Student Feedback on course		Students	Middle of The Course	Feed Back Forms		1 to 6
	End of Course Survey			End of The Course	Questionnaire		1 to 6

\*CIE – Continuous Internal Evaluation

\*SEE – Semester End Examination

**Note:**

1. I.A. test shall be conducted as per SEE scheme of valuation. However obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the next higher digit.
2. Rubrics to be devised appropriately by the concerned faculty to assess Student activities.

## Suggested Student Activities:

Each Student has to prepare a self-hand written report of 3 pages or solved in a blue book considering any one of the following topics.

1. Soldering practice for a better solder.
2. Mini-Projects: Rectifier circuits with and without filters, and OPAMP circuits.
3. List out the different protective devices used in your laboratories or house with their ratings.
4. Visit nearby Battery charging shop or show room and prepare a report of the visit.
5. Prepare a report of the conditions of batteries available in the Polytechnic.
6. For given voltage, current, Ah ratings of individual cell, and required voltage and current rating of battery, prepare a report of calculations for number of cells and their method of connections and calculate the rating of UPS.
7. Report on block diagram, internal parts and working of CRO.
8. Report on block diagram, internal parts and working of DC Regulated power supply.

### MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY ( Course Coordinator)

Dimension	Scale					Students score (Group of five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	3				
2	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2				
3	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	5				
4	Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	4				
<p><b>Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks</b></p> <p><b>One activity on any one CO (course outcome) may be given to a group of FIVE students</b></p> <p style="text-align: right;"><b>Grand Average/Total</b></p>						14/4				
						=3.5				
						≈4				

**Example only: MODEL OF RUBRICS / CRITERIA FOR ASSESSING STUDENT ACTIVITY-  
Task given- Industrial visit and report writing**

Dimension	Scale					Students score (Five students)				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary	1	2	3	4	5
1. Organisation	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed	3				
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles	2				
3. Conclusion	Poor	Less Effective	Partially effective	Summarises but not exact.	Most Effective	5				
4. Conventions	Frequent Error	More Error	Some Error	Occasional Error	No Error	4				
Total marks						14/4=3.5 ≈4				

**SCHEME OF VALUATION IN SEE**

Sl. no.	Performance	Max. Marks
1	Identification of meters, Electronic components	05
2	Writing one Circuit diagram and procedure.	10
3	Conduction of experiment	20
4	Result	05
5	Oral	10
<b>TOTAL</b>		<b>50</b>



## Model Question Bank

Course Title: **BASIC ELECTRONICS LAB**

Course Code:

**15EC02P**

1. Construct a circuit to verify ohm's law.
2. Construct a circuit to verify Kirchhoff's current and Voltage laws.
3. Conduct an experiment to find transformation ratio of a given Transformer.
4. Conduct an experiment to Plot V-I Characteristics of Junction diode (forward bias only).
5. Construct a half wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
6. Construct a half wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
7. Construct a Full wave rectifier using PN junction diode without filter and trace input and output voltage waveform.
8. Construct a Full wave rectifier using PN junction diode with filter and trace input and output voltage waveform.
9. Construct a Bridge rectifier using PN junction diode without filter and trace input and output voltage waveform
10. Construct a Bridge rectifier using PN junction diode with filter and trace input and output voltage waveform
11. Conduct an experiment to connect Op-Amp as inverting amplifier.
12. Conduct an experiment to connect Op-Amp as non-inverting amplifier.

**Materials required for Basic Electronics Lab**

<b>Sl. No</b>	<b>Name of equipment</b>	<b>Numbers Required as per norms</b>
1.	0-15 V at 2/1A continuously variable power supply with current limit.	10
2.	0-30V at 2/1A continuously variable power supply with current limit	10
3.	Function generator	05
4.	Dual trace oscilloscope.	06
5.	Digital multimeters	10
6.	Analog multimeters	05
7.	Volt meters DC 0-100mV, 0-1/2, 0-10, 0-15/30V	20
8.	Volt meters AC 0-150/300V	10
9.	Ammeters DC 0-100 $\mu$ A, 0-10mA, -100mA	4 each
10.	Ammeters AC 0-100 $\mu$ A, 0-1 $\mu$ A, 0-100mA, 0-1A, 0-5/10A	20
11.	Decade resistance boxes	03
12.	Rheostats assorted	20
13.	LCR meter	02
14.	Single phase transformer 1KVA, 2KVA	02each
15.	Diodes	L/S
16.	Electronic components –resistors, inductors, capacitors, transformers hook up wires etc	L/S
17.	Analog IC-OPAMP 741etc.	L/S
18.	Bread boards	L/S