

Department of Electrical & Electronics Engineering

COURSE MODULE OF THE COURSE TAUGHT FOR THE SESSION OCT- JAN 2023-2024 (ODD SEM)

Course Syllabi with CO's

Faculty Member: Kavyashree S				Academic Year: 2023-2024			
Department: Electrical & Electronics Engineering							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BEE306B	Electrical Measurements and Instrumentation	Core	Basic Electricals	3	-	0	40
Objectives	<ol style="list-style-type: none"> To understand the significance and method of measurement, elements of generalized measurement system and errors in measurements. To measure resistance, inductance, capacitance by use of different bridges. To study the construction, working and characteristics of various instrument transformers. To have the working knowledge of electronic instruments and display devices. 						
Topics Covered as per Syllabus							
Module-1							
Measurements and Measurement systems: Introduction, significance and methods of Measurements, Instruments and measurement systems, Mechanical, electrical and electronic instruments. Classification of instruments. Functions and applications of Measurement systems. Types of Instrumentation systems, information and signal processing. Element of generalized measurement system. Input-output configurations of measuring instruments and measurement systems. Methods of correction for interfering and modifying inputs, errors in measurements, Accuracy and precision.							
Module-2							
Measurement of Resistance: Wheatstone's bridge, sensitivity, limitations. Kelvin's double bridge. Earth resistance measurement by fall of potential method and by using Megger.							
Measurement of Inductance and Capacitance: Sources and detectors, Maxwell's inductance and capacitance bridge. Hay's bridge, Anderson's bridge, Desauty's bridge, Schering bridge. Shielding of bridges. (Derivations and Numerical as applicable).							
Module-3							
Instrument Transformers: Introduction, Use of Instrument transformers. Burden on Instrument transformer.							
Current transformer (CT): Relationships in CT, Errors in CT, characteristics of CT, causes and reduction of errors in CT, Construction and theory of CT.							
Potential transformer (PT): Difference between CT and PT, Relationships in PT, Errors in PT, characteristics of PT, reduction of errors in PT.							
Magnetic measurements: Introduction, measurement of flux/ flux density, magnetizing force and leakage factor.							

Module-4 Electronic and Digital Instruments:

Introduction. Essentials of electronic instruments, Advantages of electronic instruments. True RMS reading voltmeter. Electronic multimeters. Digital voltmeters (DVM) - Ramp type DVM, Integrating type DVM and Successive - approximation DVM. Q meter. Principle of working of electronic energy meter (with block diagram), extra features offered by present day meters and their significance in billing.

Module-5 Display Devices: Introduction, character formats, segment displays, Dot matrix displays, Bar graph displays. Cathode ray tubes, Light emitting diodes, Liquid crystal displays, Nixies, Incandescent, Fluorescent, Liquid vapor and Visual displays.

Recording Devices: Introduction, Strip chart recorders, Galvanometer recorders, Null balance recorders, Potentiometer type recorders, Bridge type recorders, LVDT type recorders, Circular chart and XY recorders. Digital tape recording, Ultraviolet recorders. Electro Cardio Graph (ECG).

Suggested Learning Resources:

1. Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co, 10th Edition.
2. A Course in Electronics and Electrical Measurements and Instrumentation, J. B. Gupta, Katson Books, 2013

Reference Books:

1. Electrical and Electronic Measurements and Instrumentation, R.K. Rajput, S Chand, 5th Edition, 2012
2. Electrical Measuring Instruments and Measurements, S.C. Bhargava, BS Publications, 2013
3. Modern Electronic Instrumentation and Measuring Techniques, Cooper D and A.D. Heifrick, Pearson, First Edition, 2015
4. Electronic Instrumentation and Measurements, David A Bell, Oxford University, 3rd Edition, 2013
5. Electronic Instrumentation, H.S.Kalsi, Mc Graw Hill, 3rd Edition, 2010

Graduate Attributes:

Engineering Knowledge, Problem Analysis

Course Outcomes

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

CO1: Explain the significance and methods of Measurements, elements of generalized measurement system and errors in measurements. (L2)

CO2: Identify the suitable bridges to Measure resistance, inductance and capacitance by different methods. (L3)

CO3: Explain the construction, working and characteristics of various instrument transformers. (L3)

CO4: Summarize the working of different electronic instruments and display devices. (L2)

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the
- second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then
- only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**).

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Course Code:	BEE306B	TITLE: Electrical Measurements and Instrumentation							Faculty Member: Kavyashree S			
List of Course Outcomes	Program Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	3	2	2	-	2	-	-	-	-	-	-	-
CO-2	3	3	2	-	2	-	-	-	-	-	-	-
CO-3	2	2	2	-	-	-	-	-	-	-	-	-
CO-4	2	2	2	-	-	-	-	-	-	-	-	-

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution

The Correlation of Course Outcomes (CO's) and Program Specific Outcomes (PSO's)

Course Code:	BEE306A	TITLE: Electrical Measurements and Instrumentation	
List of Course Outcomes	Program Specific Outcomes		
	PSO1		PSO2
CO-1	2		-
CO-2	2		-
CO-3	2		-
CO-4	2		-

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution