B.Tech. First Year AY 2023-24 (For E&TC Branch)

Course Code	Course Title	L	T	P	C
	Electrical Measurement and Measuring Instruments	01	00	00	02

Pre-requisites:

1. Concepts of Electrostatics and Current Electricity.
2. Fundamentals of Magnetic effect of electric current, magnetism and Electromagnetic Induction.

Course Learning Objectives:

CLO 1: To analyze of Static characteristics & types of Errors
CLO 2: To analyze statistical parameters in measuring system
CLO 3 : To Understand Measurement of Resistance and Wheatstone Bridge
CLO 4: To Understand Measurement of Capacitance
CLO 5 : To Understand Measurement of Inductance
CLO 6: To Understand Measurement of current, voltage & range increment

Course Outcomes:

After completion of this course the student shall be able to:
CO 1: Analyze Static characteristics, Comprehend types of Errors
CO 2: Exhibit the knowledge of various Statistical Parameters
CO 3 : Measure medium and low resistances using appropriate bridges.
CO 4: Measure Capacitance using appropriate bridges.
CO 5 : Measure Inductance using appropriate methods.
CO 6: Demonstrate the knowledge of Current & Voltage measurements with range extension.

Unit No.	Content	No. of Lectures Required
1	**Static characteristics:** Accuracy, Precision, Sensitivity, Linearity, Threshold, Resolution, Repeatability and Hysteresis. **Errors:** Gross error, Systematic error, Random error, Limiting error.	**03**
2	**Statistical Parameters:** Arithmetic mean, Range, deviation, average deviation, Standard deviation, variance Probable error. (Numerical Expected)	**03**
3	**Measurement of Resistance:** Classification of Resistance, Wheatstone Bridge, Sensitivity of Wheatstone Bridge, Low resistance measurement using Kelvin double bridge	**03**
4	**Measurement of Capacitance:** Measurement of Capacitance using Schering Bridge and modified De Sauty's Bridge.	**02**

5	Measurement of Inductance using Maxwell's Bridge and Hay's Bridge	**02**
6	**Electrical Measuring Instrument:** Measurement of Current and Voltage using PMMC, Range extensions of ammeters and voltmeters, Numerical on Range extensions	**03**
	Total	**16 – Lectures**

Text Books:

1. H. S. Kalsi, Electronic Instrumentation, McGraw Hill Education Pvt Ltd., New Delhi, 1995.
2. A.K.Sawhney, A course in Electrical and Electronic Measurement and Instrumentation – Dhanpat Rai and Sons, New Delhi, 1999
3. B.C.Nakra and K.K.Chaudary, Instrumentation Measurement and Analysis, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1985.

Reference Books:

1. David A. Bell, Electronic Instrumentation and Measurements, Third Edition, Oxford Higher Education,
2. D.Patranabis, Principles of Industrial Instrumentation, Tata McGraw Hill Publishing Ltd., New Delhi, 1999.
3. R.K.Jain, Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.
4. Ernest O. Doebelin, Measurement systems Application and Design, International Student Edition,IV Edition, McGraw Hill Book Company, 1998.
4. Robert L.Boylestad, "Electronic Devices and Circuit theory", Publ. Pearson Education

Laboratory on Electrical Measurement and Measuring Instruments

Course Code	Course Title	L	T	P	C
	Electrical Measurement and Measuring Instruments Laboratory	00	00	02	01

Contents: Minimum Eight practical's are to be conducted out of the following.

List of Experiments:

1. Measurement of resistance using Wheatstone's Bridge
2. Measurement of resistance using Kelvin double bridge
3. Measurement of capacitance using Schering Bridge
4. Measurement of capacitance using modified De Sauty's Bridge
5. Measurement of Inductance using Maxwell's Bridge
6. Measurement of Inductance using Hay's Bridge
7. Design of multi-range DC ammeter
8. Design of multi-range DC voltmeter
9. Measurement of high resistance using Megger
10. Measurement of Arithmetic mean, Range deviation, average deviation for voltage/current.