

Measurement I

Semester- 3rd

L T P
3 2

Full marks Theory 80 + 20 (100)
Full marks Practical 40 + 10 (50)

Subject Code : ELE304

01. Fundamentals of Measurement

4 Hr

- 1.1 Electrical signals and errors, their types
- 1.2 Desirable qualities of measuring instruments.
- 1.3 Various effects of electricity employed in measuring instruments.
- 1.4 Classification of measuring Instruments.

02. Measurement of Current and Voltage

9 Hr

- 2.1 Construction and principle of PMMC, MI, Dynamometer & induction type instruments, Hot wire & electrostatic instruments.
- 2.2 Voltmeter, Ammeter, Multi-meter : analog and digital types
- 2.3 Range Extension of Ammeter and Voltmeter.
- 2.4 Instrument transformers (CT & PT), tongue tester, their use in extension of ranges

03. Measurement of Power

6 Hr

- 3.1 Principle and Construction of single phase & three phase dynamometer type wattmeter.
- 3.2. Errors and their compensation.
- 3.3 Measurement of single phase power with one wattmeter and 2 wattmeter methods for balanced and unbalanced loads.
- 3.4 Three phase power measurement by two wattmeter and three wattmeter for balanced and unbalanced loads.
- 3.5 Effect of power factor variation on wattmeter readings in two wattmeter method.

04. Measurement of Energy

6 Hr

- 4.1 Constructional feature & principle of working of single phase induction type energy meter.
- 4.2 Constructional feature & principle of working of three-phase induction type energy meter.
- 4.3 Different types of errors and their compensation.
- 4.4 Concept of Electronic energy meter.

05. Measurement of Resistance

4 Hr

- 5.1 Low, medium & high resistance
- 5.2 Measurement of low resistance by potentiometer & Kelvin's double bridge
- 5.3 Measurement of earth resistance by megger
- 5.4 Measurement of medium resistance by Wheatstone bridge method.
- 5.5 Measurement of high resistance by loss of charge method.

06. Measurement of Inductance & Capacitance

6 Hr

- 6.1 Measurement of inductance by Maxwell Bridge, Andersons Bridge, Hays Bridge
- 6.2 Measurement of capacitance by D-sauty Bridge, Schering Bridge.
- 6.3 Self & Mutual inductance Measurement,
- 6.4 Digital multimeter, LCR meter.

07. Transducers

7 Hr

- 7.1 Introduction of different types of transducers.
- 7.2 Primary and Secondary, Active and Passive Transducers.
- 7.3 LVDT, RVDT, RTD, Thermistor,
- 7.4 Piezoelectric, photoelectric, ultra-sonic.

MEASUREMENT LAB

Subject Code : ELE308

List of Practical's: (Minimum 10 experiments to be performed by students)

Marking will be in the following pattern

Attendance Previous Lab records Experiment performance Observations Viva

(all heads will have equal weight age)

1. Measurement of Current and Voltages by Low range ammeter and voltmeter respectively with shunt and multiplier.
2. Calibration of Wattmeter at various power factors by standard Wattmeter.
3. Measurement of active power in three phase balanced load by single wattmeter method.
4. Measurement of active and reactive power in three phase balanced load by two wattmeter method
5. Measurement of single phase power with 3 ammeters and 3 voltmeters.
6. Calibration of Energy meter at various power factors by standard energy meter.
7. Measurement of energy in single phase & three phase balanced load using Electronic Energy Meter.
8. Measurement of Low resistance by Kelvin's Double Bridge.
9. Measurement of Medium resistance by Wheatstone bridge.
10. Measurement of Insulation Resistance by Megger.
11. Measurement of Resistance, Voltage, Current, Voltage, Current in A.C & D. C. Circuit by using digital multimeter.
12. Measurement of A.C. Current by tongue tester.
13. Measurement of Circuit Parameters by LCR meter.
14. To measure linear displacement by LVDT and plot characteristics.
15. Measurement of inductance by Maxwell Bridge.
16. Measurement of Capacitance by Schering Bridge.
17. Measurement of inductance by Hay's Bridge.

Books Recommended:-

1. Electrical & Electronics Measuring Instrument- Dhanpat Rai & Sons.--- A.K Sawhney
2. Electrical Measurement & Measuring Instrument-Khanna Publisher—Rejendra Prasad
3. Electrical Measurement & Measuring Instrument --- E.W.Golding
4. Electrical & Electronic Measurement by J B Gupta
5. Electrical & Electronic Measurement by Ryder
6. Electronic Instrumentation and Measurement by W D Cooper