

## 13EE3107-ELECTRICAL MEASUREMENTS

(EEE)

Instruction/week: 4 hrs.

Univ. Exam: 3 hrs.

Max. sessional marks:40

Univ. Exam marks: 60

### UNIT-I

**General theory of instruments:** Accuracy, Precision, Resolution, sensitivity, Types of Errors.

**Current and voltage measurement:** Classification-deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – deflecting torque and control torque – Errors and compensations, range extension–Ohmmeter, thermal type meter - Electrostatic Voltmeters and their types.

### UNIT –II

**Measurement of power and energy:** Single phase dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems.

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading. Three phase energy meter – trivector meter.

### UNIT –III

**Instrument transformers:** CT and PT – Ratio and phase angle errors – design considerations

–**P.F meters:** Type of P.F. Meters – dynamometer and moving iron type –

1-ph and 3-ph meters **Frequency meters:** resonance type and Weston type – synchrosopes.

### UNIT-IV

**Potentiometers:** Principle and operation of D.C. Crompton’s potentiometer – standardization – Measurement of unknown resistance, current, voltage.

A.C. Potentiometers: polar and coordinate types standardization – applications

### UNIT – V

**Resistance measurement:** Ammeter voltmeter method – Wheatstone’s bridge – Kelvin’s double bridge – Megger – loss of charge method.

**AC bridges:** Measurement of inductance - Maxwell’s bridge, Hay’s bridge, Anderson’s bridge, Owen’s bridge. Measurement of capacitance -Desauty bridge. Wien’s bridge – Schering Bridge.

### TEXT BOOKS:

1. “Electronic Instrumentation”,H.S.Kalsi, Tata McGraw Hill, 2004.
2. “Electrical & Electronic Measurements and Instrumentation”, A.K. Sawhney, DhanpathRai& Co (P) Ltd, 2004.

### REFERENCES:

1. “Industrial Instrumentation and control”, S.K.Singh,Tata McGraw Hill, 2 edn.,2002.
2. “Electrical And Electronics Measurements”,R.K.Rajput,S.Chand publications