

## **33042 MEASUREMENTS AND INSTRUMENTS**

### **DETAILED SYLLABUS**

#### **UNIT I Classification and Characteristics of Instruments**

General - Definition of Measurement – functions of Measurement system (Indicating, Recording and controlling function) – Applications of measurement systems – classification – Absolute and secondary instruments – Indicating Recording and Integrating Instruments – Analog and Digital – Definition of True value, accuracy, precision, error and error correction – Instrument efficiency – Effects used in instruments – operating forces – Deflecting, controlling and damping forces – constructional details of moving system – Types of Supports - Balancing – Torque weight ratio – control system (spring control and gravity control) Damping systems – Magnets – pointers and scales.

#### **UNIT II MEASUREMENT OF CURRENT, VOLTAGE AND RESISTANCE**

Types of Instruments – construction, working and torque equation of moving coil, Moving iron, dynamometer type (Shaded pole) Instruments – Extension of instrument range using shunts and multipliers. (Calculation, requirements and simple problems). Tong tester – Electrostatic voltmeter – Rectifier type instruments – Instruments transformers CT and PT – Testing, Errors and characteristics of CT and PT - Classification of Resistance – measurement using conventional method – (Ammeter – voltmeter method) Measurement of low resistance using Kelvin's Bridge ohmmeter – measurement of Medium resistance using Wheatstone bridge – High resistance using Megger - earth resistance- – using Earth tester – Multimeters.

#### **UNIT III MEASUREMENT OF POWER AND ENERGY**

Power in D.C and A.C Circuits – watt meters in power measurement – Electrodynamometer type and LPF watt meters – Three phase power measurement using three phase wattmeter- Reactive power measurement in balanced load.

For Notes, Syllabus, Question Papers and Many more

Measurement of Energy in AC circuits – Single phase and three phase energy meters construction and operation – Errors and Error correction – calibration using RSS meter - Digital Energy meter.

#### **UNIT IV MEASUREMENT OF POWER FACTOR, FREQUENCY AND PHASE DIFFERENCE**

Power factor meters – single phase and Three phase Electro dynamometer type – construction and working – phase sequence Indicator – phase difference measurement using synchroscope – Trivector meter – Merz price maximum demand Indicator. Frequency measurement – Frequency meter – Weston type – Digital Frequency meter – (Simplified Block diagram

#### **UNIT V MEASUREMENT OF L,C AND WAVEFORMS**

Measurement of Inductance – Maxwell's Inductance bridge – Andersons bridge – Measurement of capacitance using Schering bridge. CRO – Block diagram – CRT – Applications - Measurements of voltage, frequency and phase difference using CRO - Time base and synchronization – Dual trace CRO – Digital storage oscilloscope – Block diagram

#### **TEXT BOOK**

A Course in Electrical and Electronics Measurements and Instrumentation, A.K. Sawhney Puneet, Sawhney Dhanpat Rai & Co (P) Ltd., New Delhi 1993