

EEIEVAC02- Basics of Measuring Instruments

Unit I Basic measurement concepts

Definition of measurement-Methods of measurement- Types of measurement- Definition of instrument- Types of instruments- Classification of instruments- Functional classification of instruments- Functional elements of instruments- Units and Standards of measurement-performance characteristics of instruments: Static and Dynamic characteristics- Errors in measurement.

Unit II Measuring instruments for Non electrical quantities

Instruments to measure mass, volume and area- Instruments to measure weight, force and torque- Instrument to measure atmospheric pressure (Barometer), altitude (Altimeter), intensity of sound (Audiometer), radiation (Bolometer), quantity of heat (Calorimeter), concentration of substance (Spectrophotometer), specific gravity of liquid (Hydrometer), Intensity of earthquake shocks (Seismograph).

Unit III Measuring instruments for Electrical quantities

Analog indicating instruments- Moving coil and moving iron instruments- Instruments for measuring current and voltage: ammeter and voltmeter - Principle of instruments to measure electrical power and energy: Wattmeter and energy meter- Measurement of electrical resistance: Ohm meter, Megger, LCR meter for coil resistance -capacitance and inductance measurement.

Unit IV Industrial measuring instruments

Temperature measuring instruments- Pressure, Differential pressure measuring instrument- Instrument to measure level of liquid- Flow measuring instrument- Instruments to measure density, viscosity, moisture, humidity, conductivity and pH.

Unit V Principle of medical instruments

Introduction to principle of sphygmomanometer- principle of Stethoscope- Endoscope- Principle of ECG, EMG, EEG, and ERG- Introduction to application of CT scan, MRI scan and ultrasound scan.

References:

Gnanavadivel et al, Measurements and Instrumentation, Anuradha Publications, Chennai, 2010.

Kalsi, Electronic Instrumentation and Measurements, Tata McGraw Hill Publishing Company Ltd., New Delhi, 4th edition, 2019.

Leslie Cromewell et al., Biomedical Instrumentation and Measurements, Prentice Hall of India private Ltd., 1997.

Thomas G. Beckwith et al, Mechanical Measurements, Addison Wesley Longman Inc., 6th edition, 2007.