Subject Code : P8IE4

MEASUREMENTS AND INSTRUMENTATION

UNIT – I : : Generalized Performance Characteristics of Instruments.

Static characteristics – accuracy, precision, repeatability, reproducibility, resolution, sensitivity, linearity, drift, span, range. Dynamic characteristics – transfer function, zero order instruments – first order instruments – step, ramp response of first order instruments – frequency response of first order instruments-second order instruments – step, ramp response of second order instruments. Dead-time elements. Errors – types of errors- cross errors-systematic errors-random errors.

UNIT – II : Transducers:

Selection, Resistive: Strain gauge, Capacitive, Inductive: LVDT, Magnetic: Hall effect transducers. Magneto resistive, piezoelectric, Optical junction - less detectors, junction devices, Temperature: Resistance Temperature Device, Thermocouples, Thermistors.

UNIT – III : Measurement of Parameters:

Application of PMMC Meter Movement in voltmeter and ammeter. BJT, FET and MOSFET voltmeter circuits. Solid state multimeter; DMM.
Generating Instruments: Audio and Radio frequency Signal Generators. AM Signal generator. Function generator.
Display Instruments: Storage CRO-Sampling CRO. Wave analyzer and spectrum analyzer.

UNIT – IV : Chemical and thermal measurements.

Principles of pH measurements- electrodes for pH measurements – digital pH meter – industrial pH meter- selective ion electrodes. Introduction to thermal methods analysis- thermo gravimeter – differential thermo analysis.

UNIT – V : : Biomedical Instrumentation.

Introduction to human physiology. Characteristics of recording system – Electrocardiography (ECG). Electro-encephalography (EEG). Electromyography (EMG) – Electro retinography (ERG). Electro oculo graphy (EOG). Pacemakers – artificial heart valves – defibrillators. Nerve and muscle stimulators. Heart lung machine. Kidney machine.

Books for Study:

1. Electronics Measurements Systems, Anton F.P. Van Putten, Prentice Hall.
2. Electrical and Electronics Instrumentation, H.H.Chiang, Wiley.
3. Digital Instrumentation, A.J.Bouwens, McGraw Hill.
4. Electronics Instrumentation and Measurements, D.A.Bell, Prentice Hall.
5. Electronic Instrumentation and Measurement Techniques, F.F.Mazda, Cambridge University Press.
6. Electronic Instrumentation Measurement Techniques, W.D.Cooper & Helfrick, Wiley Eastern.
7. Biomedical Instrumentation, M. Arumugam, Anuradha Agencies
8. Hand book on Biomedical Instrumentation, R. S. Khandpur, Tata McGraw Hill