Subject Code : P8AP1

CORE COURSE - I PRINCIPLES OF INSTRUMENTATION AND TRANSDUCERS

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 and 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-I

Introduction-Primary and secondary transducers-Electrical Transducers-Active and passive transducers-Resistive transducers-Potentiometers-Strain Gauges-Resistance thermometers- Thermistor - Inductive transducers-LVDT-Capacitive Transducers.

Unit-III Transducers-II

Introduction- Thermoelectric transducers- Piezoelectric Transducers- magnetostrictive transducer-Ionization Transducers- Digital Transducers- switching magnetic sensors-Squid sensor-Fiber Optic sensor-Temperature pressure and displacement measurement.

Unit-IV Electro analytical Sensors

Introduction- electro chemical cell- cell potential- Standard Hydrogen Electrodes-Liquid Junction and other potentials –Sensor electrodes-electro ceramics in general media-chem FET-Smart Sensors.

Unit- V Data manipulation and Recording

A/D conversion techniques- D/A conversion- A/D conversion-ramp –Integrating – Potentiometric A/D conversion- recorders- graphic recorders-strip chart recorders- XY recorders- magnetic tape recorders- digital storage oscilloscope- ratio telemetry.

Books for study

1. A.K. Sawhney and Puneet Sawhney, A Course in Mechanical Measurement and Instrumentation, Dhanpat Rai &Sons, New Delhi 2000. (Units I, II, III, V)
2. D.Patranabis, Sensors and Transducers, Prentice – Hall of India (P) Ltd., New Delhi (2003). (Unit-IV).

Books for reference

1. D.V.S. Murty, Transducers and Instrumentation, Prentice – Hall of India (P) Ltd., New Delhi (1995).
2. Ernest O. Doebelin, Measurement system applications and design, McGraw Hill International Book Company, Singapore (1983).