IAC - 112

Transducer Technology

(02 credits – 50 marks)

Course Outcomes:

On completion of the course, students should be able to-

1	Observe, monitor, analyze and sympathy towards the instruments form the basis of measurement
2	Distinguish between transducers, sensors and transmitters
3	Define principle behind strain gauge and pressure sensors
4	Explain working of displacement, position, motion & temperature sensors
5	Work with different sensors

Course Contents:

Module– I: Introduction to Transducers **(06 Hrs)**

Characteristics and choice of Transducer, Classification of Transducer: Primary & secondary, Passive & Active, Transducers & Inverse Transducers; Advantages of Electrical Transducers, Summery of factors influencing the choice of Transducers, Types of signals: Pneumatic signal, Hydraulic signal, Electric signal, Difference between sensors, transmitter and transducer.

Module– II: Displacement, Position and Motion Sensor **(06 Hrs)**

Principles of variable resistance, variable inductance, variable reluctance, variable capacitance type sensors, Position and Motion sensor : Limit switches, proximity sensors, optical proximity sensor, ultrasonic proximity sensor
LVDT & RVDT: Construction, working principle, Advantages and Disadvantages
Hall Sensor: Working principle, Hall Effect gear tooth sensor
Accelerometer: Definition, General Construction, Working principle, types of accelerometer

Module– III: Temperature Sensors **(06 Hrs)**

Mechanical and resistance type temperature sensors, Thermistors: Construction of Thermistors, resistance temperature characteristics of thermistors, voltage current and current time characteristics of thermistors, salient features of thermistors
Thermocouple: Construction of thermocouple, Measurement of thermocouple output, Compensation circuit, reference junction compensation, Optical pyrometer

Module– IV: Strain Gauge and Pressure Sensor **(06 Hrs)**

Strain Gauge: Working principle, construction, piezo resistance co-efficient; Types of strain gauge: bonded, unbounded, semiconductor; Strain gauge measurement: Wheatstone bridge measurement

Pressure Sensor: Classification of pressure, Pressure measurement methods: inductive type, capacitance type, strain gauge type, reluctance type, piezoelectric pressure transducer

Module- V:

Presentations, case studies, Assignments, Tutorials based on Module I to IV.

Ref. Books:

1. A K Ghosh: Introduction to Instrumentation and Control, Prentice Hall of India, New Delhi 2004.
2. A K Sawhney: A course on electrical and electronic measurements and instrumentation, Dhanpat Raj & Co, 2005
3. D Patranabis: Principle of Industrial Instrumentation, Tata McGraw-Hill, New Delhi 2004
4. John P.Bentley: Principles of measurement systems, 3rd edition, Addison Wesley Longman, 2000.
5. David A Bell: Electronic Instrumentation and measurement, Prentice Hall of India
6. M.M.S.Anand: Electronic instruments and instrumentation Technology, Prentice-Hall of India,2004.
7. Alan S.Morris: Principles of measurement and instrumentation, 2nd edition, Prentice-Hall of India,2004.
8. Ernest O. Doebelin: Measurement systems, 4th edition, Tata-McGraw Hill, 1990.
9. H.S.Kalsi-Electronic Instrumentation,3rd edition,2011