

IAGE – 314

Advanced Sensor Technology

(02 credits – 50 marks)

Course Outcomes:

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

1	Describe basic characteristics of measurement system
2	Discuss elements of motion and dimensional measurements
3	Explain working of basic force and torque measurement
4	Explain working of advanced temperature transducers

Course Contents:

Module-I : Characteristics Of Measurement Systems

(07 Hrs)

Static characteristics - Dynamic characteristics - Mathematical model of transducer - Zero, I and II order transducers. Response to impulse, step, ramp and sinusoidal inputs. Simulation using MATLAB.

Module-II : Motion and Dimensional measurement

(06 Hrs)

Fundamental standards, relative displacements- translational and rotational, Calibration, Resistive potentiometers, differential transformers, variable inductance & variable reluctance pickups, capacitance pickup, Digital displacement transducers, Mechanical fly ball angular velocity sensor, Mechanical revolution counters and timers, tachometer encoder methods, stroboscopic method, translational velocity transducer, eddy current Drag-cup tachometer, velocity sensors.

Module-III : Force, Torque, Shaft power

(07 Hrs)

Standards & calibration; basic methods of force measurement; characteristics of elastic force transducer-Bonded strain gauge, differential transformer, Piezo electric transducer, variable reluctance/FM-oscillator, digital systems. Loading effects; Torque measurement on rotating shafts, shaft power measurement (dynamometers).

Module-IV : Temperature measurement

(07 Hrs)

Standards & calibration; thermal expansion methods bimetallic thermometers, liquid-in-glass thermometers, pressure thermometers; RTD, thermister and thermocouple (comparative study); digital thermometers. Radiation Methods – radiation fundamentals, radiation detectors: thermal

and photon, monochromatic brightness radiation thermometers, two color radiation thermometers, black body tipped fiber optic radiation thermometer, Fluor optic temperature measurement, infrared imaging systems.

Module-V : Tutorials, assignments and presentation based on Module I to IV

References:

1. S H A Doshelin, „Measurement Systems Applications and Design“, Tata Mc Graw Hill, New York, 2012
2. John P. Bentley, „Principles of Measurement Systems“, 4th Edition, Pearson Education, 2005.
3. S. Ranganathan, „Transducer Engineering“, Allied Publishers Pvt. Ltd., 2003.
4. D.V.S. Murthy, „Transducers and Instrumentation“, Prentice Hall of India, 2011.
5. D.Patranabis, „Sensors and Transducers“, Prentice Hall of India, 2004