

INDUSTRIAL INSTRUMENTATION-I

Code : EI 403

Credits : 4

Module I

Static and Dynamic errors: Standard inputs and system analysis for evaluation of such errors. Definition of precision, hysteresis, nonlinearity, sensitivity, speed of response, fidelity.

Statistical error analysis, mean, median, mode, average, estimates, distribution, probable error, standard deviation, test of normal distribution, chi-squared test curve fitting (a) method of sequential differences (b) method of extended differences and (c) method of least squares

Module II

Industrial weighing systems : Link-lever mechanism, Load cells – pneumatic, piezoelectric, elastic and magneto-elastic types - their mounting, pressductor, different designs of weighing systems, conveyors type, weighfeeder type.

Linear and angular measurements; Measurement of straightness, flatness, roundness and roughness.

Module III

Measurement of Force, Velocity, Acceleration, Torque, Strain gauge or piezoelectric force cells, Tachometers – Eddy current type, Stroboscopes, Encoders, non-contact type rpm meters (optical & magnetic), seismic accelerometer, piezoelectric accelerometer, Measurement of vibration and shock.

Small displacement measurement/ Proximity measurement - Inductive / magnetic, optical, capacitive and ultrasonic techniques Flapper nozzle system- pneumatic force balance and motion balance system.

Module IV

Pneumatic relay, filters, regulators, pneumatic transmitters, Electronic transmitters - hardware/ software, linearization, isolation.

Reliability: definition on the basis of Gaussian and normal distribution function, MTTF, Bath Tub curve, operating life and cumulative failure analysis.

Instrumentation in hazardous area: site, material and temperature classification. Intrinsic safety, pressurization, incendiary and non-incendiary systems, Combustible gas detection, enclosures- explosion proof type, other classification. Safety standards: IP and NEMA.