Subject Code : P8AP8

CORE COURSE - VIII - MECHANICAL AND INDUSTRIAL INSTRUMENTATION

Unit I - Displacement and Dimensional measurement

Classification of displacement measuring devices – gauge blocks – surface plates – comparators – optical methods – monochromatic light – optical flats – surface roughness – thickness measurement – contact type thickness gauge – inductive and capacitive methods - Ultrasonic methods – Laser based non-conductive thickness gauge – Radiation type non-conductive – measurement of casting thickness – Laser based length measurements – Camera based width measurement – Laser diameter gauge.

Unit II - Measurement of Temperature and pressure

Temperature – Temperature Scales – electrical temperature instruments –Radiation Pyrometers – optical pyrometer – fiber optic temperature measurement system – Ultrasonic thermometer – Calibration of thermometers-Different types of pressure – Elastic Pressure transducer – C type Bourdon tube – Diaphragm – Bellows – Measurement of Vaccum – McLeod gauge – Thermal conductivity gauge – Ionization gauge – Dead weight piston gauge – Calibration of Pressure measurements.

Unit III – Measurement of Force, Torque, Speed and Vibration

Measurement of force – strain gauge of load cell- hydraulic force meter – pneumatic force meter – measurement of Torque – Inline rotating and Stationary torque – Sensor – Proximity torque sensor – measurement of speed – eddy current tachometer – contactless tachometer – measurement of vibration – accelerometers – LVDT – Piezo electric methods.

Unit IV- Measurement of Density, Viscosity and Humidity

Density measurement – Purpose of density measurement – Types of density measurement – Solid, liquid and gas density measurements – magnetic methods – Radiation density meters – Refractometric density meter-Viscosity measurement – Falling sphere viscometer – Rotating cylinder viscometer- Humidity – dew point – Relative humidity – determination of moisture content of fabrics and materials.

Unit V- Measurement of Level and Flow

Capacitance level indicator – Laser level sensors – radiation level detector – Microwave reflection level detector – optical level detector-eddy current level detector – ultrasonic level detector-Flow measurement – Venturimeter – Orifice meter – Pitot tube – Rotameter – Electromagnetic flow meter – Hotwire anemometer – Ultrasonic flow meter.

Books for Study

1. S.K. Singh – Industrial Instrumentation and Control, Tata McGraw Hill Co., New Delhi, (2003). (Unit – I, II, III, IV & V)
2. A.K.Sawhney, A Course in Mechanical Measurements and Instrumentation, Dhanpat Rai & Sons, New Delhi, (1997). (Unit III & V)

Books for Reference

1. D.S. Kumar, Mechanical Measurements and Control Metropolitan, New Delhi, (1989)