GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Instrumentation & Control Engineering

Semester: V

Subject Name: **Process Instrumentation –II**

Sr. No.	Course Content
1.	**Temperature Measurement:** 1.1 Introduction and Importance 1.2 Temperature scales and relationship between them. 1.3 Temperature Sensors 1.3.1 Mercury-in-Glass Expansion Thermometers 1.3.2 Bimetallic thermometry 1.3.3 Filled system thermometry **:** Class I ,II,III, IV Thermometers • Errors in filled system thermometry, merits and demerits 1.3.4 Thermocouples • Thermoelectric laws • Thermocouple construction and types • Thermocouple extension wires • Cold Junction Temperature Compensation 1.3.5 Resistance Temperature Detector - Introduction - R.T.D. material , construction and characteristics - Lead wire compensation using 3-wire and 4-wire methods of measurement 1.3.6 Thermistors (PTC and NTC types) 1.3.7 Non-contact type Temperature Measurement using Radiation pyrometer and optical pyrometer 1.3.8 Fiber Optic type Temperature Measurement System 1.3.9 Ultrasonic Thermometers 1.4 Temperature switches and thermostats 1.5 Electronic Temperature transmitters
2.	**Level Measurement:** 2.1 Importance of level measurement in process industries 2.2 Classification of Level measurement methods 2.2.1 Direct methods - Sight glass method–Local and Remote Indication ,float type, displacer type 2.2.2 Indirect methods - pressure gauge type, air bellows, bubbler method 2.2.3 Capacitance type level measurement method 2.2.4 Radiation type level measurement method 2.2.5 Ultrasonic level detector. 2.2.6 Laser Level Sensors 2.2.7 Optical Level detector **2.3 Level switches** 2.3.1 Rotating paddle switch for solid level measurement

	2.3.2 Float type level switch - Magnetic and mercury type. 2.3.3 Displacer level switch **2.4 Level Transmitter** 2.4.1 Differential pressure type pneumatic level transmitter 2.4.2 Extended diaphragm level transmitter 2.4.3 Electronic differential pressure type level transmitter
3.	**Miscellaneous:** 3.1 Vibration Measurement 3.1.1 Introduction and Importance of Vibration Measurement. 3.1.2 Vibration Sensors :- Mass spring seismic sensor and Piezo– electric sensor 3.2 Force And Torque Measurement 3.2.1 Definition of force. 3.2.2 Scales and balances. 3.2.3 Elastic force meters. 3.2.4 Load cells 3.2.5 Definition of torque 3.2.6 Strain gauge torsion meter 3.2.7 Electrical torsion meter 3.2.8 Mechanical torsion meter.

Reference Books:

1. Industrial Instrumentation by D. P. Eckman.
2. Industrial Instrumentation by K. Krishnaswamy.
3. Mechanical Measurement & Control by Dr. D. S. Kumar.
4. Mechanical and Industrial Measurement by R. K. Jain.
5. Principles of Industrial Instrumentation by D. Patranabis.
6. Instrument Engineers Handbook by B. G. Liptak.