

6th Semester		Process Instrumentation	L-T-P 3-0-0	3 CREDITS
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Module I:**(13 Hrs)**

Basic concepts and qualities of measurement, Level measurement: Methods of liquid level measurement, Direct methods, Hook-type level indicator, sight glass, Float-type level indicator, Displacer level detectors, Indirect methods, Hydrostatic pressure type, Pressure gauge method, Air bellows, Air purge system, Liquid purge system, Electrical methods.

Module II:**(15 Hrs)**

Flow Measurement: Methods of flow measurement, Inferential flow measurement, Quantity flowmeters, Mass flowmeters, Calibration of flowmeters, Selection of flowmeters. Pressure measurement: Pressure, Methods of pressure measurement, Manometers, Elastic pressure transducers, Measurement of vacuum, Force-balance pressure gauges, Electrical pressure transducers, Pressure switches, Calibration of pressure measuring instruments, Maintenance and repair of pressure measuring instruments, Troubleshooting.

Module III:**(12 Hrs)**

Temperature measurement: Temperature, Temperature scales, Methods of temperature measurement, Expansion temperature, Filled-system thermometers, Electrical temperature instruments. Pyrometers: Radiation and optical. Methods of composition analysis: Absorption spectroscopy, Emission spectroscopy, Mass spectroscopy.

Text Books:

1. Industrial Instrumentation by D P Eckman, CBS.
2. Instrumentation: Devices and Systems, 2nd ed. by C Rangan, G Sarma, and V S V Mani, McGraw-Hill.

Reference Books:

1. Principles of Measurement Systems, 3rd ed. by J P Bentley, PHI.
2. Industrial Instrumentation and Control, 3rd ed. by S K Singh, McGraw-Hill.

Digital learning resources:

1. Chemical Process Instrumentation by Prof. Debasis Sarkar, Department of Chemical Engineering, IIT Kharagpur, Link: <https://nptel.ac.in/courses/103/105/103105130/>