

UG
Course Code: **CH209**
Credit: **2**
Version: **1**
Prerequisite Course: **Nil**

Department: **Chemical Engineering**
Course Name: **Process Instrumentation**
L-T-P: **2-0-0**
Approved on:

Introduction to Instruments and Their Representation: Application of instrument systems, functional elements of a measurement system, classification of instruments, standards and calibration.

Temperature Measurement: Temperature Scales, temperature measuring instruments: liquid in glass thermometer, bimetallic thermometer, resistance temperature detectors (RTD), thermocouples, pyrometry.

Pressure Measurement: Measurement of moderate pressure, high pressure and low pressure (vacuum), calibration and standardization.

Flow Measurement: Positive displacement meters, variable head meters, variable area meters (rotameters), weirs and notches, pitot tube, electromagnetic flow meter, hot wire anemometer, ultrasonic flow meters, laser Doppler anemometer.

Miscellaneous Measurements: Liquid level, pH, viscosity, conductivity, humidity, gas composition, and nuclear radiation.

Static and Dynamic characteristics of instruments: Errors and uncertainties in performance parameters, propagation of uncertainties in compound quantities, static performance parameters, formulation of system equations, dynamic response, compensation.

Transducers.

Building blocks of an instrument.

Control centre, Instrumentation diagram, On line instrumentation in modern plants.

Introduction and use of Labview Software

Books

1. Eckman, D. P., "*Industrial Instrumentation*," Wiley Eastern , 1978.
2. Nakra, B.C. and Chaudhry, K.K., "*Instrumentation, Measurement and Analysis*," 2nd ed., Tata McGraw Hill, New Delhi, 2004.
3. Patranabis, D., "*Principles of Industrial Instrumentation*," Tata McGraw Hill, New Delhi, 1999.
4. Lipták, B.G., "*Instrument Engineers' Handbook: Process Measurement and Analysis*," Vol 1 & 2, CRC Press, 2003.
5. Andrew, W. G., et al., "*Applied Instrumentation in the Process Industries*," Gulf Pub. 1993.
6. Wightman, E. J., "*Instrumentation in Process Control*," Butterworths, 1972.
7. Doebelin, E., "*Measurement Systems: Applications and Design*," 4th ed., McGraw-Hill, 1990.