



Measurement and Control Systems

Course Code:	28569
Credits:	2
Course Type:	Theoretical
Prerequisites:	Thermodynamics1, Strength Of Materials1, Fluid Mechanics1
Co-Requisites:	Vibrations
Course Length:	34 hours

Outline:

1. Theory and experiment in engineering:

Problem solving methods, engineering experimentation, computer simulations versus physical experiments

2. Characteristics of measurement devices:

Introduction to measurement devices, functional elements of measurement systems, static/dynamic characteristics, types of transducers, interfacing components, registers, indicators

3. Basics of main transducers:

Capacitive/inductive/resistive transducers, piezoelectric transducers, Peltier–Seebeck and Thomson effects

4. Review of electrical/electronic interface circuits in measurement systems:

Low pass / high pass filters, instrumentation amplifiers, resistance bridges, equilibrium AC bridges

5. Measurement methods and applications:

Measurement of motion, force, torque, power, pressure, temperature, fluid flow, sound, and electrical quantities, system analysis, measurement devices in industry, medicine, environment, etc.

6. Data analysis:



Statistics and fundamental concepts, normal distribution, graphical presentation of data, curve fitting, digital computers and applications in the analysis of experimental data

References:

- 1- Figliola, R.S. Beasley D.E. "Theory and Design of Mechanical Measurements" , J. Wiley ,2011.
- 2- Doebelin, E. O., "Engineering Experimentation", Mc Graw-Hill, 1995.
- 3- Rangan, C. S. & et al, "Instrumentation Devices & Systems", Tata Mc Graw-Hill, 1992.
- 4- Nakra, B. C. & Chaudhry, K. K., "Instrumentation, Measurement & Analysis", Tata Mc Graw-Hill, 1991.
- 5- Dieck, R. H., "Measurement Uncertainty Methods & Application", ISA, 1997.
- 6- Holman, J. P., "Experimental Methods for Engineers", Mc Graw-Hill, 1984.
- 7- Bently, J, "Principles & measurement System" longman publishing, 1988.
- 8- Jacob Fraden, "Handbook & modern sensors", spriger reday, 1996.