

MME308 (L) : Measurement, Instrumentation and Control Lab.

Programme: B. Tech

Year: II

Semester: Fourth

Course: Core

Credits: 1

Hours: 20

Laboratory Overview and Context:

The objective of the course is to expose students to basics of manufacturing as it plays a direct role in improvement of quality of human life and creating wealth for the nation. The second objective of the course is to expose students to hands-on practice with common manufacturing processes. It will cover: (i) Importance of manufacturing, (ii) Relation between materials and manufacturing, (iii) An overview of manufacturing processes, (iv) Product manufacturing.

Prerequisite Courses: Fundamental of Physics, Chemistry and Mathematics.

Text Books:

- [1] R K Jain, *Engineering Metrology*, Pearson Education India, 2009.
- [2] R.K.Rajput, *Mechanical Measurement and Instrumentation*, S K KATARIA and SONS, 2015.
- [3] B. C. Nakra, K. K. Chaudhry, *Instrumentation, Measurement And Analysis*, Tata McGraw-Hill Education, 2006.

Reference books:

- [1] Thomas G. Beckwith, *Mechanical Measurements*, Addison-Wesley, 1993
- [2] Alan S Morris, Reza Langari, *Measurement and Instrumentation: Theory and Application*, Elsevier, 2012.
- [3] William Bolton, *Control Systems*, Oxford, 2002.
- [4] Sergey E. Lyshevski, *Control Systems Theory with Engineering Applications*, Springer, 2014.

Additional Resources: NPTEL, MIT Video Lectures, Web resources etc.

Course Outcomes (COs): On completion of this course, the students will have:

CO1	Acquire importance to metrology in engineering.
CO2	Evaluate and understand the measuring instrument capabilities and ensure that these are adequate for their respective measurements.
CO3	Understand the methodology, maintenance and the accuracies of measurement by periodical calibration of the metrological instruments
CO4	Acquire fundamentals of various metrological instruments and their working principles.
CO5	Understand, analyze and design the control systems for specific applications.

Sr. No.	List of Experiments
1	Introduction to Metrology and measurement instruments
2	Measurements of linear / angular dimensions of a part using precision/non-precision measuring instruments.
3	Precision angular measurement using sine bar/sine center.
4	Measurement of temperature and pressure using various gauges.
5	Measurement of screw thread using floating carriage micrometer. Measurement of gear tooth thickness by gear tooth vernier caliper

6	Study of vibration & shock measuring set up.
7	Measurement of screw thread using floating carriage micrometer.
8	Calibration of dial gauges.
9	Study and applications of profile projector and Tool Makers microscope.
10	Study and applications coordinate measuring machine.
11	Study of open loop control and closed loop control systems with MATLAB. Analysis of First order and second order systems with MATLAB.
12	Study and design of proportional-integral-derivative control for system application using MATLAB.
13	Air Track Experimental Setup.

Evaluation Methods:

Item	Weightage (%)
Attendance	10
Lab Report	40
Final Lab exam including viva	50

Prepared By:**Last Update: 8th November, 2016.**