

COURSE CODE	ENGINEERING METROLOGY & MEASUREMENTS	L	T	P	C
1151ME201		2	0	2	3

1. Preamble

This course provides knowledge on various metrological equipment's available to measure the dimensions of the components and to understand the principles of Laser and advances in metrology.

2. Prerequisite

Engineering Physics - 1150PH101

3. Links to other Courses:

Project Work

4. Course Educational Objectives

Students undergoing this course are expected to:

- Understand the significance of measurement, generalized measurement system.
- Have familiarity on the correct procedure to be adopted to measure the dimension of the components.
- Understand the principles of laser and advances in metrology

5. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Generalise the importance of measuring system	K2
CO2	Demonstrate the concepts of linear and angular measurements to practical applications	K3
CO3	Illustrate the methods for form measurements.	K3
CO4	Describe the principles and applications of laser in metrology.	K3
CO5	Select the equipment and suitable technique to measure power, force and temperature.	K3

6. Correlation of Cos with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H	L		L								L	M	L
CO2	H	L		L								L	M	L
CO3	H			L								L	M	L
CO4	H			L	L							L	M	L
CO5	H			L	L							L	M	L

H- High; M-Medium; L-Low

7. Course Content

UNIT I CONCEPT OF MEASUREMENT

L- 6 P-6

General concept – Generalised measurement system-Units and standards-measuring instruments-sensitivity, readability, range of accuracy, precision-static and dynamic response-repeatability-systematic and random errors-correction, calibration, interchangeability.

Experiments: Demonstration on various measuring instruments of concept of measurement.

UNIT II LINEAR AND ANGULAR MEASUREMENT

L-6 P-6

Linear measuring instruments: Vernier, micrometer, Slip gauges, limit gauges- Comparators: Mechanical, pneumatic and electrical. Angular measurements: -Sine bar, optical bevel protractor.

Experiments: Calibration of linear measuring instruments, Calibration of angle measuring instruments.

UNIT III FORM MEASUREMENT

L-6 P-6

Measurement of screw threads-Thread gauges-measurement of gears-tooth thickness-constant chord and base tangent method –surface finish, straightness and flatness measurements.

Experiments: Measurement of thread parameters, Measurements of Gear Tooth Dimensions.

UNIT IV LASER AND ADVANCES IN METROLOGY

L-6 P-6

Precision instruments based on laser-Principles- laser interferometer-application in linear, angular measurements and machine tool metrology, Coordinate measuring machine (CMM) - Constructional features – types, applications.

Experiments: Measurement of the taper angle used by profile projector, Measurement of straightness and flatness used by Autocollimator.

UNIT V MEASUREMENT OF POWER AND TEMPERATURE RELATED PARAMETER

L-6 P-6

Measurement of power: mechanical, pneumatic, hydraulic and electrical type. Temperature: bimetallic strip, pressure thermometers, thermocouples.

Experiments: Measurement of Displacement, Temperature, Force and torque.

TOTAL = 60 periods

8. Text Books:

1. Jain. R.K., "Engineering Metrology", Khanna Publishers, New Delhi, 2009.
2. Dr N. V. Raghavendra, Dr LKrishnamurthy., "Engineering Metrology and Measurements", OUP India Publishers, 2013.

9. References:

1. Thomas G.Beckwith, RoyD.Marangoni, JohnH.Lienhard V, "Mechanical Measurements", Pearson Education, 2007.
2. Alan S. Morris, "The Essence of Measurement", Prentice Hall of India, 1997
3. A.K, "Instrumentation and Mechanical Measurements", Galgotia Publications, 2005
4. A.M.Badadhe, "Metrology And Quality Control", Technical Publications, Pune, 2006.
5. <http://nptel.iitm.ac.in/>