

INSTITUTE	DIPLOMA STUDIES
PROGRAM	DIPLOMA ENGINEERING (MECHANICAL ENGINEERING)
SEMESTER	4
COURSE TITLE	MECHANICAL MEASUREMENT & METROLOGY
COURSE CODE	09ME2403
COURSE CREDITS	2

Objective:

- 1 This subject introduces in mechanical to understand the fundamental of the measurements. In industries, as processing and manufacturing techniques have become complex and complicated so for mechanical engineer, their control is very much difficult by judgment only. Therefore, the exact and precise measurements are the basic need of the industries. This subject gives knowledge and skill to students so that they can work on shop floor independently for accurate and precise measurements and manufacturing.

Course Outcomes: After completion of this course, student will be able to:

- 1 To measure various elements and assemblies using linear and angular instruments.
- 2 To check geometrical accuracy of given component.
- 3 To measure and derive important dimensions of thread forms and gear.
- 4 To check dimensions using various gauges
- 5 To measure temperature of various bodies.
- 6 To measure fluid flow and pressure.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	4	0	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	LINEAR AND ANGULAR MEASUREMENT Introduction to metrology, definition of accuracy, precision and error, Linear measurement- principal of Vernier scale and least count, types, constructional sketch, major parts and their functions, measuring methods for various linear measuring instruments (Vernier gauge, height gauge, depth gauge, micrometer), Slip gauge types, applications, and wringing method., Angular measurement- types, constructional sketch, major parts and their functions, least count, measuring methods for various linear measuring instruments (Bevel protector, Sine bar, Spirit level)	0
2	GEOMETRIC TOLERANCES Dial gauges- types, construction and applications., Definition, symbol and measuring method of various geometric tolerances (Straightness, Squareness, Flatness, Parallelism, Perpendicularity, Roundness, Concentricity, Cylindricity), Limit gauges- types, sketch, construction and working	0
3	METROLOGY OF GEAR AND THREAD Types of gears, gear terminology, Sketch, major parts and their functions, least count, measuring methods and measurement illustration of Gear Tooth Vernier, Threads-classification, elements, specifications and forms, measurement of major and minor diameters, Pitch measurement methods.	0
4	TEMPERATURE, PRESSURE AND FLOW MEASUREMENT Classification, working principle, construction, working, advantages, limitations and applications of temperature measuring devices (Thermometer, Thermistor, Thermocouple), Types and applications of manometers, working principle, construction, working, and applications of various pressure gauges, Flow measurement using Venturi meter and Orifice meter and Rota meter.	0
5	MISCELLANEOUS METROLOGY Coordinate measuring machines-Structure, Modes of Operation Probe, Operation and applications, Optical Measuring Technique- Tool Maker's Microscope, Profile Projector, Optical Square	0
Total Hours		0

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Basic understanding of measurements and metrology: concepts, application, advantage and future aspects Basic understanding of measurements and metrology: concepts, application, advantage and future aspects	2
2	Performance on linear measurements using Vernier Caliper Performance on linear measurements using Vernier Caliper	4

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	Performance on linear measurements using Vernier height gauge Performance on linear measurements using Vernier height gauge	4
4	Performance on linear measurements using Micrometer Performance on linear measurements using Micrometer	4
5	Performance on Angular Measurement of large component using Sine bar Performance on Angular Measurement of large component using Sine bar	4
6	Performance on Angular Measurement using bevel protractor Performance on Angular Measurement using bevel protractor	4
7	To study and measuring of various geometrical tolerances and use of limit gauge To study and measuring of various geometrical tolerances and use of limit gauge	8
8	To study gear terminology and measuring methods for various parameters To study gear terminology and measuring methods for various parameters	6
9	To study thread form terminology and measuring methods for various parameters To study thread form terminology and measuring methods for various parameters	6
10	To study about temperature measurement To study about temperature measurement	4
11	To study about pressure and flow measurement To study about pressure and flow measurement	4
12	Perform surface measurement using dial gauge Perform surface measurement using dial gauge	6
Total Hours		56

Textbook :

- 1 Metrology and Instrumentations, D. A. Desai, Atul Prakashan, 2018

References:

- 1 Mechanical Measurements and Instrumentations, Mechanical Measurements and Instrumentations, R K Rajput, Kataria Publication, 2009

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
28.00	35.00	37.00			

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Supplementary Resources:

- 1 <https://amrita.olabs.edu.in/?sub=1&brch=5&sim=156&cnt=2>
- 2 <https://kcgcollege.ac.in/Virtual-Lab/Mechanical/Exp-3/theory.html>