

DEPARTMENT OF MECHANICAL ENGINEERING (2026-2027)
LESSON PLAN

Discipline: Mechanical	Semester: 5TH	Name of the Teaching faculty: GEETANJALI SETHI, Sr. Lecturer, Mechanical Engg.		
Subject: TH:1- METROLOGY AND MEASUREMENT	No of Days/ Week class allotted: 3	Semester from Date: 1/07/2026	To Date: 5 /11 /2026	No of
Week	Class Day	Topics		
1st	1st	Unit-I: Introduction to measurements: Definition of measurement; Significance of measurement		
	2nd	Methods of measurements: Direct & Indirect; Generalized measuring system		
	3rd	Standards of measurements: Primary & Secondary; Factors influencing selection of measuring instruments		
2nd	1st	Terms applicable to measuring instruments: Precision and Accuracy, Sensitivity and Repeatability, Range, Threshold, Hysteresis, calibration		
	2nd	Errors in Measurements: Classification of errors, Systematic and Random error		
	3rd	Measuring instruments: Introduction; Thread measurements: Thread gauge micrometer		
3rd	1st	Angle measurements: Bevel protractor, Sine Bar; Gauges: plain plug gauge, ring Gauge, snap gauge, limit gauge		
	2nd	comparators, Types of comparators		
	3rd	Surface finish: Definition, Terminology of surface finish, Talysurf surface roughness tester; Co-ordinate measuring machine.		
4th	1st	REVISION & TEST		
	2nd	Unit-II: Transducers and Strain gauges: Introduction		
	3rd	Transducers: Characteristics, classification of transducers		
5th	1st	two coil self-inductance transducer, Piezoelectric transducer		
	2nd	Strain Measurements: Strain gauge, Classification		
	3rd	mounting of strain gauges, Strain gauge rosettes-two and three elements.		
6th	1st	Measurement of force, torque, and pressure: Introduction		
	2nd	Force measurement: Spring Balance, Proving ring, Load cell		
	3rd	Torque measurement: Prony brake, Eddy current		
7th	1st	Hydraulic dynamometer; Pressure measurement: Mcloed gauge		
	2nd	REVISION & TEST		
	3rd	Unit-III: Applied mechanical measurements: Speed measurement: Classification of tachometers, Revolution counters, Eddy current tachometers		
8th	1st	Displacement measurement: Linear variable Differential transformers (LVDT);		
	2nd	Flow measurement: Rotometers, Turbine meter		
	3rd	Temperature measurement: Resistance thermometers, Optical Pyrometer		
9th	1st	Miscellaneous measurements: Humidity measurement: hair hygrometer		
	2nd	Density measurement: hydrometer		
	3rd	Liquid level measurement: sight glass, Float gauge; Biomedical measurement: Sphygmo monometer		
10th	1st	REVISION & TEST		
	2nd	Unit-IV: Limits, Fits & Tolerances: Concept of Limits, Fits, and Tolerances		
	3rd	Selective Assembly; Interchangeability; Hole and Shaft Basis System;		

11th	1st	Taylor's Principle; Design of Plug; Ring Gauges; IS 919-1993 (Limits, Fits & Tolerances, Gauges} IS 3477-1973; concept of multi gauging and inspection
	2nd	Angular Measurement: Concept; Instruments for Angular Measurements; Working and Use of Universal Bevel Protractor, Sine Bar, Spirit Level
	3rd	Principle of Working of Clinometers; Angle Gauges (With Numerical on Setting of Angle Gauges).
12th	1st	Screw thread Measurements: ISO grade and fits of thread
	2nd	Errors in threads; Pitch errors;
	3rd	Measurement of different elements such as major diameter, minordiameter, effective diameter, pitch; Two wire method;
13th	1st	Thread gauge micrometer; Working principle of floating carriage dial micrometer
	2nd	REVISION & TEST
	3rd	Unit-V Gear Measurement and Testing: Analytical and functional inspection; Rolling test;
14th	1st	Measurement of tooth thickness (constant chord method); Gear tooth vernier
	2nd	Errors in gears such as backlash, runout, composite.
	3rd	Machine tool testing: Parallelism; Straightness
15th	1st	Squareness; Coaxiality; roundness; run out
	2nd	alignment testing of machine tools as per IS standard procedure
	3rd	REVISION & TEST

REFERENCES:

1. Mechanical measurements – Beckwith Marangoni and Lienhard, Pearson Education, 6th Ed., 2006.
2. Metrology & Measurement – Anand K Bewoor, Vinay kulakarni, Tata McGraw Hill, New Delhi, 2009
3. Principles of Industrial instrumentation and control systems – Channakesava. R. Alavala, DELMAR cenage learning, 2009.
4. Principles of Engineering metrology – Rega Rajendra, Jaico publishers, 2008
5. Dimensional Metrology – Connie Dotson, DELMAR, cenage learning, 2007
6. Instrumentation measurement and analysis – B.C. Nakara, K.K. chaudary, second edition, Tata cgraw Hill, 2005.
7. A text book of Engineering metrology – I.C. Gupta, Dhanpat Rai and Sons, New Delhi, 2005
8. Metrology for Engineers – J.F.W. Galyer and C. R. Shotbolt, ELBS
9. Engineering Metrology – K. J. Hume, Kalyani publishers

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Signature of the faculty