



GIET INSTITUTE OF ENGINEERING & TECHNOLOGY (Polytechnic), JAGATPUR, CUTTACK
DEPARTMENT OF MECHANICAL ENGINEERING
LESSON PLAN-2026 WINTER

Discipline – MECHANICAL ENGG.	Semester – 5 th	Name of Teacher – SUBHIRANSU SEKHAR BARIK
Subject – [MEPC301TH:1] METROLOGY AND MEASUREMENT	No. of days/week Class allotted –3	Semester from date 01.07.2026 to date 05.11.2026 No. of weeks – 15
Week	Class Day	Theory Topics
1 st	1 st	1. Introduction to measurements: Definition of measurement; Significance of measurement Methods of measurements; Direct & Indirect.
	2 nd	Generalized measuring system; Standards of measurements; Primary & Secondary.
	3 rd	Factors influencing selection of measuring instruments.
2 nd	1 st	Terms applicable to measuring instruments: Precision and Accuracy, Sensitivity and Repeatability, Range, Threshold, Hysteresis.
	2 nd	Calibration; Errors in Measurements: Classification of errors, Systematic and Random error.
	3 rd	Measuring instruments: Introduction; Thread measurements: Thread gauge micrometer.
3 rd	1 st	Angle measurements: Bevel protractor, Sine Bar.
	2 nd	Gauges: plain plug gauge, ring Gauge, snap gauge, limit gauge.
	3 rd	Comparators: Characteristics of comparators, Types of comparators.
4 th	1 st	Surface finish: Definition, Terminology of surface finish, Talysurf surface roughness tester; Co-ordinate measuring machine.
	2 nd	2-Transducers and Strain gauges: - Introduction; Transducers: Characteristics, classification of transducers.
	3 rd	Two coil self-inductance transducer.
5 th	1 st	Piezoelectric transducer.
	2 nd	CLASS TEST
	3 rd	Strain Measurements: Strain gauge, Classification.
6 th	1 st	Mounting of strain gauges, Strain gauge rosettes- two and three elements.
	2 nd	Measurement of force- Introduction; Force measurement: Spring Balance, Proving ring, Load cell.
	3 rd	Torque measurement: Prony brake.
7 th	1 st	Eddy current, Hydraulic dynamometer.
	2 nd	Pressure measurement: Mcloed gauge.
	3 rd	3-Applied mechanical measurements: Speed measurement: Classification of tachometers, Revolution counters, Eddy current tachometers.

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8 th	1 st	Displacement measurement: Linear variable Differential transformers (LVDT).
	2 nd	Flow measurement: Rotometers, Turbine meter.
	3 rd	Temperature measurement: Resistance thermometers, Optical Pyrometer.
9 th	1 st	Miscellaneous measurements: Humidity measurement: hair hygrometer.
	2 nd	Density measurement: hydrometer.
	3 rd	Liquid level measurement: sight glass, Float gauge.
10 th	1 th	Biomedical measurement: Sphygmo monometer.
	2 nd	4-Limits, Fits & Tolerances: - Concept of Limits, Fits, and Tolerances; Selective Assembly.
	3 rd	CLASS TEST
11 th	1 st	Interchangeability; Hole and Shaft Basis System; Taylor's Principle; Design of Plug; Ring Gauges; IS 919-1993 (Limits, Fits & Tolerances, Gauges} IS 3477-1973.
	2 nd	Concept of multi gauging and inspection. Angular Measurement: Concept; Instruments for Angular Measurements.
	3 rd	Working and Use of Universal Bevel Protractor.
12 th	1 st	Working and Use of Sine Bar, Spirit Level.
	2 nd	Principle of Working of Clinometers; Angle Gauges (With Numerical on Setting of Angle Gauges).
	3 rd	Screw thread Measurements: ISO grade and fits of thread; Errors in threads; Pitch errors; Measurement of different elements such as major diameter, minor diameter, effective diameter, pitch.
13 th	1 st	Two wire method; Thread gauge micrometer.
	2 nd	Working principle of floating carriage dial micrometer.
	3 rd	5-Gear Measurement and Testing: - Analytical and functional inspection; Rolling test.
14 th	1 st	Measurement of tooth thickness (constant chord method); Gear tooth vernier.
	2 nd	Errors in gears such as backlash run out, composite.
	3 rd	Machine tool testing: Parallelism; Straightness; Square ness; Coaxiality; roundness; run out.
15 th	1 st	Machine tool testing: Parallelism; Straightness; Square ness; Coaxiality; roundness; run out.
	2 nd	CLASS TEST.
	3 rd	Alignment testing of machine tools as per IS standard procedure.

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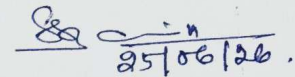


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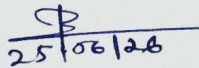
Learning Resources:

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

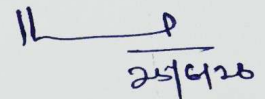

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