C. V. RAMAN POLYTECHNIC, BHUBANESWAR

LESSON PLAN

Session (2026-2027)

Discipline: Mechanical Engineering	**Semester:** 5th Semester, Winter/2026	**Name of the Faculty:** Dr. Brundaban Sahoo, Asst.Prof **Email ID:** brundaban.sahoo@cvrp.edu.in
Subject: Subject: TH:1 - Metrology And Measurement	**No. of Days/week:** 03	**Start Date: 01/07/2026** **End Date: 05/11/2026**

Week	Class Day	Theory Topics
1st	1st	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.
	2nd	Gauges: Plain plug gauge, Ring Gauge, Snap gauge, Limit gauge.
	3rd	Comparators: Characteristics of comparators. Types of comparators.
4th	1st	Surface finish: Definition, Terminology of surface finish, Talysurf surface roughness tester; Co-ordinate measuring machine (CMM).
	2nd	Transducers and Strain gauges Introduction; Transducers: Characteristics, classification.
	3rd	Working of two coil self-inductance transducer.
5th	1st	Working principle of Piezoelectric transducer.
	2nd	Strain Measurements: Concept of Strain gauge, Classification.
	3rd	Techniques for mounting of strain gauges.
6th	1st	Strain gauge rosettes: two and three elements.
	2nd	Measurement of force, torque, and pressure Introduction; Force measurement: Spring Balance.
	3rd	Force measurement: Proving ring, Load cell.
7th	1st	Torque measurement: Prony brake dynamometer.

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

Signature of Faculty

Signature of HOD