

GOVT. POLYTECHNIC KANDHAMAL, PHULBANI
At- Salunki, PO- Phulbani, Pin- 762001, website- gpkandhmal.org

DEPARTMENT OF MECHANICAL ENGINEERING
LESSON PLAN

Discipline: Mechanical	Semester: 5th	Name of the Teaching faculty: Manas Kumar Mishra
Subject: METROLOGY AND MEASUREMENT (TH 1)	No of Days/Week class alloted: 3	Semester from Date: 01/07/26 To date: 05/11/26
Week	Class Day	Topics
1st	1st	Syllabus, Lesson plan, Course outcomes, Exams.
		Introduction to measurements: Definition of measurement; Significance of measurement. Methods of measurements: Direct & Indirect
	2nd	Generalized measuring system, Standards of measurements: Primary & Secondary. Factors influencing selection of measuring instruments.
	3rd	Terms applicable to measuring instruments: Precision and Accuracy, Sensitivity and Repeatability, Range, Threshold, Hysteresis, calibration
2nd	1st	Errors in Measurements: Classification of errors, Systematic and Random error
	2nd	Measuring instruments: Introduction; Thread measurements: Thread gauge micrometer.
	3rd	Angle measurements: Bevel protractor, Sine Bar. Gauges: plain plug gauge
3rd	1st	Ring Gauge, snap gauge, limit gauge
	2nd	Comparators: Characteristics of comparators, Types of comparators
	3rd	Surface finish: Definition, Terminology of surface finish.
4th	1st	Talysurf surface roughness tester, Co-ordinate measuring machine.
	2nd	Transducers and Strain gauges: Introduction; Transducers: Characteristics
	3rd	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
	3rd	Load cell; Torque measurement: Prony brake,
7th	1st	Eddycurrent, Hydraulic dynamometer.
	2nd	Pressure measurement: Mcloed gauge.
	3rd	Applied mechanical measurements: Speed measurement: Classification of tachometers

8th	1st	Revolution counters, Eddy current tachometers; Displacement Measurement
	2nd	Linear variable Differential transformers (LVDT); Flow measurement: Rotometers, Turbine meter
	3rd	Temperature measurement: Resistance thermometers, Optical Pyrometer
9th	1st	Miscellaneous measurements: Humidity measurement: hair hygrometer
	2nd	Density measurement: hydrometer; Liquid level measurement
	3rd	sight glass, Float gauge
10th	1st	Biomedical measurement: Sphygmo monometer
	2nd	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
	2nd	Ring Gauges; IS 919-1993 (Limits, Fits & Tolerances, Gauges} IS 3477-1973, concept of multi gauging and inspection.
	3rd	Angular Measurement: Concept; Instruments for Angular Measurements; Working and Use of Universal Bevel Protractor, Sine Bar, Spirit Level
12th	1st	Principle of Working of Clinometers; Angle Gauges (With Numerical on Setting of Angle Gauges).
	2nd	Screw thread Measurements: ISO grade and fits of thread; Errors in threads; Pitch errors
	3rd	Measurement of different elements such as major diameter, minordiameter, effective diameter
13th	1st	pitch; Two wire method; Thread gauge micrometer
	2nd	Working principle of floating carriage dial micrometer
	3rd	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; Squareness
15th	1st	Coaxiality; roundness; run out
	2nd	Alignment testing of machine tools as per IS standard procedure.
	3rd	Probable Questions discussion/Test.

COURSE OUTCOMES:-

After completion of the course, the students will be able to:

CO 1	Define accuracy, precision, calibration, sensitivity, repeatability and such relevant terms in metrology.
CO 2	Distinguish between various types of errors.

CO 3	Understand the principle of operation of an instrument and select suitable measuring device for a particular application.
CO 4	Appreciate the concept of calibration of an instrument
CO 5	Analyze and interpret the data obtained from the different measurements processes and present it in the graphical form, statistical form.

Mishra
25/06/26
M.K. Mishra
Sign of Faculty