

STRENGTH OF MATERIAL AND METROLOGY PRACTICAL

DETAILED SYLLABUS

OBJECTIVES

Acquire skills on different types of testing methods of metals.

- Conduct material testing on elasticity, hardness, shear strength
- Familiarize the measuring techniques of Metrology instruments.
- Select the range of measuring tools.
- Obtain Accurate measurements.

STRENGTH OF MATERIALS

- Determine stress strain relations for steel.
- Determine hardness of materials.
- Perform torsion, impact and shear tests.

Exercises

1. Test on Ductile Materials: Finding Young's Modulus of Elasticity, yield points, percentage elongation and percentage reduction in area, stress strain diagram plotting, tests on mild steel.
2. Hardness Test: Determination of Rockwell's Hardness Number for various materials like mild steel, high carbon steel, brass, copper and aluminium.
3. Torsion test: Torsion test on mild steel – relation between torque and angle of twist-determination of shear modulus and shear stress.
4. Impact test: Finding the resistance of materials to impact loads by Izod test and Charpy test.
5. Tests on springs of circular section: Determination of modulus of rigidity, strain energy, shear stress and stiffness by load deflection method (Open & Closed coil spring)
6. Shear test: Single or double Shear test on M.S. bar to finding the resistance of material to shear load.

METROLOGY

- Introduction to linear measurement
- Introduction to angular measurement

- Linear Measuring Instruments- Vernier Caliper, Micrometer, Vernier Height gauge, and Slip Gauge.
- Angular Measuring Instruments – Universal Bevel Protractor, Sine Bar.

Exercises

I. LINEAR MEASUREMENTS

1. Determine the measurement of the following using Vernier Caliper. a. Thickness of ground MS flat b. Diameter and length of cylindrical objects c. Inside diameter of a bush component
2. Determine the diameter of a cylindrical component using micrometer and checking the result with digital micrometer.
3. Determine the height of gauge block or parallel bars using Vernier Height gauge and check with slip gauges
4. Determine the of a bore component using bore dial gauge.

II. ANGULAR MEASUREMENTS

5. Determine the angle of V-block, Taper Shank of Drill and Dovetails in mechanical components using universal bevel protractor.
6. Determine the angle of machined surfaces of components using sine bar with Slip gauges.