

G-27/2071

STRENGTH OF MATERIALS (MCE 203)  
Bachelor of Technology (MECHANICAL ENGINEERING)  
End Semester Exam

5965/MJ

TIME ALLOWED: 3 Hour

Roll. No.....

Maximum Marks: 50

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

**Section-A (3x5)**

- Q1 Define equilibrium. Write the conditions for a three force system to be in equilibrium.
- Q2. Explain the terms: Stress and Strain. Write relation between these two terms. Also write the units of these two terms.
- Q3. A square steel rod 10 mm x 10 mm in section is to carry an axial load of 50 kN. Calculate change in length of rod, if the original length is 25 mm.  $E = 2.14 \times 10^8 \text{ kN/m}^2$ .
- Q4. Derive torsion equation.
- Q5. A 5 metres long horizontal cantilever carries point loads of 1 kN and 2 kN at distance of 2 m and 3 m from free end respectively. Draw shear force and bending moment diagrams.

**Section-B (3x5)**

- Q6. A solid round bar is used as column. It has 50 mm diameter and 2 m length. One end of the column is fixed, while other end is hinged. Find the safe compressive load using Euler's formula. Assume  $E = 200 \text{ GN/m}^2$ , and factor of safety = 3.
- Q7. Derive bending equation.
- Q8. Explain Macaulay's method to find slope and deflection.
- Q9. Explain the construction of Mohr's circle to find principle stresses for a body under the action of tensile stresses in two mutually perpendicular directions.
- Q10. State and explain any two theories of failure.

**Section-C (10x2=20)**

- Q11
- Define Hooke's law.
  - Explain modulus of elasticity.
  - Write the relation between power transmitted by a shaft and torque.
  - Define point of contraflexure.
  - Define shear force.
  - What are the applications of RCC beams?
  - Define slenderness ratio.
  - Define slope and deflection.
  - For what purpose strain rosettes are used.
  - What is the significance of theories of failure?