

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (IE-2008 Batch)/(ME) (Sem.-4th)

STRENGTH OF MATERIALS-II

Subject Code : ME-202

Paper ID : [A0808]

Time : 3 Hrs.

Max. Marks : 60

SECTION-B

- State the advantages of calculating the strain energy in an application in structural analysis?
- Find the axial and torsional stiffnesses of a spring of wire diameter 6 mm with 20 turns of mean diameter 50 mm. Find the stress in the wire when subjected to an axial load of 10 kN. Take $G = 80 \text{ GPa}$ and $E = 200 \text{ GPa}$.
- Explain why no single theory of failure can satisfy all the materials?
- A curved beam of circular section has an initial radius of curvature 100 mm. Find the maximum stresses due to a BM of 400 Nm.
- Derive an expression for the shear stress at any point in a beam which is subjected to a shear force F .

SECTION-C

- Compare and contrast the maximum principal stress theory with the maximum shear stress theory with the help of their graphs. Give their applications.
- A thick walled closed-end cylinder is made of a material with $E = 72 \text{ GPa}$ and Poisson's ratio 0.33. The inside diameter is 200 mm and outside diameter is 800 mm. The cylinder is subjected to an internal fluid pressure of 150 MPa. Determine the maximum shear stress at a point on the inner surface. Also determine the increase in inside diameter due to the internal pressure.
- (a) State and explain Maxwell's reciprocal theorem.
(b) A simply supported beam of span 'l' is carrying a point load 'P' at the centre and a uniformly distributed load of intensity 'w' per unit length. Show that Maxwell's reciprocal theorem is satisfied for the centre of the beam. UDL is on the entire length of the beam.

INSTRUCTIONS TO CANDIDATES :

- SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A**I. Answer briefly :**

- What is proof resilience?
- Explain the concept of energy of dilation.
- State the distortion energy theory.
- What is a close-coiled helical spring?
- State any two assumptions made in Lamé's theory.
- "Mild steel has more toughness than high-strength steel". Explain in terms of strain energy.
- What is meant by the stiffness of a spring?
- State Castigliano's theorem.
- What is shear centre?
- Give an expression for the circumferential stress induced in a thin flat ring rotating at a speed ' ω '.

