Roll No. | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2011 onwards) (Sem.–4)

STRENGTH OF MATERIALS-II

Subject Code : BTME-401

Paper ID : [A1211]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

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

SECTION-A

1) **Write briefly :**

a) Discuss Columb's theory of failure.

b) What is the difference between cylindrical and spherical shells?

c) State Castigliano's theorems and explain their utility.

d) Differentiate between strain energy and complementary energy.

e) How are principal and shear stresses obtained in thick cylinders?

f) What is the utility of a disc of uniform strength?

g) What is the type of variation of bending stress across the section of a curved bar with large initial curvature?

h) Differentiate between open and closed coiled helical springs.

i) What is the importance of Shear Centre?

j) How is bending moment determined in a ring?

SECTION-B

2) A thin cylinder and a thin sphere having the same diameter/wall thickness) are subjected to same internal pressure. Determine the ratio of

   (a) Maximum tensile stresses

   (b) Volumetric strains in the cylinder and sphere, v = 0.3.

3) A semi elliptic leaf spring with 5 leaves and master leaf length 600 mm has to absorb 600 Joules of energy without exceeding bending stress of 800 MPa and deflection of 50 mm. Determine width, thickness and length of each leaf, E = 210G Pa.

4) Prove that maximum shear stress is twice to that of average shear stress for a thin circular section.

5) Describe the 'Octahedral Shear Stress Theory' and explain how it reduces to shear strain energy theory.

6) Derive the expression for circumferential stress distribution in a thick cylinder subjected to internal pressure only.

SECTION-C

7) Explain Tresca and Beltrami failure theories with suitable figures.

8) A hook of circular section 25 mm diameter and radius of curvature of its central axis also 25 mm carries a load of 5 kN. Calculate maximum stress in the hook

9) The maximum radial pressure in a circular disc of uniform thickness when rotating at a certain speed is 20 MPa. External diameter of the disc is 800 mm and internal diameter is 200 mm. Determine the corresponding maximum hoop stress. Density of the material is 7 Mg/m^3 and Poisson's ratio is 0.3.