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Total No. of Questions : 09

B.Tech. (CE) (2011 Onwards)   (Sem.–3)
STRENGTH OF MATERIALS
Subject Code : BTCE-303
Paper ID : [A1133]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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 have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1) **Write briefly :**

   a) What is the difference between Engineering and True Stress Strain curve?

   b) Derive the Torsion Equation.

   c) Differentiate between homogeneity and isotropy.

   d) Differentiate between polar modulus and section modulus.

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

   f) Define thermal stress and thermal strain.

   g) Explain the effect of change in temperature for a composite bar.

   h) Distinguish between centre of gravity and centroid.

   i) What is meant by point of contraflexure in bending of beams?

   j) Discuss the failure for long and short columns.

SECTION-B

2) A steel bolt of 500mm length and 18mm diameter passes coaxially through a steel tube of the same length and 20mm diameter and 30mm external diameter assembly is rigidly fixed at its both ends by washers. If one of the nuts is tightened through 45°. Find the stresses developed in the steel bolt and steel tube. Take pitch of threads as 2.4mm and E for steel as 200GPa.

3) A T-section 150mm × 120mm × 20mm is used as a strut of 4m long hinged at both ends. Calculate crippling load if E=200GPa.

4) Derive the relation between bulk modulus and Young's modulus in terms of Poisson's ratio.

5) Three beams have same lengths, allowable stresses and bending moments. Cross sections of the beams are shown in Fig.1. Find the ratios of weights of circular and rectangular cross section beams with respect to the square cross section beam.
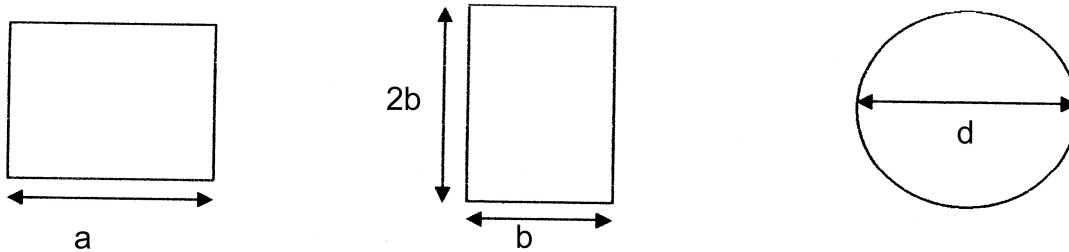

Fig.1

6) An element in a strained body is subjected to tensile stress of 150MPa and a shear stress of 50MPa tending to rotate the element in an anti clockwise direction. Find out the magnitude of normal and shear stresses on a section inclined at 40° with the tensile stress. Also calculate magnitude and direction of maximum shear stress that can exist on the element. Use Mohr's circle graphical method to solve this.

SECTION-C

7) Explain Von Mises and Octahedral shear stress failure theories.

8) Derive the stresses on an oblique section of a body subjected to a direct stress in one plane and accompanied by a simple shear stress.

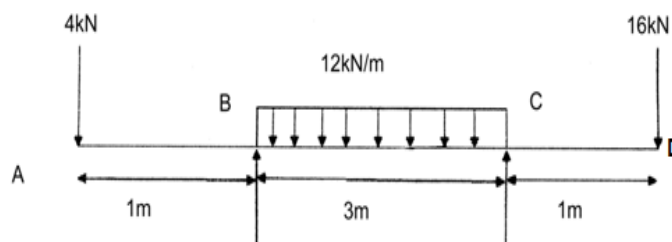9) Draw Shear Force and Bending Moment diagram for the Fig.2

Fig.2