[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2064)

14625

B. Tech 4th Semester Examination

Strength of Materials-II (N.S.)

ME-223

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question each from Sections A, B, C & D of the paper and all sub-parts of Q. No. 9 of Section E. Use of Non-Programmable calculators is allowed.

SECTION - A

1. A cylindrical thin drum 80 cm diameter and 3m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2, determine: Change in diameter, Change in length and Change in volume. Take E= 2×10^5 N/mm^2, Poisson's ratio=0.25 (20)

2. Derive the expressions for radial and circumferential stresses for thick shells. Also state the assumptions made in Lame's Theory. (20)

SECTION - B

3. A steel disc of uniform thickness and of dia. 900 mm is rotating about its axis at 3000 r.p.m. Determine the radial and circumferential stresses at the centre and outer radius. The density of the material is 7800 kg/m^3 and Poisson's ratio 0.3. (20)

4. Derive the expression for circumferential and radial stresses in a rotating thin disc. (20)

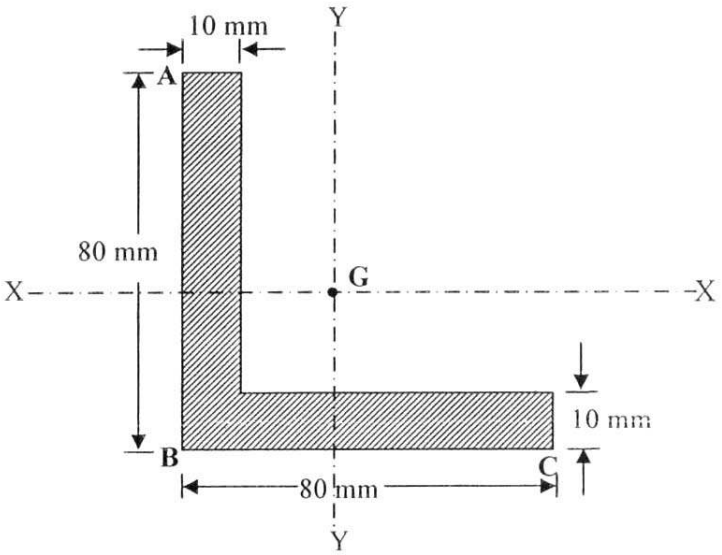
SECTION - C

5. For a close coiled helical spring subjected to an axial load of 300 N having 12 coils of wire diameter 16 mm and made with coil diameter of 250 mm, Find: Axial deflection, Strain energy stored, Maximum Torsional shear stress in the wire and the maximum shear stress using Wahl's correction factor.
Take C = 80 GN/m^2. (20)

6. Derive the expressions for stresses in a curved bar using Winkler Bach Theory. (20)

SECTION - D

7. A 80 mm × 80 mm × 10 mm angle section is used as a simply supported beam over a span of 2.4 m. It carries a load of 200 N along the line YG, where G is the centroid of the section. Calculate the stresses at point A, B, and C of the mid section of the beam. Take E = 200 G N/mm^2. (20)



8. A continuous beam ABC covers two consecutive spans AB and BC of length 4m and 6m, carrying uniformly distributed loads of 60 kN/m and 100 kN/m respectively. If the ends A and C are simply supported find the support moments at A, B and C. Also draw BM and SF diagrams. (20)

SECTION - E

9. (a) Derive the expression for Hoop's stress in a thin shell.

   (b) State the assumptions of Lame's theory for thick shells.

   (c) What do you mean by disc of uniform strength?

   (d) Find the expression for h^2 of a rectangular crossection.

   (e) Define torsional rigidity and polar moment of inertia.

   (f) Define helical spring. Name two important types of helical springs.

   (g) State the reasons responsible for unsymmetrical bending,

   (h) State the importance of shear centre.

   (i) Differentiate between thick and thin shells.

   (j) State Clapeyron's theorem of three moments. (2×10=20)