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

14656

B. Tech 4th Semester Examination

Strength of Materials-II (O.S.)

ME-4003

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 : (i) Attempt five questions in all selecting one question from each of the sections A, B, C & D and all the subparts of the questions in section E. Use of non-programmable calculators is allowed.

(ii) Draw the neat sketches wherever required.

(iii) Assume the data if not given.

SECTION - A

1. Prove that f/y = M/I = E/R where f = stress, M = moment of resistance, y = distance of element form the neutral axis, I = moment of inertia, R = Radius of curvature and E = Young modulus of elasticity. (20)

2. A continuous beam covers three consecutive spans of 6, 8 and 10 metre. The first span carries a UDL of 6 kN/m, the second span carries a UDL of 5 kN/m and the third span carries a UDL of 4 kN/m. Draw the B.M. and S.F. diagrams using Clapeyrons theorem. (20)

SECTION - B

3. Prove that in the case of thin cylindrical shell subjected to an internal fluid pressure, the tendency to burst lengthwise is twice as compared to transverse section. (20)

4. A thick metallic cylindrical shell of 150mm internal diameter is required to withstand an internal pressure of 8 N/mm^2. Calculate the necessary thickness of the shell, if the permissible tensile thickness in the section is 20 N/mm^2. (20)

SECTION - C

5. A steel disc of uniform thickness and of diameter 400 mm is rotating about its axis at 2000 rpm. The density of the material is 7700 kg/m^3 and Poisson ratio is 0.3. Calculate the variations of circumferential and radial stresses. (20)

6. A hollow cylinder 200 mm external radius and 100 mm internal radius is rotating at 3000 rpm. The density of material is 7800 kg/m^3 and the Poisson ratio is 0.3. Determine the maximum stress in the cylinder. Also calculate the variations of radial and hoop stresses in the cylinder. (20)

SECTION - D

7. Derive the expressions for maximum tensile and compressive stresses in a crane hook? (20)

8. A closely coiled helical spring is made of 6 mm wire. The maximum shear stress and deflection under a load of 20 kg is not to exceed 800 kg/cm^2 and 1.1 cm respectively. Calculate the number of coils and their mean radius. Take Modulus of rigidity as 0.84×10^6 kg/cm^2. (20)

SECTION - E

9 (i) What do you mean by the term: Neutral axis? (2)

(ii) Define the term: Modulus of Rupture. (2)

(iii) What do you mean by a continuous beam? (2)

(iv) What do you mean by longitudinal and circumferential stress in a cylindrical shell subjected to an internal pressure? (2)

(v) What do you understand by wire-wound cylinders? (2)

(vi) What is link radius? Write the values of link radius for the circular and trapezoidal sections. (2)

(vii) What are the assumptions made while developing theory for rotating long cylinders? (2)

(viii) What are the conditions for the maximum circumferential stresses in a rotating solid circular cylinder? (2)

(ix) Differentiate between a closely coiled and an open coiled helical spring. (2)

(x) Write the formulas to determine the deflection of closely coiled helical spring subjected to an axial load. (2)