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(2063)

813

B.Tech 4th Semester Examination

Strength of Materials-II

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 A beam ABCD is continuous over three spans, AB = 8m, BC = 6m, CD = 6m. There is uniformly distributed load of 3 KN per metre run over BC. On AB, there is a point load of 15KN at 2 metre from A and on CD, there is a point load of 20 KN at 4.5m from D. If the ends A and D are both built- in, Determine the support moments using Clapeyrons theorem. **(20)**

2. 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)**

SECTION - B

3. Derive the expressions for the hoop and longitudinal stresses in a thin spherical shell subjected to an internal pressure. **(20)**

4. A vertical thin walled stand pipe is 4.8m in diameter and stands 30m high. If the allowable working stress in tension is 120 N/mm^2, what is the required wall thickness of the pipe? Assume that the pipe is filled with water of specific weight 10 KN/m^3. **(20)**

SECTION - C

5. 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)**

6. Calculate the intensities of principal stresses in flat steel disc of uniform thickness having a diameter of 1m and rotating at 2400 rpm. What will be the stresses if the disc has a central hole of 0.2 m diameter. **(20)**

SECTION - D

7. A chain link is made of 2 cm diameter round steel with mean radius of circular ends 2.5 cm and the length of straight portion being 2 cm. Calculate the values of maximum tensile and compressive stresses, when the link is subjected to a pull of 2000 kg at its ends. **(20)**

8. A leaf spring is to be made of seven steel plates 65 mm wide and 6.5 mm thick. Determine the length of the spring so that it may carry a central load of 2.75 KN, the stress being limited to 160 N/mm^2. **(20)**

SECTION - E

9. (i) Define the term: Modulus of Rupture.

   (ii Discuss the applications of Clapeyron theorem.

   (iii) What are the limitations of Wilson method?

   (iv) What do you understand by wire-wound cylinders.

   (v) Write the assumptions for solving the problems on thick cylindrical shells.

   (vi) Write the relations for maximum compressive and tensile stresses in a ring.

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

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

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

   (x) What are the conditions for the maximum circumferential stresses in a rotating solid circular cylinder? **(2×10=20)**