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R09

B.Tech II Year II Semester (R09) Supplementary Examinations December/January 2014/2015

STRENGTH OF MATERIALS - II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 A steel cylinder is 1 m inside diameter and is to be designed for an internal pressure of 8 MN/m^2. Calculate the thickness if the maximum shearing stress is not to exceed 35 MN/m^2. Calculate the increase in volume, due to working pressure, if the cylinder is 6 m long with closed ends. E = 200 GN/m^2, Poisson's ratio = 1/3.

2 Differentiate between a thin cylinder and a thick cylinder. Find an expression for the radial pressure and hoop stress at any point in case of a thick cylinder.

3 A composite shaft consists of steel rod of 80 mm diameter surrounded by a closely fitting tube of brass. Find the outside diameter of the brass tube when a torque of 2000 N-m is applied on the composite shaft and shared equally by the two materials. Take N for steel as = 0.84×10^5 N/mm^2 and N for brass as 0.42×10^5 N/mm^2. Also, determine the common angles of twist in a length of 5 meters.

4 A safety valve of 80 mm diameter is to blow off at a pressure of 1 N/mm^2 by gauge. It is held by a close coil helical spring of circular steel wire. The mean diameter is 150 mm and initial compression is 20 mm. Find the diameter of steel wire and the number of coils necessary if the shear stress allowed is 80 N/mm^2. Take G = 0.8×10^5 N/mm^2

5 (a) Derive the Euler's buckling load for a column with both ends hinged.

(b) Find the ratio of buckling strength of a solid column to that of a hollow column of the same material and having the same cross-sectional area. The internal diameter of the hollow column is half of its external diameter. Both the columns are hinged and the same length.

6 Explain the following:

(a) Core of section.

(b) Combined stresses.

(c) Eccentric loading.

(d) Slenderness ratio.

7 Find the centroidal principal moments of inertia of a equal angle section 30 x 30 x 8 mm.

8 A horizontal circular bow girder of radius 5 m is continuous over five equally spaced supports. It carries a vertical u.d.l. of 50 KN/m. Obtain the B.M, torsional moment and S.F. diagrams for one span indicating the critical values.

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