Code No: 154CA

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, July/August - 2021
STRENGTH OF MATERIALS – II
(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. A closely coiled helical spring of 100 mm mean diameter is made up of 10 mm diameter rod and has 22 turns. The spring carries an axial load of 400 N. Determine the shear stress in the spring. Taking the value of modulus of rigidity 8.4×10^4 N/mm^2, determine the deflection when it carries this load. Also calculate the stiffness of spring. [15]

2. A hollow cast iron column is 4.5 meters long and fixed at both ends .The internal and external diameter of the column are 100 mm and 200 mm respectively. Determine the safe load carried by the column by Rankine's formula using the factor of safety as 4.0. Take σ_c = 550 MN/mm^2 and α = 1/1600. [15]

3. A rectangular masonry dam 6 m high and 3 m wide has water level with its top. Find:
a) Total pressure per meter length of the dam.
b) Maximum and minimum intensities of stresses at the bottom of the dam. Assume the weight of water and masonry as 10 kN/m^3 and 20 kN/m^3 respectively. [7+8]

4. The principal stresses at the inner edge of a cylindrical shell are 81.88 MPa (T) and 40 MPa (C). The internal diameter of the cylinder is 180 mm and the length is 1.5 m. The longitudinal stress is 21.93 MPa (T). Find:
a) Maximum shear stress at the inner edge b) Change in internal diameter
c) Change in length d) Change in volume
Take E=200 GPa and μ=0.3. [15]

5. A beam of T-section having a flange of 140mm×20mm and web of 160mm×20mm and 4m long is simply supported at its ends. It carries 6 kN at 35 ^{0} to the vertical and passing through the Centroid of the section. Obtain the maximum tensile and compressive stresses. Take E= 205GPa. [15]

6.a) State the assumptions made in the Euler's Theory of Buckling of Columns.
b) Determine maximum deflection, bending moment and stress for a Beam-Column hinged at both the ends and subjected to an axial thrust and a lateral point load 'W' at the centre. [7+8]

7. Show that in the case of a thin cylindrical shell subjected to an internal fluid pressure, the tendency to burst lengthwise is twice as great as in a transverse section. Also derive a formula for the hoop stress in a thin spherical shell subjected to an internal pressure. [15]

8. Explain the concept of unsymmetrical bending. What are the conditions that should be satisfied for a beam to bend without twisting? Also state the assumptions made in analyzing a beam for unsymmetrical bending. [15]

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