Code No: 114DP

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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. Design a solid shaft required to transmit 250 kW power at 150 rpm. The maximum torque is not to exceed the mean by 30% and the shear stress is limited to 75 N/mm^2. What percentage saving in weight would be obtained if the solid shaft were replaced by a hollow shaft with internal diameter is 0.8 times the external diameter, the length, material and the maximum shear stress being the same? [15]

2. Derive the expression for the deformation of a close-coiled helical spring subjected to an axial pull. [15]

3. Derive the Euler's critical load for a column (L, A, I and E) with one end fixed and the other end is free. [15]

4. A semi-circular beam of radius 5 m and uniform cross-section is supported on three symmetrically placed columns. The beam is subjected to a uniformly distributed load of intensity 25 kN/m. Analyse the beam and draw the bending moment diagram. [15]

5. A 3 m long steel hinged-hinged tubular strut with external and internal diameters of 150 mm and 125 mm respectively, is subjected to an axial compressive load of 75 kN and a transverse load 25 kN at its mid-span. Determine the maximum bending moment and stresses. [15]

6. A masonry dam of trapezoidal section, 6.6 m high, has a vertical water face and retains water to a depth of 6 m. The width of the dam at the top is 1 m and 4 m at the base. Determine the maximum and minimum stresses intensities at the base. The unit weight of masonry is 20 kN/m^3. [15]

7. A beam of rectangular cross-section, 75 mm × 150 mm, is subjected to a bending moment of 20 kNm in a plane making an angle 45^0 (Anti-Clockwise) with respect to a vertical axis passing through the centroid of the section. Determine the neutral axis of the section and also calculate the maximum bending stress induced in the section. [15]

8. A cylinder has 1.8 m diameter, 12.5 mm wall thickness and 3 m long containing a fluid at a pressure of 3.5 N/mm^2. Determine the circumferential and longitudinal stresses due to the fluid pressure. [15]

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