Code No: 154CA

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, August/September - 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. Derive the torsion equation $f_s/R = T/J = G\theta/L$ with neat sketch and usual notations. [15]

2. A built up I-section has an overall depth of 400 mm, width of flanges 300 mm, thickness of flanges 50 mm and web thickness 30 mm. It is used as a beam with simply supported ends and it deflects by 10 mm when subjected to a load of 40 kN/m length. Find the safe load if this I-section is used as a column with both ends hinged. Use Euler's formula. Assume factor of safety 1.75 and take $E=2\times10^5$ N/mm^2. [15]

3. Determine the maximum and minimum stresses at the base of an hollow circular chimney of height 30m with external diameter 6m and internal diameter 3m. The chimney is subjected to a horizontal wind pressure of intensity 2kN/m^2. The specific weight of the material of chimney is 22 kN/m^3. [15]

4. A boiler is subjected to an internal steam pressure of 2N/mm^2. The thickness of boiler plate is 2.0cm and permissible tensile stress is 120N/mm^2. Find the maximum diameter when efficiency of longitudinal joint is 90% and that of circumferential joint is 40%. [15]

5. A simply supported beam of T-section having a flange of 180mm×20mm and web of 160mm×20mm is 3.5m long. It carries 5kN at 30^0 to the vertical and passing through Centroid of the section. Calculate the maximum tensile and compressive stresses. Take E=220GPa. [15]

6. A hollow cast-iron column with fixed ends supports an axial load of 1000kN. If the column is 5.0m long and has an external diameter of 250mm, find the thickness of metal required. Use the Rankine formula, considering a constant of 1/6400 and a working stress of 80 MPa. [15]

7. A tapering chimney of hollow circular section is 32 m high. Its external diameter at the base is 3.6 m and at the top it is 2.4 m. It is subjected to a wind pressure of 18 kN/m^2 of the projected area. Calculate the over turning moment at the base. If the weight of the chimney is 4000 kN and the internal diameter at the base is 1.1 m, determine the maximum and minimum stress at the base. [15]

8. Derive the formulae for longitudinal and circumferential stresses for a thin cylinder. [15]

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