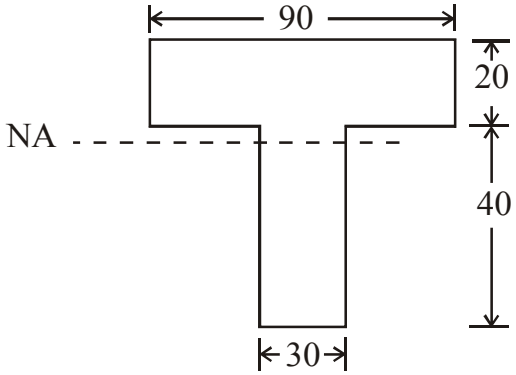

All dimensions in mm.

5. Adopting suitable sign convention and coordinate derives the torsion stress formula from first principle. **20**

6. Derive the formula for the Euler critical stress for a column with fixed–fixed end conditions as a function of slenderness ratio. Discuss the validity of Euler's formula from curve between Euler critical stress and slenderness ratio. **20**

7. A simply supported beam of length 20 metres has three concentrated load of 5 kN each symmetrically placed at equal interval. Calculate the deflection under each load and the maximum deflection. Assume $E = 2 \times 10^5$ N/mm^2. **20**

No. of Printed Pages : 05 Roll No. .....

332

B. Tech. EXAMINATION, Dec. 2017

(Third Semester)

(Old Scheme) (Re-appear Only)

(ME)

ME-203

STRENGTH OF MATERIALS—I

Time : 3 *Hours*] [*Maximum Marks :* 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt any *Five* questions. Missing data and unit should be suitably assumed through your subject knowledge and experience as student engineer.

1. (a) Draw a typical stress-strain diagram showing salient points on the curve and list out the information drawn there from with brief description.

(b) A rod of length L and uniform cross-section area A is hanging vertically downward from a ceiling. A vertifcally down force is acting at its free end. Taking also the weight into consideration, determine the stress at the section at a distance x from the ceiling and the total elongation of the rod. Assume material density to be ρ. **8+12=20**

2. (a) Derive relation among shear force, bending moment and load. Clearly show the sign convention adopted.

(b) Draw shear force and bending moment diagrams for a cantilever beam of length L. The beam is continuously loaded with intensity q at free end and 2q at fixed end. **8+12=20**

3. (a) Draw and describe Mohr's stress circle choosing suitable coordinate system and sign convention for pure 1-dimensional tension case and pure shear case.

(b) If, at a point within a material, the minimum and maximum principal stresses are 30 N/mm^2 and 90 N/mm^2, both tension, find the shear stress and normal stress on a plane through this point making an angle of 30º with the plane on which the maximum principal stress acts. **8+12=20**

4. (a) Adopting a sign convention and a coordinate system derives the bending stress formula.

(b) Determine the position of the neutral axis of the T-shaped beam section shown on page no 4. **8+12=20**

8. From first principle derive requisite expressions for the maximum bending moment and deflection of a beam of length L, flexural rigidity EI and fixed at both ends for the following cases : **20**

(a) Transverse load W is concentrated at midpoint of the beam, and

(b) Transverse load W is uniformly distributed over the entire length.

8. From first principle derive requisite expressions for the maximum bending moment and deflection of a beam of length L, flexural rigidity EI and fixed at both ends for the following cases : **20**

(a) Transverse load W is concentrated at midpoint of the beam, and

(b) Transverse load W is uniformly distributed over the entire length.