Code : 15ME31T

Register Number | | | | | | | | | | |

III Semester Diploma Examination, Nov./Dec. 2018

STRENGTH OF MATERIAL

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **six** questions from Part – A and any **seven** questions from Part – B.
(ii) Assume suitable data, if necessary.

PART – A

1. Define Poisson's ratio and Modulus of Rigidity. **5**

2. Explain linear and lateral strain. **5**

3. State parallel and perpendicular axis theorem. **5**

4. Locate CG for triangle, rectangle, semi-circle, trapezium, cone with the help of plain figure. **5**

5. Explain point of contraflexure in a beam. **5**

6. Explain sagging and hogging bending moment. **5**

7. List the assumption in theory of simple bending. **5**

8. Explain modulus of section for rectangular and circular section. **5**

9. Explain strain energy and resilience. **5**

[Turn over

PART – B

10. A tensile test is performed on a brass specimen 10 mm in diameter using a gauge length of 50 mm when applying axial tensile load of 25 kN it was observed that the distance between the gauge marks increase by 0.152 mm. Calculate modulus of elasticity of brass. **10**

11. The Young modulus for a given material is 100 kN/mm^2 and its modulus of rigidity is 40 kN/mm^2. Determine its bulk modulus and also its lateral contraction if the diameter is 50 mm and length 2 m and extension 2 mm. **10**

12. (a) Find the centroid of I section **5**

Top flange	100 × 20 mm
Web	20 mm × 100 mm
Bottom flange	200 × 20 mm

(b) Calculate the centre of gravity of the section shown in fig (1). **5**

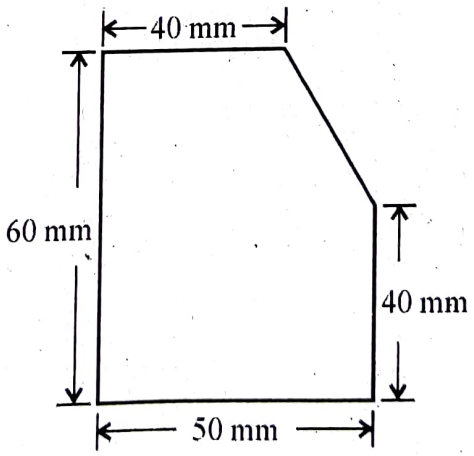

Fig. (i)

Find the moment of inertia of a T-section shown in fig (ii) about X-X axis and Y-Y axis passing through the centre of gravity of the section. **10**

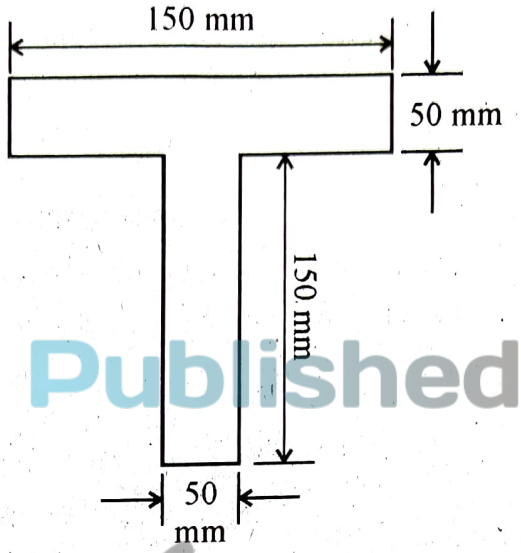

Fig. (ii)

A cantilever 5 m long carries point load of 30 kN and 10 kN at distances of 1 m and 5 m from the fixed end. In addition to this the beam carries a UDL of 10 kN/m between the point load. Construct shear force diagram and bending moment diagram giving all salient values. **10**

A simply supported beam of 8 metre carries an UDL of 5 kN/m for a length of 3 metre from the left support and point loads of 6 kN, 5 kN and 4 kN at 4 metre, 5 metre and 6 metre from the left support. Draw SFD & BMD. **10**

The moment of inertia of the beam section 500 mm deep is 69.49×10^7 mm^4. Find ıe longest span over which a beam of this section when simply supported could carry a UDL of 50 kN/m run. The stress in the material is not to exceed 110 N/mm^2. **10**

A circular pipe of external diameter 70 mm and thickness 10 mm is used as a simply supported beam over a effective span of 2.5 m. Find the maximum point load that can be applied at the centre of span if permissible stress in the tube is 150 N/mm^2. **10**

18. (a) List the assumption made in theory of Torsion.

(b) Calculate the strain energy stored in a steel bar 2 metre long and 500 mm^2 cross-sectional area when subjected to a tensile stress of 50 N/mm^2. Take $E = 2 \times 10^5$ N/mm^2.

19. A hollow shaft is required to transmit 300 kN at 90 rpm. The permissible shear stress in the shaft is 60 kN/mm^2. The maximum torque transmitted exceeds the mean torque by 25% more than the mean torque. The internal diameter is half of the external diameter. Find the internal diameter and external diameters of the shaft.