1272

Code : 15ME31T

III Semester Diploma Examination, April/May-2017

STRENGTH OF MATERIALS

Time : 3 Hours | **| Max. Marks : 100**

Note :   Answer any **six** questions from **Part – A** and any **seven** from **Part – B**.

PART – A

(Each question carries 5 marks)

1. With neat sketch explain Hoop stress and longitudinal stress in thin cylindrical shells.   **5**

2. Explain Bulk modulus and modulus of rigidity (shear modulus).   **5**

3. Locate CG of square, triangle, circle trapezium, semicircle with the help of plane figure.   **5**

4. Find the Moment of Inertia of Rectangular section about its base.   **5**

5. Explain with neat sketch Sagging and Hogging Bending moment.   **5**

6. Name three types of Beams and three types of loads with sketches.   **5**

7. List the assumptions in Theory of Simple Bending.   **5**

8. Write the Bending equations with all notations.   **5**

9. Write the Torsion equation with all notations.   **5**

PART – B

(Each question carries 10 marks)

10. A hollow steel tube 3.5 m long has external diameter 120 mm and is subjected to a tensile load of 400 kN and extension measured is 2 mm. Determine the internal diameter. Take E = 200 GPa.   **10**

11. A circular rod of steel is 20 mm in diameter and 500 mm long. It is subjected to an axial pull of 45 kN. If E for steel is 200 kN/mm², find stress, linear strain, change in length and change in volume.   **10**

12. Find the centroid of the lamina shown in figure.   **10**
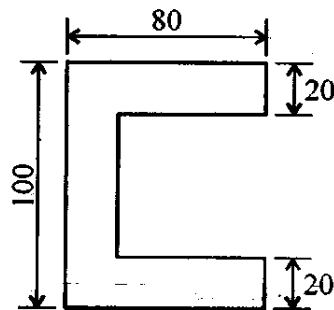
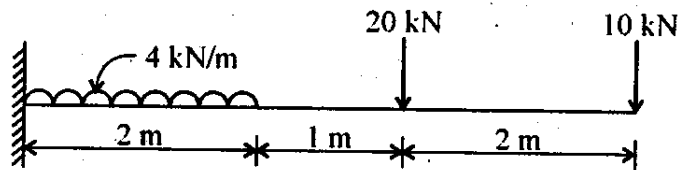**All Dimensions are in mm.**

13. Find the moment of inertia about the centroidal axis 'xx' and 'yy' of the section shown in the figure.   **10**
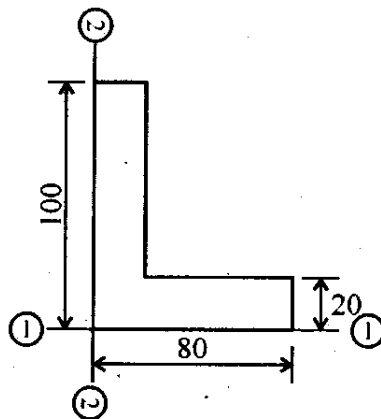
All Dimensions are in mm.

14. (a) A cantilever beam of span 4 m carries point loads of 2 kN at its free end and 5 kN at 1 m from free end. Sketch BMD and SFD.   5

     (b) Draw SFD and BMD for the cantilever beam shown in figure :   5

15. A simply supported beam having a span of 6 m carries a UDL of 12 kN/m over a length of 4 m commencing from left hand support. It is also carries a point load of 10 kN at a distance of 1 m from the right support. Draw SFD and BMD.   10

16. Find the dimension of timber joist span 6 m carries a brick wall 225 mm, 3 m high. The weight of the brick is 20 kN/m³ and the maximum permissible stress is limited to 8 N/mm². The depth of joist is to be twice its breadth.   10

17. A cantilever beam of 6 m span in rectangular in section having 200 mm width and 300 mm depth. If the container is subjected to a point load of 6 kN and UDL of 5 kN/m find the maximum bending stress.   10
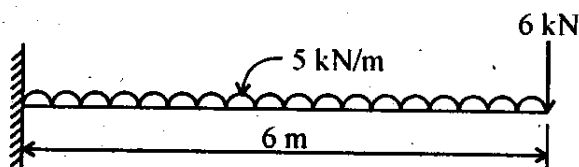
18. (a) An axial pull of 25 kN is suddenly applied to a steel rod 2 m long, 1000 mm² in cross section. Calculate the strain energy, that can be stored if $E = 2 \times 10^5$ N/mm².   5

     (b) An axial pull of 50 kN is suddenly applied to a rod of 2 m long 40 mm dia. Calculate the stress produced and strain energy that can be stored if $E = 200$ kN/mm².   5

[Turn over

19. A steel shaft transmits 105 kW at 160 rpm. If the shaft is 100 mm in diameter, find the torque on the shaft and the maximum shear stress induced. Find also twist of the shaft in a length of 6 m. Take $C = 80 \times 10^3$ N/mm². **10**