Register No.:

612

October 2017

Time – Three hours
(Maximum Marks: 75)

[N.B: (1) Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory. Answer any FOUR questions from the remaining in each PART - A and PART - B

(2) Answer division (a) or division (b) of each question in PART - C.

(3) Each question carries 2 marks in PART – A, 3 marks in Part – B and 10 marks in PART – C.]

PART – A

1. What is factor of safety?
2. Define bending moment.
3. Define fixed support and show on equilibrium diagram.
4. Define centroid and center of gravity.
5. Define moment of inertia.
6. State Mohr's theorem I.
7. Define long column and short column.
8. Define elasticity and plasticity.

PART – B

9. Briefly explain the different types of stresses.
10. Define three elastic constants.
11. Explain the types of loads on beams.
12. Draw any three symmetrical sections and mark their centroidal position.
13. Explain flexural rigidity and stiffness of beam.
14. What are the different types of trusses? Draw any four.
15. Explain perfect frame and imperfect frame with examples.
16. Differentiate between determinate and indeterminate beams.

[Turn over.....

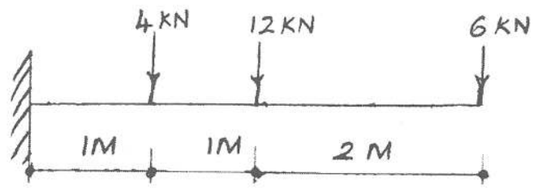
PART – C

17. (a) A bar of 20mm diameter is subjected to a pull of 45kN. The measured extension on a gauge length of 200mm is 0.08mm and change in diameter is 0.0033mm. Calculate the Poisson's ratio and the values of three elastic constants.

(Or)

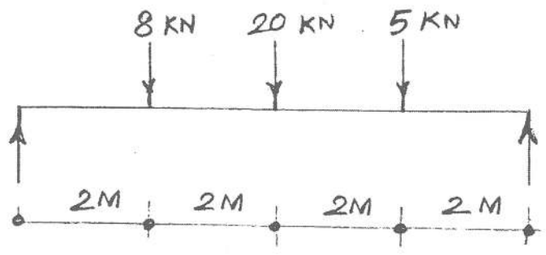
(b) A steel bar of 300mm long is 50mm square in section for 120mm of its length, 25mm diameter for 80mm length and 40mm diameter for the remaining length. If a tensile force of 100kN is applied to the bar, calculate the maximum and minimum stress produced in it and the elongation. Take $E=2\times10^5$ N/mm².

18. (a) Draw the SFD and BMD for the cantilever shown in figure.

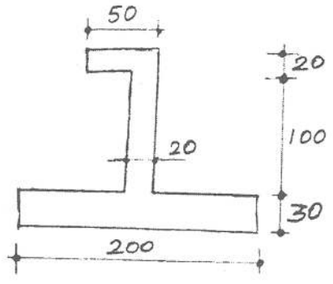


(Or)

(b) Sketch the SFD and BMD for the beam shown in figure.

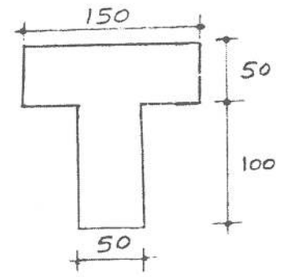


19. (a) Find the centroid of the lamina shown in figure. All dimensions are in mm.



(Or)

(b) Calculate the moments of inertia about the centroidal axes of the T-section shown in figure. All dimensions are in mm.



20. (a) A cantilever of span 4m carries an udl of 8kN/m and a concentrated load of 12kN at the free end. The cross section of the beam is 200x300mm. Young's modulus is 2.1×10^5N/mm². Calculate the maximum slope and maximum deflection at the free end of the beam.

(Or)

(b) A continuous beam ABC is simply supported at A and C such that AB=6m and BC=5m. The span AB carries an UDL of 20kN/m and the span BC carries a point load of 50kN at its mid span. Find the support moments by theorem of three moments. Draw the BMD.

21. (a) A mild steel tube 6m long, 50mm internal diameter and 5mm thick is used as a strut. Take $E=2\times10^5$N/mm². Calculate the Euler's crippling load for the following end conditions:
(i) When both ends are hinged (ii) When one end is hinged and other end fixed (iii) When one end is fixed and the other end free (iv) When both ends are fixed.

(Or)

(b) Find the magnitude and nature of forces in all the members of the structure shown in figure by graphically.