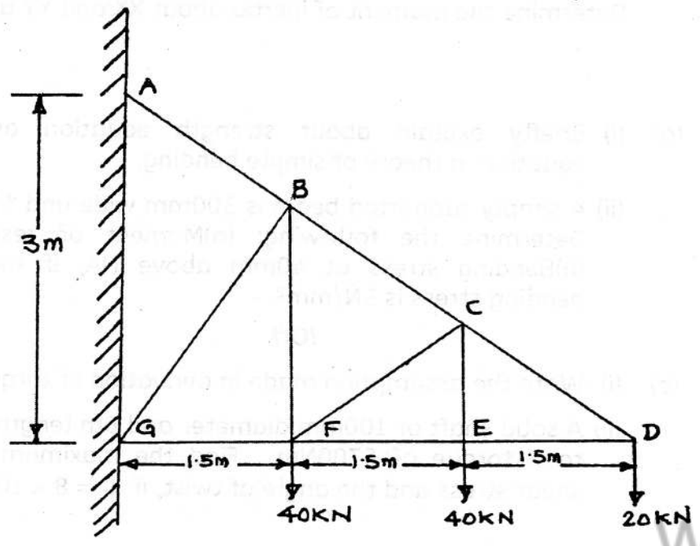
(b) Determine the magnitude and nature of forces in the members of truss shown in figure-2 by graphical method. Tabulate the results.

Figure-2



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673 Register No.:

April 2018

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. Define the terms: longitudinal and lateral strains.
2. State the significance of percentage of elongation and reduction in area of cross-section.
3. Draw the sketches of hinged and roller supports and show their reaction components.
4. What are symmetrical and anti-symmetrical sections?
5. Write down the equations of parallel axis and perpendicular axis theorems.
6. Define the terms: Flexural rigidity and torsional rigidity.
7. State the difference between perfect frame and imperfect frame.
8. State the conventional signs used for SF and BM.

PART – B

9. Find the modulus of rigidity and bulk modulus of a material, if $E = 2.1 \times 10^5 N/mm^2$ and ν=0.30.
10. Draw the stress-strain curve for a mild steel loaded upto failure and state the salient points.
11. State the three static equilibrium equations to be used in the analysis of beams.
12. Sketch a simply supported beam of span 'l' subjected to udl 'w' throughout the span and its BMD indicating the maximum BM.
13. Derive the expression for MI and section modulus of an hollow circular section. Use MI formulae for circular section.

[Turn over.....

14. What do you understand by theory of simple bending. Give an example.

15. Compare hollow and circular shafts with reference to economy, efficiency and power transmitted.

16. What are zero-force members? How do you identify zero-force members? Give examples.

PART – C

17. (a) A bar of 50mm x 30mm and 300mm long is subjected to an axial compression of 90kN in the length direction. Calculate linear strain, lateral strain, volumetric strain and changes in dimensions. Assume $E = 2.1 \times 10^5 MPa$.

(Or)

(b) (i) Briefly explain the following:
Tensile stress, compressive stress and shear stress.

(ii) A steel bar is 500mm long. The two end portions are 35mm and 25mm in diameters and each end portion is 150mm. The middle portion is 20mm in diameter and 200mm long. Calculate the total elongation, if it carries an axial pull of 30kN. Take $E = 2 \times 10^5 N/mm^2$.

18. (a) (i) Briefly explain different types of beams based on support conditions.

(ii) A cantilever beam of 4m span carries a point load of 8kN at free end. It also carries an udl of 3kN/m for a length of 2m from the fixed end. Draw the BMD.

(Or)

(b) A simply supported beam of 5m span carries an udl of 10kN/m over the entire span and a point load of 20kN at mid span. Draw the SFD and BMD.

19. (a) (i) Derive an expression for MI of rectangular section about its centroidal axes.

(ii) Locate the centroid of a square plate of 150mm size with a circular hole of 50mm diameter. The center of circular hole lies in vertical axis at a distance of 40mm from the base.

(Or)

(b) A steel beam of a I-section has the following details:

Top flange	= 75mm x 12mm
Bottom flange	= 75mm x 12mm
Web	= 125mm x 8mm

Determine the moment of inertia about XX and YY axes.

20. (a) (i) Briefly explain about strength equation and stiffness equation in theory of simple bending.

(ii) A simply supported beam is 300mm wide and 400mm deep. Determine the following: (a)Moment of resistance and (b)Bending stress at 40mm above NA, if the maximum bending stress is 5N/mm².

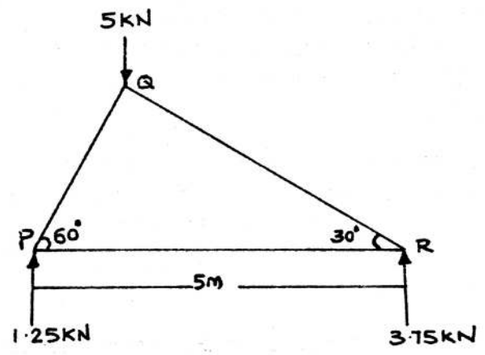
(Or)

(b) (i) Write the assumption made in derivation of torque equation.

(ii) A solid shaft of 100mm diameter and 6m length is subjected to a torque of 5700Nm. Find the maximum intensity of shear stress and the angle of twist, if $G = 8 \times 10^4 N/mm^2$.

21. (a) Determine the magnitude and nature of forces in the members of truss shown in figure-1 by method of joints.

Figure-1



(Or)

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