903

024

April 2015

Time – Three hours

(Maximum Marks: 75)

[N.B: (1) Answer any fifteen *questions in PART – A and division (A) or division (B) of each question in PART - B.*

(2) Each question carries 1 (one) mark in PART – A and 12 (twelve) marks in PART - B.]

PART – A

1. Define the term toughness.
2. Write the expression for volumetric strain.
3. State any one relationship between elastic constants.
4. State any one principle used in the analysis of composite bar.
5. What are transverse loads?
6. Sketch the hinged support with its reaction components.
7. Give any two examples of statically indeterminate teams.
8. State the relationship between intensity of load and SF.
9. Sketch a typical Z-section with its centroidal position.
10. Define polar moment of inertia.
11. Write the expression for radius of gyration about centroidal axes.
12. Write the expression for section modulus of a circular section.
13. Define the term moment of resistance.
14. Write the stiffness equation due to bending of beams.
15. What do you mean by the term torque?
16. Write the expression for power transmitted by a shaft.
17. Define the term deficient frame.
18. How do you designate a force in the analysis of frames?
19. Mention different methods of analysis of frames.
20. What do you mean by Bow's notation?

[Turn over

PART – B

Marks

21. (A) A copper flat 150mm x 20mm and 600mm long carries a pull of 300kN in the direction of its length. Calculate (i)Changes in dimensions (ii)Volumetric strain and (iii)Increase in volume. Take $E=1.17\times10^5$ N/mm^2 and $\gamma=0.35$. 12

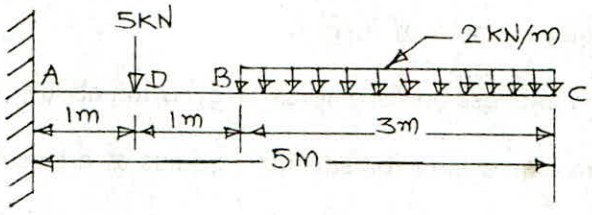
(Or)

(B) (i) Define the terms shear modulus, bulk modulus and factor of safety. 3

(ii) A bar 400mm long, 40mm square in section for the first 190mm length, 25mm diameter for the next 120mm length and 35mm x 30mm rectangular in section for the remaining length is subjected to an axial tension of 120kN. Find the maximum and minimum stresses induced in the bar. Also calculate the total elongation. Take $E=2.10\times10^5$ N/mm^2. 9

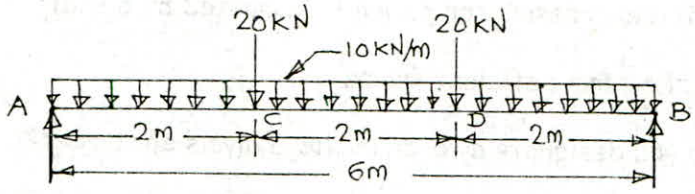
22. (A) (i) State the three static equilibrium equations to be used in the analysis of beams. 3

(ii) Draw the SFD and BMD for the cantilever beam shown in figure. 9



(Or)

(B) Draw the SFD and BMD for the simply supported beam shown in figure. 12



23. (A) Calculate the moment of inertia of the I-section about XX and YY axes having the following details: 12

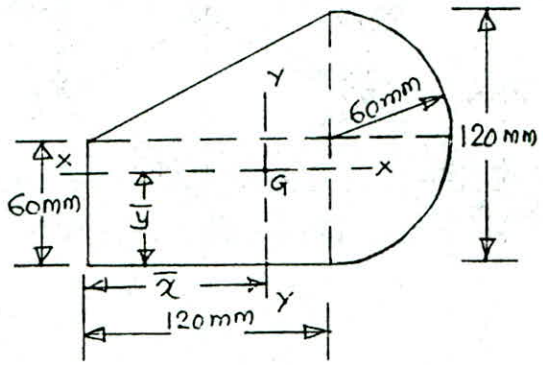
Top flange: 150mm x 15mm Web: 220mm x 15mm

Bottom flange: 150mm x 15mm

(Or)

(B) (i) State parallel and perpendicular axes theorems. 4

(ii) Locate the centroid of the section ($\bar{x}$ and $\bar{y}$) shown in figure. 8



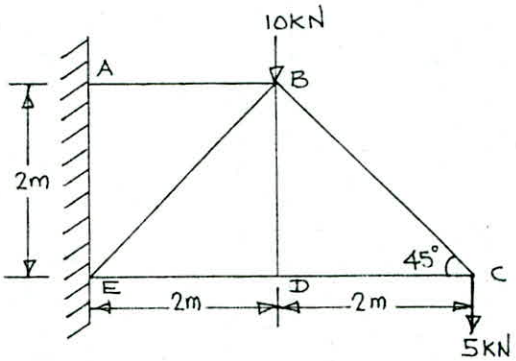
24. (A) (i) State the assumptions made in the theory of pure torsion. 4

(ii) A cantilever beam of rectangular section 200mm x 300mm is 3m long. It is loaded with 5kN/m over the entire span. Determine (a) maximum moment resistance of the beam and (b) the concentrated load that can be placed at the free end of the cantilever in addition to the udl if the bending stress is not to exceed 10N/mm^2. 8

(Or)

(B) Determine the maximum allowable torque to which a solid circular shaft of 100mm diameter and 3m long can be subjected to without exceeding a shear stress of 55N/mm^2 and a twist of 3.5°. Take G=7x10^4 N/mm^2. 12

25. (A) Determine the magnitude and nature of forces in the members of truss shown in figure by method of joints. 12



(Or)

(B) Determine the magnitude and nature of forces in the members of truss shown in figure by graphical method. 12