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C16-C–302

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BOARD DIPLOMA EXAMINATION, (C-16)

JUNE/JULY—2022

DCE – THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIALS AND THEORY OF STRUCTURES

Time : 3 hours] [*Total Marks* : 80

PART—A

3×10=30

Instructions : (1) Answer all questions.

(2) Each question carries three marks.

(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. Define the terms :

   (a) Bending stress

   (b) Shear stress

2. Sketch the bending stress distribution diagram for a beam of rectangular cross-section.

3. Draw the deflected shapes of simply supported, cantilever, fixed beams subjected to point load applied at centre.

4. Derive the relation among curvature, slope and deflection of a loaded beam.

5. Define principal planes and principal stress.

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6. Write any three assumptions made in deriving the torsional formula.

7. Define hoop stress and longitudinal stress.

8. A mild steel tube 3 m long, 30 mm internal diameter and 4 mm thick is used as a strut both ends hinged. Find the collapsing. Take $E = 2\times10^5$ N/mm^2.

9. List any three failures of dam.

10. Distinguish between a statically determinate frame and statically indeterminate frame.

PART—B

10×5=50

Instructions : (1) Answer *any* five questions.

(2) Each question carries ten marks.

(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

11. A rectangular beam of 200 mm × 300 mm cross-section is simply supported over a span of 5 m and carries a u.d.l. of 12 kN/m. Calculate the maximum stress induced in the beam and also draw the bending stress distribution along the depth of the beam.

12. A steel rod of 120 mm diameter is to be bent to a circular section. Find the minimum radius of curvature to which it should be bent, so that the stress in the steel may not exceed 120 N/mm^2. Take $E = 2\times10^5$ N/mm^2.

13. A simply supported beam of 3·5 m carries a central point load of 300 kN. If the value of EI is 4×10^{13} N/mm^2. Find the maximum deflection at centre and also splope at supports.

14. A cantilever of length 3 m carries two points loads of 2 kN at the free end and 4 kN load at a distance of 2 m from the free end. Determine the deflection at the free end by Mohr's theorem. Take $E = 2\times10^5$ N/mm^2 and $I = 10^8$ mm^4.

15. A uniform round bar 3 m long is used a simply supported beam and the deflection 8 mm under a central point load of 200 N. Find the Euler's crippling load for the bar when used as a strut with one fixed and the other end free.

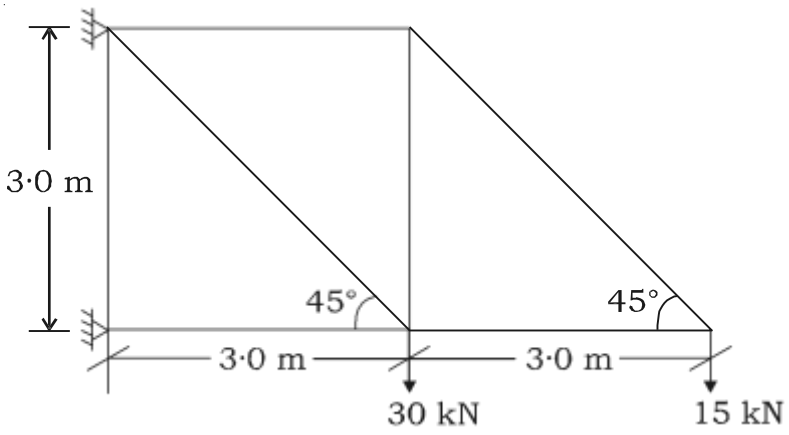
16. A built up column is made up of ISLB 350 mm × 150 mm with two cover plates 160 mm × 12 mm are at top and another at bottom flange. It is 5·0 m long with one end fixed and other end pinned. Calculate the safe load using ranking formula with a factor of safety 4.

c/s area = 6301 mm^2, I_{xx} = 131·583×10^6 mm^4, I_{yy} = 6·319×10^6 mm^4. Take f_c = 0·33 kN/mm^2, α = 1/7500.

17. A masonry dam of rectangular section is 10 m high and 2 m thick.

Determine the max and min stress intensities at the base section, when the wall is retaining water up to a height of 6 m. Take specific weight of masonry and water are 22 kN/m^3 and 10 kN/m^3 respectively.

18. Find the magnitude and nature of forces in all the members of truss shown in figure by Method of Joints.



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