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C16–C–302

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BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2018

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 : 1½+1½

(a) Moment of resistance

(b) Curvature of beams

2. State the assumptions made in the theory of simple bending. 3

3. Define the following : 1½+1½

(a) Slope

(b) Deflection

4. Distinguish between the strength and stiffness. 3

5. Mention the importance of a Mohr's circle. 3

6. Calculate the minimum diameter of a solid shaft required if it is to transmit a torque of 160 kN m so that the max. stress does not exceed 45 N / mm^2. 3

7. A cylindrical shell of 2·5 m diameter and 20 mm thick is subjected to an internal pressure of 3 N/mm^2. Find the circumferential and longitudinal stress developed in the material of the cylinder. 3

8. State the effective length of column for any three types of end conditions. 3

9. List any three failures of a retaining wall. 3

10. Classify the types of frames. 3

PART—B 10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each question carries **ten** marks.
(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. A mild steel strap 10 mm thick and 250 mm wide is wound round on a bullock cart wheel of 1·5 mm radius. Determine the bending moment and max. bending stress developed in the strap. Take E 2 10^5 N/mm^2.

12. An I-section has two flanges of each 100 mm wide and 20 mm thick and web 120 mm high and 20 mm thick. If the section is subjected to a shearing force of 10 kN, find the values of maximum and average shear stress induced in the section.

13. A simply supported beam of 6 m carries a point load of 20 kN at its centre. Calculate the slope at the ends and deflection at the mid span using Mohr's theorems. Take EI 5400 10^9 N-mm^2.

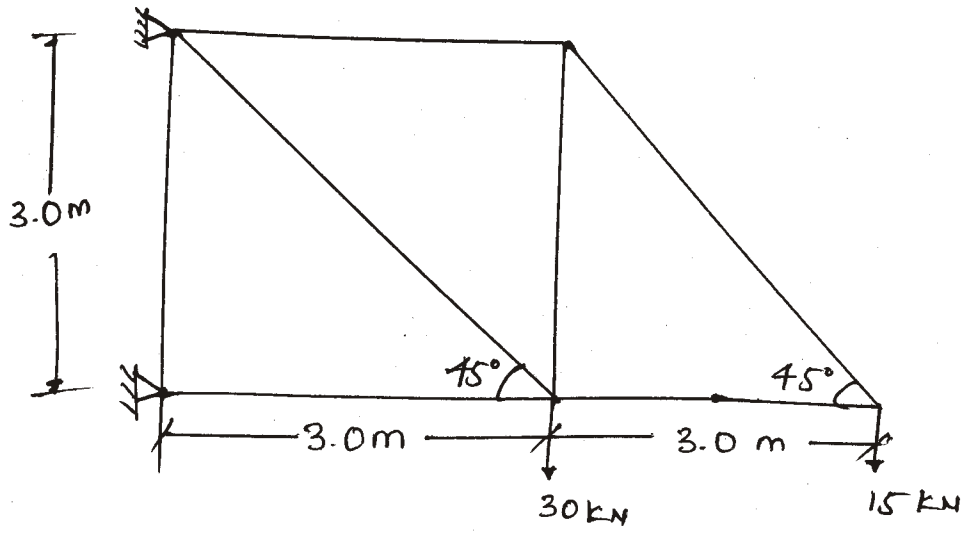
14. A cantilever 4 m span carries two point loads of each 20 kN at 0 m and 2 m from free end. Find the max. slope and deflection using the moment area method. Take EI 8400 10^9 N-mm^2.

15. A hollow cast iron column of external diameter 220 mm is to carry a load of 300 kN. Length of the column is 6 m and fixed at both ends. Determine the thickness required for the column by Rankine equation. Given E 210 kN / mm^2.

16. A hollow cast iron column where external diameter is 200 mm and internal diameter is 160 mm and is 4·5 m long and is fixed at both ends. Calculate the safe load by Rankine formula using factor of safety 4 and ratio of Euler and Rankine critical load. Given E 200 kN / mm^2, f_c 350 N / mm^2, a $\frac{1}{1600}$.

17. A masonry dam of trapezoidal section is 2 m wide at top and 5 m wide at bottom is 8 m high and retains water on the vertical face to a height of 6 m. Find the maximum and minimum stress at the base and draw the stress diagram. Given specific weight of masonry is 22·5 kN/m^3 and specific weight of water is 10 kN/m^3.

18. Find the magnitude and nature of forces in all the members of truss shown in fig. by method of joints.



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