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C16–C–302

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BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—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:

(a) Neutral axis

(b) Modulus of section

2. State any three assumptions made in the theory of simple bending.

3. Write the relation between curvature, slope and deflection.

4. Define:

(a) Mohr's Theorem-I

(b) Mohr's theorem-II for slope and deflection

5. Define:

(a) Principal plane

(b) Principal stress

6. Find the torque which a shaft of 200 mm diameter can safely transmit, if the shear stress is not to exceed 48 N/mm^2.

7. A water main of 1.5 m diameter and 20 mm thick is subjected to an internal pressure of 2 N/mm^2. Calculate the circumferential stress and longitudinal stress induced in pipe.

8. State any three limitations of Euler's formula.

9. List any two failures of dam.

10. State any two methods used for analyzing statically determinate frames.

PART—B 5×10=50

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

(2) Each question carries **ten** marks.

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

11. Find the moment of resistance (Bending moment) of a square beam cross-section if one of its diagonal is placed vertical. Assume the cross-sectional area is 2500 mm^2 and the permissible bending stress is 40 N/mm^2.

12. A circular beam of 150 mm diameter is subjected to a shear force of 25 kN. Determine maximum shear stress, average shear stress and the shear stress at a distance of 25 mm from neutral axis.

13. A cantilever beam 3 m long carries a u.d.1 or 10 kN/m run over a length of 2 m from fixed end and a point load of 5 kN at free end. Calculate the maximum slope and deflection. Take E = 200 kNmm^2 and moment of inertia I 8600 10^4 mm^4.

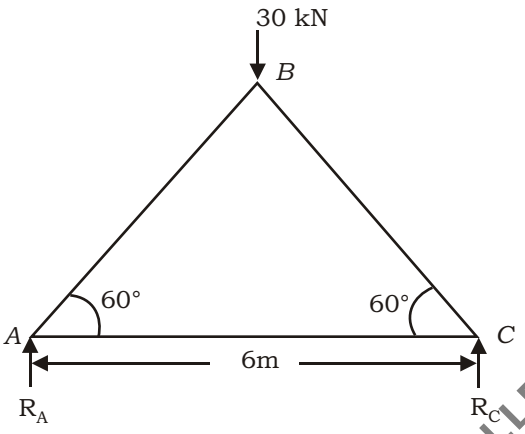
14. A steel shaft 300 mm diameter and 4 m long is used as a cantilever beam. If E for steel is 2 10^5 N / mm^2 and carries a point load of 40 kN at its free end, find the slope and deflection at a distance of 2 m from fixed end by double integration method.

15. The column is of rectangular shape of size 230 150 mm. The column carries compressive load of 28 kN. Factor of safety in 2.5 and E 2.1 10^8 kN / m^2. Determine the length of the column whose both ends fixed.

16. A cast iron table 40 mm external diameter and 30 mm internal diameter and 1m long is used as pin ended strut (both ends pinned). Calculate the crippling loads given by Euler's and Rankine's formulae. Given f_c 560 N / mm^2 and 1/A1600; E 100 kN / mm^2.

17. A trapezoidal concrete dam 10 m high has top width of 1 m and bottom width of 6 m. The face exposed to water has a slope of 1 horizontal to 10 vertical. Determine the maximum and minimum stresses at the base of the dam when level coincides with the top of the dam. Also sketch the stress distribution diagram. Take specific weight of concrete is 23 kN/m^3 and specific weight of water is 10 kN/m^3.

18. Find the forces in the members of the truss (by method of joints) of span 6 m and is carrying a load of 30 kN at its apex as shown below figure.



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