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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2017

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 section modulus and calculate the section modulus for a hollow circular section having external diameter 300 mm with 16 mm thickness. 1+2=3

2. Draw the shear stress distribution diagram for the following sections : 1+1+1=3

(a) Circular section

(b) I-section

(c) Rectangular section

3. Calculate the maximum deflection for a cantilever beam of span 3 m carries a point load of 30 kN at its free end. Take E 200 kN/mm^2 and I 156 5 10^6 mm^4. 3

4. Calculate the maximum slope and deflection for a simply supported beam 6 m span carries a UDL 20 kN/m over its entire length. Take EI 35000 kN-m^2. 3

5. Define stiffness and write the standard equation for maximum slope and deflection for a simply supported beam of span L m subjected to a point load at center. 1+1+1=3

6. Differentiate between long column and short column. 1½+1½=3

7. Calculate the effective length of a column having length 6 m for the following conditions : 1+1+1=3

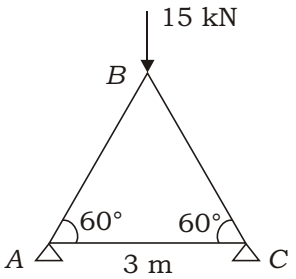
(a) Both ends fixed

(b) One end fixed and other end hinge

(c) One end fixed and other end free

8. Calculate the minimum stress at the base of a trapezoidal dam section of 8 m height, having top width 1·5 m bottom width 4 m. Take unit weight of concrete and water as 24 kN/m^3 and 10 kN/m^3. Water level coincides with the top of the dam. 3

9. Calculate the forces in the members AB and AC for the figure shown using methods of joints. 1½+1½=3



10. Define torque and write the torsional rigidity equation and explain the terms. 1+1+1=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 simply supported rectangular beam carries a UDL 12 kN/m over the entire span of 6 m and a point load 40 kN at mid span. Design a suitable section taking (D $2B$) if the stress in the beam is not to exceed 15 N/mm^2. 10

12. Calculate the maximum load carrying capacity (UDL) of a rectangular beam 200 mm × 3000 mm over a span of 4 m if the maximum permissible stresses in bending and in shear are not to exceed 25 N/mm^2 and 3 N/mm^2 respectively. 10

13. Calculate the prom reaction when the prop is placed at free end of a cantilever beam and carries a UDL of 8 kN/m over its entire length of 4 m. Draw the shear force and bending moment diagrams and also find point of contra flexure. 2+4+4=10

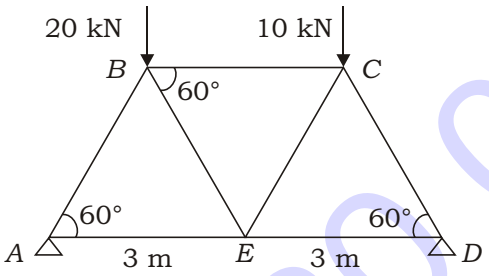
14. A simply supported beam 6 m long, carries a point load of 20 kN which acts at 3 m from right support. Calculate the deflection under point load using double integration method. Take E 200 kN/mm^2 and I 156 5 10^6 mm^4. 10

15. List any five assumptions made in Euler's theorem for columns. Determine Euler's crippling load for 5 m long rectangular column (150 mm × 75 mm) with one end fixed and other end hinged. Take E 200 kN/mm^2. 5+5=10

16. A stanchion is made up of an ISLB 300 mm × 150 mm with two plates 200 mm × 15 mm one at top and one at bottom flange, used as a column 5 m long with both ends fixed. Calculate the safe load on column using Rankine's formula with factor of safety 3, fc 330 N/mm^2, 1 / 7500. For given ISLB : Ixx 73 329 10^6 mm^4, Iyy 3 762 10^6 mm^4, A 4060 mm^2. 10

17. A concrete dam of trapezoidal section with 2 m top, 6 m bottom, 12 m height retains water up to top with its water is vertical. Calculate the maximum and minimum stresses at base at plot the stress distribution diagram. Take specific weight of concrete and water as 24 kN/mm^3 and 10 kN/mm^3. 4+4+2=10

18. Find the forces in all members of the truss shown using method of sections. 10



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