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C09–C–303

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BOARD DIPLOMA EXAMINATION, (C–09)

SEPTEMBER/OCTOBER - 2020

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 following terms :

(a) Neutral axis

(b) Modulus of section

2. Write the general equation for shear stress distribution over any cross-section and explain the terms.

3. Define the following :

(a) Slope

(b) Deflection of a beam

4. List different methods to calculate slope and deflection.

5. State Mohr's theorem I and II.

6. Define the following terms :

(a) Critical load

(b) Effective length

7. Draw the sketches for the following end conditions and mention its effective length :

(a) Both ends hinged

(b) Both ends fixed

(c) One end fixed other end free

8. List any three failures in dam.

9. Differentiate between statically determinate and indeterminate structures.

10. Give the equation of torsion and with usual notations.

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 rectangular beam 300 mm deep simply supported over a span of 3 m. What udl/m the beam can carry, if the bending stress is not to exceed 120 N/mm^2? Take I 18 10^7 mm^4.

12. A 300 mm deep and 160 mm wide rolled steel joists of I-section has flanges 10 mm thick and web 8 mm thick. Calculate the safe udl that this section will carry over a span of 5 m, if the permissible skin stress is limited to 120 N/mm^2.

13. A cantilever 3 m long carries an udl of 10 kN/m over a length of 2 m from fixed end and a point load of 5 kN at the free end. Calculate the max. slope and deflection. Given E 200 kN/mm^2 and I 86 10^6 mm^4.

14. A simply supported beam of span 4 m carries an udl of 20 kN/m including its self weight. The width of the wooden rectangular beam is 300 mm. The permissible bending stress is not to exceed 5 N/mm^2 and the central deflection is not to exceed 6 mm. Determine the depth of the beam required. Take E $1{\cdot}25\times10^4$ kN/mm^2.

15. A hollow steel tube 180 mm external diameter and 10 mm thick is 3·5 m long. It is used as a stanchion. If E for steel tube material is 2×10^8 kN/m^2, determine the safe buckling load on the stanchion if—

(a) both ends are fixed;

(b) one end is fixed and the other end is hinged.

Take FS as 4.

16. A cast-iron hollow column, having 80 mm external diameter and 60 mm internal diameter, is used as a column of 3 m long, using Rankine's formula, determine crippling load, when both the ends are fixed. Take f_c 500 N/mm^2, 1/1600.

17. A concrete dam of rectangular section 22 m high and 8 m wide contains water up to a height of 20 m. Find the following :

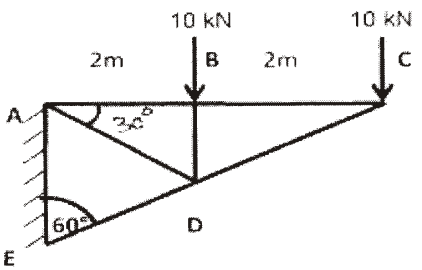
(a) Total pressure/m length of the dam

(b) The point where the resultant pressure cuts the base

(c) The maximum stress at the base

(d) The minimum stress at the base

18. Find the magnitude and nature of forces in all the members of the truss shown in the figure below :



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