C16-**C-302**

6223

BOARD DIPLOMA EXAMINATIONS

SEPTEMBER/OCTOBER - 2020

DCE – THIRD SEMESTER

STRENGTH OF MATERIALS & THEORY OF STRUCTURES

Time: 3 hours Max. Marks: 80

PART – A **3 X 10 = 30**

Instructions: *1. Answer **all** questions.*
*2. Each question carries **Three** Marks.*
3. Answer should be brief and straight to the point and should not exceed Five simple sentences.

1. State any Three assumptions in the theory of simple bending.

2. A women beam 100 mm wide, 200 mm deep and 3 m span is simply supported and carrying an UDL of 30 KN/m over the entire span. Determine maximum shear stress.

3. State Mohr's theorems.

4. A beam of 4m span is freely supported and carries a point load of 50 KN at the centre. Calculate the maximum deflection, given EI =7000 X 10^9 N-mm^2.

5. Define Mohr's circle and state its importance.

6. Determine the polar moment of inertia of hollow circular shaft of external diameter 20 mm and internal diameter 10 mm.

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7. Define the following:

   a) Circumferential stress

   b) Longitudinal stress.

8. State the equation for Rankine's crippling load and explain the terms.

9. Mention any three stability conditions for a dam.

10. Distinguish between a deficient frame and redundant frame.

PART – B **5 X 10 = 50**

***Instructions**:* *1. Answer any **Five** questions*
*2. Each question carries **TEN** Marks.*
3. Answer should be comprehensive and a criterion for valuation is the content but not the length of the answer.

11. A rectangular beam 100 mm x 250 mm is 3 m long and is simply supported at the ends. If carries a point load of 10 KN at mid-span. Determine the maximum bending stress induced in the beam.

12. A rectangular beam 200 mm x 350 mm is simply supported over a span of 4m carries a UDL of w KN/m on its entire span. The maximum flexural stress due to bending is 8.5 N/mm^2. Calculate the intensity of load and maximum shear stress induced in beam.

13. Derive the formulae for the maximum slope and maximum deflection of a simply supported beam of span L with a point load w at its mid-span in terms of flexural rigidity. Use double-integration method.

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14. Determine the maximum slope and maximum deflection of a simply supported beam of span 6 m subjected to a UDL of 12 KN/m over the entire span and a central point load of 14 KN. Take EI = 200 KN/mm^2 and
I = 75 X 10^6 mm^4.

15. A stanchion is made up of an ISLB 300 mm x 150 mm with two plates 150 mm 12 mm, one at top and one at bottom flanges. If it is used as a column 4 m long with both ends hinged, with a factor of safety of 3. For the given ISLB, I_{XX} = 73.329 x 10^6 mm^4, area = 4808 mm^2. Take E = 210 KN/mm^2.

16. A hollow cylindrical cast Iron column is 7 m long both ends being fixed. Design the column to carry an axial load of 300 KN. Use Rankine's formula and adopt a factor of safety of 4. The internal diameter may be taken as 0.80 times the external diameter. Take f_c= 550 n/mm^2 and a= 1/1600.

17. A retaining wall of trapezoidal cross section 10 m high, 2 m wide at top retains earth on vertical side in level with its top. Calculate the minimum base width necessary to avoid formation of tensile stresses at the base. Specific weight of masonry is 24 KN/mm^3, Specific weight of water is Specific weight of masonry is 24 KN/mm^3, Specific weight of water is 10 KN/mm^3, Specific weight of water is 10 KN/mm^3 and Angle of repose 30^0.

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18. Determine the forces and nature of forces in all members of the truss shown below by method of joints.