6223

BOARD DIPLOMA EXAMINATIONS

OCT/NOV-2019

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. Define the terms a) Moment of resistance b) Curvature of beams.

2. Fine the modulus of section of a hollow circular section of external diameter 450 mm and internal diameter 320 mm.

3. A simply supported beam of span 4.5 m carries a central point load of 40 KN. Find the maximum deflection at centre. Take EI = 4 X 10^{13} N-mm^2.

4. Show the deflected shapes of the following

   a) Simply supported beam b) Cantilever beam

5. Mention the importance of Mohr's circle.

6. Define Hoop stress and Longitudinal stress.

7. Calculate the minimum diameter of a solid shaft if it is to transmit a torque of 160 KN-m, so that the maximum shear stress does not exceed 50 N/mm^2.

8. State the Effective length for different end conditions of a column.

9. Define Angle of internal friction and Surcharge angle.

10. Differentiate between Statically Determinate and Statically Indeterminate beams.

[Cont..,

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 beam of I – section 500 mm deep and 200 mm wide has flanges 25 mm thick and web 15 mm thick. It carries a shear force of 400 KN at a section. Calculate intensity of shear stress at salient points with moment of inertia of 650 x 10^6 mm^4. Also sketch the shear stress distribution across the section.

12. A timber beam of rectangular section is simply supported over a span of 8 m and carries a UDL of 22 KN/m over entire span. Calculate the width and depth of the beam, if the bending stress is not to exceed 10 N/mm^2. The ratio of depth to width is 2.

13. A cantilever 150 mm x 300 mm deep, 4 m long is carrying a load of 10 KN at the free end and 25 KN at distance of 1.5 m from free end. Determine the slope and deflection at the free end. Take E = 200 KN/mm^2.

14. A simply supported beam of span 8 m carries a concentrated point load of 12 KN at a distance of 5 m from left support. Determine the slope at the ends and maximum deflection using Macaulay's method. E = 200 KN/mm^2; I=56 x 10^6 mm^4.

15. Determine the ratio of buckling strengths of two circular columns, one is hollow and the other one is solid. Both the columns are made of same material and have same length, cross-sectional area and end conditions. The internal diameter of hollow column is 0.8 times that of its external diameter.

16. A hollow cast iron column whose outside diameter is 220 mm and thickness of 15 mm. It is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine's formula with a factor of safety of 4. Calculate the slenderness ratio and the ratio of Euler's to Rankine's critical loads. For cast iron take f_c = 560 N/mm^2, $\propto$ = 1/1500 and E = 8x10^4 KN/mm^2.

17. A concrete dam of rectangular cross section 20 m high and 10 m wide contains water to a height of 19m. Find

a) Total pressure per meter length of dam.

b) The point where the resultant cuts the base.

c) The maximum and minimum stress at the base.

d) Show the stress distribution at the base.

18. Calculate the forces in all the members of the truss shown below by the method of joints.