6223

BOARD DIPLOMA EXAMINATIONS OCT/NOV-2019

DCE - THIRD SEMESTER

STRENGTH OF MATERIALS & THEORY OF STRUCTURES

Time: 3 hours

PART - A

- **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.
- Fine the modulus of section of a hollow circular section of external diameter 2. 450 mm and internal diameter 320 mm.
- A simply supported beam of span 4.5 m carries a central point load of 40 3. KN. Find the maximum deflection at centre. Take $EI = 4 \times 10^{13} \text{ N-mm}^2$.
- Show the deflected shapes of the following 4.
 - b) Cantilever beam a) Simply supported beam
- Mention the importance of Mohr's circle. 5.
- 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/mm².
- 8. State the Effective length for different end conditions of a column.

9. Define Angle of internal friction and Surcharge angle.

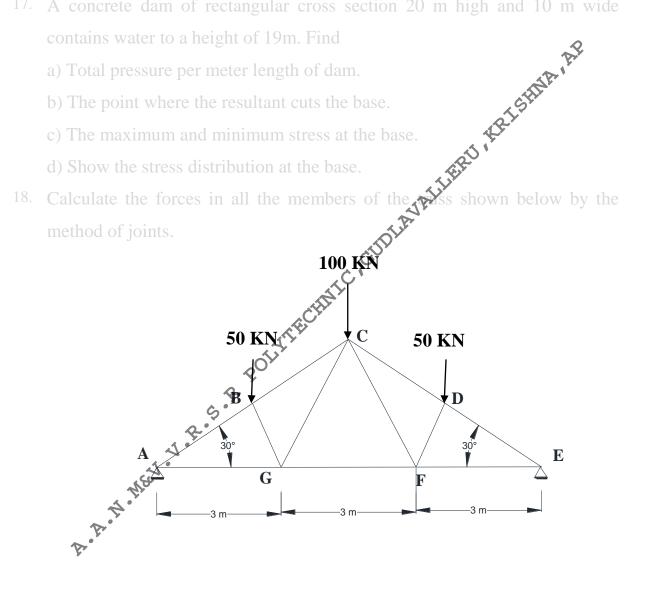
10. Differentiate between Statically Determinate and Statically Indeterminate beams. 「Cont..,

PART - B

 $5 \times 10 = 50$

- **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 curswer.
- 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 10⁶ mm⁴. 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/mm². 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 $E = 200 \text{ KN/mm}^2$.
- 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/mm²; $I=56 \times 10^6 \text{ mm}^4$.
- 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 $= 560 \text{ N/mm}^2$, $\propto = 1/1500 \text{ and E} = 8 \times 10^4 \text{ KN/mm}^2$.



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