

c16-c-**302**

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BOARD DIPLOMA EXAMINATION, (C-16) MARCH/APRIL-2018

DCE—THIRD SEMESTER EXAMINATION

STRENGTH OF MATERIALS AND THEORY OF STRUCTURES

Time : 3 hours]

[Total Marks : 80

PART—A Ć

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 terms : $1\frac{1}{2} + 1\frac{1}{2}$
 - (a) Moment of resistance
 - (b) Curvature of beams
- State the assumptions made in the theory of simple bending. 3
 Define the following : 1¹/₂+1¹/₂

(a) Slope

(b) Deflection

- **5.** Mention the importance of a Mohr's circle.
- 6. Calculate the minimum diameter of a solid shaft required if it is to transmit a torque of 160 kN m so that the max. stress does not exceed $45 \text{ N} / \text{mm}^2$.

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- 7. A cylindrical shell of 2.5 m diameter and 20 mm thick is subjected to an internal pressure of $3 \text{ N}/\text{mm}^2$. Find the circumferential and longitudinal stress developed in the material of the cylinder.
- 8. State the effective length of column for any three types of end conditions.
- **9.** List any three failures of a retaining wall.
- **10.** Classify the types of frames.

Instructions : (1) Answer any **five** questions.

- Answer any five questions.
 (2) Each question carries ten markstillet
 (3) Answers should be comprehendent for valuation is the the answer
- 11. A mild steel strap 10 mm thick and 250 mm wide is wound round on a bullock cart wheel 5 mm radius. Determine the bending moment and max. Gending stress developed in the $2 \ 10^5 \,\mathrm{N}\,\mathrm{mm}^2$. strap. Take E
- **12.** An I-section has two flanges of each 100 mm wide and 20 mm thick and web 120 mm high and 20 mm thick. If the section is subjected to a shearing force of 10 kN, find the values of maximum and average shear stress induced in the section.
- 13. A simply supported beam of 6 m carries a point load of 20 kN kat its centre. Calculate the slope at the ends and deflection at the mid span using Mohr's theorems. Take $EI > 5400 \quad 10^9 \text{ N-mm}^2.$ P'
- 14. A cantilever 4 m span carries two point loads of each 20 kN at 0 m and 2 m from free end. Find the max. slope and deflection using the moment area method. Take $EI = 8400 = 10^9 \text{ N-mm}^2$.
- **15.** A hollow cast iron column of external diameter 220 mm is to carry a load of 300 kN. Length of the column is 6 m and fixed at both ends. Determine the thickness required for the column by Rankine equation. Given $E = 210 \text{ kN} / \text{mm}^2$.

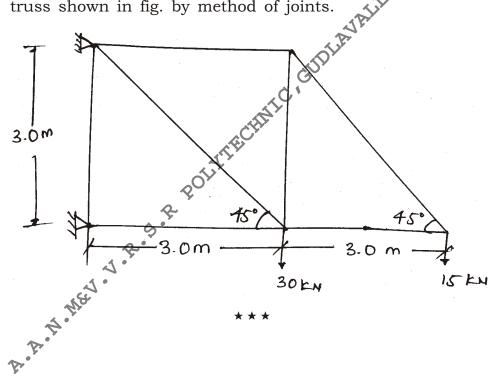
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- **16.** A hollow cast iron column where external diameter is 200 mm and internal diameter is 160 mm and is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine formula using factor of safety 4 and ratio of Euler and Rankine critical load. Given $E = 200 \text{ kN} / \text{mm}^2$, $f_c = 350 \text{ N} / \text{mm}^2$, $a = \frac{1}{1600}$.
- 17. A masonry dam of trapezoidal section is 2 m wide at top and 5 m wide at bottom is 8 m high and retains water on the vertical face to a height of 6 m. Find the maximum and minimum stress at the base and draw the stress diagram. Given specific weight of masonry is 22.5 kN/m³ and specific weight of water is 10 kN/m³.
- **18.** Find the magnitude and nature of forces in all the members of truss shown in fig. by method of joints.



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