C-16-C-16S-C-302

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BOARD DIPLOMA EXAMINATION, (C-16/C-16S)

MARCH / APRIL - 2019

DCE - III SEMESTER EXAMINATION

STRENGTH OF MATERIALS

Time : 3 Hours] [Total Marks : 80

PART - A 3×10=30

Instructions : *(1) Answer ALL questions.*
(2) Each question carries THREE marks.
(3) Answer should be brief and straight to the point.

1. Define : (a) Shear force (b) Bending moment

2. A simply supported beam of span 4 m carries a point load of 10 kN at distance of 1 m from the left support, find the reaction at supports.

3. Write any three assumptions made in theory of simple bending.

4. Find the modulus of section of a rectangular beam of size 240 mm × 400 mm.

5. Show the deflected shapes of following :
   (a) cantilever beam with point load at its free end.
   (b) simply supported beam subjected to udl over a entire span.

6. Define : (a) Stiffness of beam (b) Strength of beam

7. A cantilever beam of 2 m long carries a point load of 350 kN at its free end. Find the deflection at the free end. Take E = 200 GN/m^2 and I = 210 × 10^6 cm^4.

8. Define : (a) Radius of gyration (b) Slenderness ratio.

9. A water main of 1.5 m diameter and 20 mm thick is subjected to an internal pressure of 1.5 N/mm^2. Calculate the hoop stress and longitudinal stress.

10. Define Pure Torsion.

PART - B 10×5=50

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

11. A horizontal beam of 12 m long simply supported at its end. It is subjected to vertical loads of 10 kN, 20 kN and 25 kN at 3 m, 7 m and 10 m from left hand support respectively. Draw SFD and BMD indicating values at salient points. 4+4+2

12. (a) Define point of contraflexture. 3
    (b) Deduce the relationship between rate of loading shear force and bending moment. 7

13. A simply supported timber joist of 5 m span carries a uniformly distributed load of 15 kN/m over its entire span. Find the dimensions of the joist if the maximum permissible stress is limited to 8 N/mm^2. The depth of joist equals to twice the width.

14 An I - section with rectangular ends has following dimensions.
Flange = 200 mm × 20 mm
Web = 300 mm × 20 mm
Total depth = 340 mm
Find the maximum shearing stress developed in the beam for a shear force of 50 kN. Also sketch the shear stress distribution across the section.

15 Derive the equation for maximum slope and deflection for simply supported beam with central point load by using double integration method.

16 A simply supported beam of span 6 m carries a point load of 10 kN placed at distance of 2 m from right hand side support. Determine the slope at the ends and maximum deflection by using Macaulays method. Take E = 200 kN/mm^2 and I = 48 × 10^6 mm^4.

17 (a) Differentiate between short column and long columns. 3+7

(b) A column of length 12 m has a cross-section of square with each side of 0.5 m. The column has made of a metal having modulus of elasticity as 2 × 10^8 kN/m^2, using Euler's formula find the critical load if

(i) Both ends of the column are hinged.

(ii) One end is fixed and the other end of the column is free.

18 A rectangular column 200 mm (wide) × 150 mm (thick) is carries a vertical load of 12 kN at an eccentricity of 50 mm in plane bisecting the thickness. Determine the maximum and minimum intensities of stress in the section. Sketch the stress distribution at the base. 4+4+2

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