C09-C-303

3219

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH / APRIL - 2019

DCE - III SEMESTER EXAMINATION

STRENGTH OF MATERIALS & THEORY OF STRUCTURES

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 A steel strip of 30 mm thick and 60mm wide is bent round a circular drum of 40 m diameter. Calculate the maximum stress due bending, if E = 200 kN/mm^2.

2 Draw the shear stress distribution diagram over a symmetrical I-section of overall size (B × D) and size of web (b ×d).

3 Write the formulae for maximum slope and maximum deflection of a cantilever beam of span 'I' subjected to a u.d.l of w/unit length over its whole span.

4 Define Stiffness of the beam and Flexural rigidity.

5 State Mohr's theorems.

6 Define : (i) Crushing load and (ii) crippling load

7 State any three assumptions made in Euler's theory of long columns.

8 List any three failures of a retaining wall.

9 Draw the figures of :
(a) Simply supported truss
(b) Cantilever truss.

10 Find the torque which a shaft of 300 mm diameter can safely transmit if the shear stress is not to exceed 48 N/mm^2.

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PART - B **10×5=50**

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

*(2) Each question carries **TEN** marks.*

(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11 Find the width and depth of the strongest beam of rectangular section which can be cut out of a circular section of diameter D. Hence obtain the size of the strongest beam that can be cut out of a circular log of wood which has 220 mm diameter.

12 A wooden beam of square section 200 mm × 200 mm is used as a cantilever of length 3m. How much load can be applied at the end of the cantilever if the shear stress developed in the section is not to exceed 10 N/mm^2 ? What is the shear stress developed at a depth of 50 mm from the top ?

13 A simply supported beam 5m long carries a u.d.l. of 4 kN/m run over a length of 2m from right hand support. Calculate the maximum slope and deflection. Use Macaulay's method. Take E = 10 kN/mm^2 and moment of inertia I = 3.375 $\times 10^8$ mm^4.

14 A cantilever of 5m span is subjected to a point load of 10 kN at a distance of 3m from fixed end. If it is propped at its free end, determine the prop reaction and draw the SF and BM diagrams showing all the salient values.

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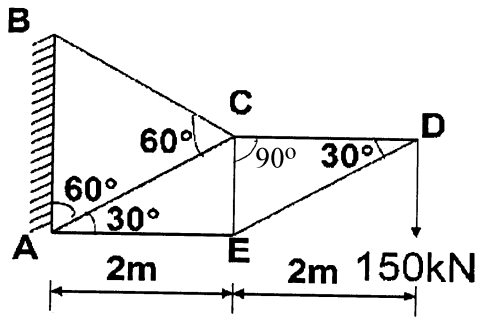
15 A stanchion is made up of an ISLB 300 mm × 150 mm with two plates 150 mm × 12 mm, one at top and one at bottom flanges. If it is used as a column 4m long with both ends hinged, find the safe load using Euler's formula, with a factor of safety of 3. For the given ISLB I_{xx}=73.329 × 10^6 mm^4, I_{yy} = 3.762 × 10^6 mm^4, Area = 4800 mm^2. Take E=210 kN/mm^2.

16 Determine the ratio of crippling loads given by Rankine's and Euler's formula for hollow circular cast iron column both ends pin jointed, 4 meters long, having outer diameter 150 mm and inner diameter 145 mm. Given f_c = 560 N/mm^2; E = 210 kN/mm^2 a = 1/1600.

17 A concrete dam of trapezoidal section 15m high and 3m wide at top and 7m wide at bottom. The water face is vertical and retains water up to 13 m. Check the stability of the dam for overturning, sliding and no tensile stresses are developed at the base, if the co-efficient of friction of the dam material and soil is 0.6. Specific weight of concrete is 23 kN/m^3 and specific weight of water is 10 kN/m^3.

18 Determine the forces in all the members of the truss shown in figure by method of sections.



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