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C14–C–302

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2017

DCE—THIRD SEMESTER EXAMINATION

MECHANICS OF SOLIDS

Time : 3 hours] [*Total Marks* : 80

PART—A 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.

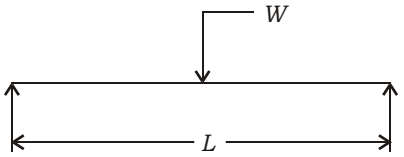
1. Defined the following terms :

(a) Shear force

(b) Bending moment

(c) Pointof contrafexlure

2. Draw shear force diagram and bending moment diagram for simply supported beam with point load at mid span.



3. Draw neat sketches for the following beams :

(a) A continuous beam with uniformly distributed load w/m run

(b) A simply supported beam with centra point load W

4. Define the following terms :

(a) Bending Shear stress

(b) Shear stress

5. A steel rod 100 mm diameter is to be bent to a circular section. Find the minimum radius of curvature to which it should be bent so that stress in the steel may not exceed 120 N/mm^2. Assume E 2 10^5 N/mm^2.

6. State the theory of simple bending.

7. State any three cases of beams where Mohr's theorems can be used easily.

8. Distinguish between strength and stiffness.

9. Define a propped cantilever. State the conditions when it is said to be statically indeterminate.

10. A beam of 6 m span is freely supported and carries a point load at the centre. If the slope at the ends is 0·5° under this load. Calculate the maximum deflection.

PART—B 10×5=50

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

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

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

11. Describe the procedures for sketching the shear force diagrams and bending moment diagrams.

12. A simply supported beam 5 m long carries an uniformly distributed load of 2·5 kN/m over a length of 2 m from left hand support. Construct the shear force diagram and bending moment diagram. Also find the position and magnitude of maximum bending moment.

13. An I-Section with rectangular ends has the following dimensions :

Flanges = 200 mm × 200 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.

14. A steel beam having an I-section as shown in the Fig. 2 is 3 m long and is simply supported at its ends. If the safe stress in tension for the beam is 30 MPa, determine the permissible uniformly distributed load acting on the whole span of the beam.

15. Explain Macaulay's method (for simply supported beams) of finding the slope and deflection.

16. A rectangular beam 400 mm deep is simply supported over a span of 6 m. If the maximum deflection is not to exceed 1/600 of the span, find the maximum permissible uniformly distributed load on it and the corresponding bending stress.

Given I_{xx} 280 10^6 mm^4 and E 200 kN/mm^2

17. Calculate the increase of volume per unit volume of their walled steel circular cylinder closed at both ends and subjected to uniform internal pressure of 6 kg/cm^2. The wall thickness is 0·1 cm. The ratius 0·34 m and poisons ratio $\frac{1}{3}$. Take E 2 1 10^4 kg/cm^2.

18. Find the maximum torque that can be applied safely on a drum of 300 mm diameter. The permissible angle of twist is 1·5° in a length of 7 m and the shear stress is not to exceed 42 N/mm^2. C 8 10^4 N/mm^2

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