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C16-C–106

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BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL—2021

DCE - FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

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. State the "Law of parallelogram of forces".

2. Differentiate between centre of gravity and centroid.

3. Locate the centroid of T-section with its flange 100 mm × 20 mm and the web below that is 20 mm × 100 mm.

4. State :

(a) Parallel axis theorem

(b) Perpendicular axis theorem

5. Define Young's modulus and state its units.

6. Define the terms :

(a) Linear strain

(b) Lateral strain

(c) Poisson's ratio

7. What is principle of superposition? When is it valid?

8. Define the terms :

(a) Bending moment

(b) Point of contraflexure

9. Write any three types of beam. Illustrate with the help of sketches.

10. Draw Shear Force Diagram and Bending Moment Diagram for a Simply Supported Beam carrying a point load at mid-span.

PART—B

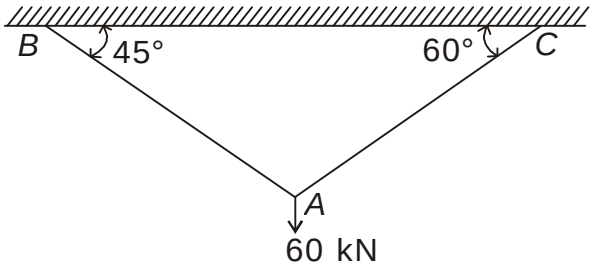
10×5=50

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

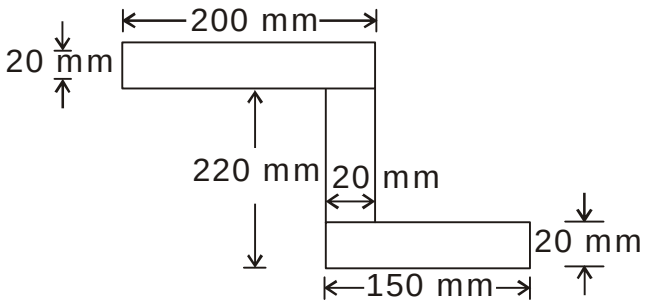
(2) Each question carries **ten** marks.

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

11 Calculate the forces in the ropes *AB* and *AC* of the arrangement as shown below.

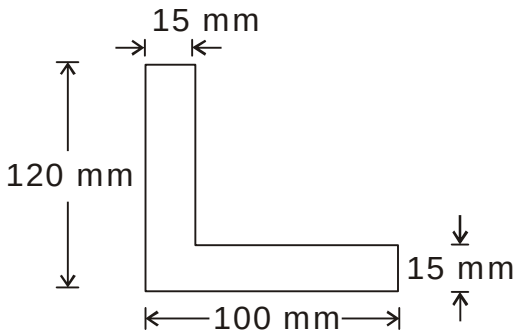


12. Find the centroid for Z-section shown below.

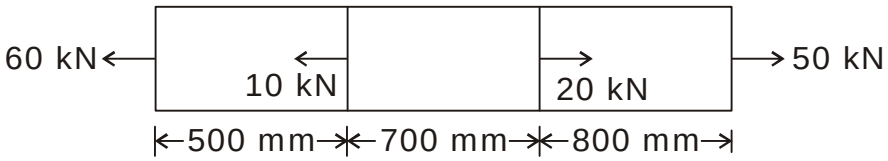


13. An unsymmetrical I-section has top flange 100 mm × 20 mm, bottom flange 80 mm × 20 mm and web 10 mm × 120 mm. Overall depth of the I-section is 160 mm. Calculate moment of inertia about X-X axis.

14. Determine the moment of inertia of the following section.



15. A steel bar 25 mm diameter is acted upon by forces as shown below. Find the total elongation in the bar. $E = 2 \times 10^5$ N/mm^2.



16. A test bar of certain material 50 mm in diameter when put to an axial pull of 600 kN recorded an extension of 0·44 mm on a gauge length of 150 mm. A decrease of 0·033 mm in diameter was observed. Calculate Poisson's ratio, Young's modulus, rigidity modulus and bulk modulus of the material.

17. A cantilever beam of 4 m long carries a UDL of 10 kN/m for 1 m from fixed end and 20 kN/m for 1 m from the free end. Draw SFD and BMD.

18. A simply supported beam of span 7 m carries a concentrated load of 70 kN at a distance of 3 m from right support. Draw SFD and BMD.

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