



c09-c-106

3016

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2018

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 Lami's theorem.
2. State the conditions of equilibrium.
3. Find the centroid for T-section with its flange 100 mm × 10 mm and web 10 mm × 200 mm.
4. Define radius of gyration.
5. Define stress and strain.
6. State the three relations between the elastic constants.
7. A steel bar of 2500 mm length is stretched by 1.5 mm under certain axial pull. Find the axial strain.
8. State the different types of supports with sketches.

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9. State the relation among rate of loading, shear force and bending moment.
10. Sketch the BMD and give the magnitude of max. BM for a cantilever of span 3 m subjected to point load of 20 kN at free end.

PART—B

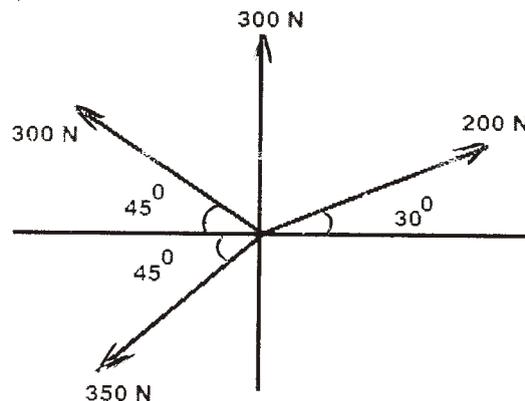
10×5=50

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

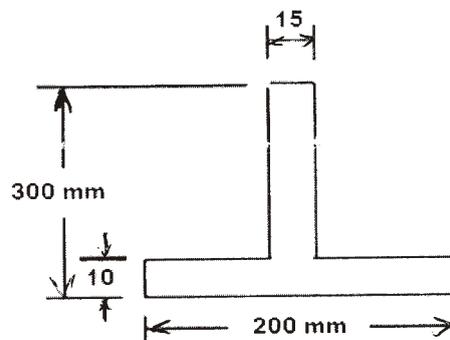
(2) Each question carries **ten** marks.

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

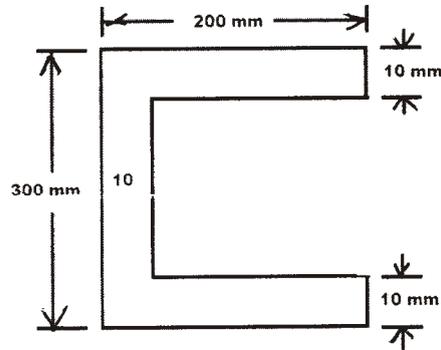
11. Find the magnitude and direction of the resultant of the coplanar concurrent force system shown in the figure below :



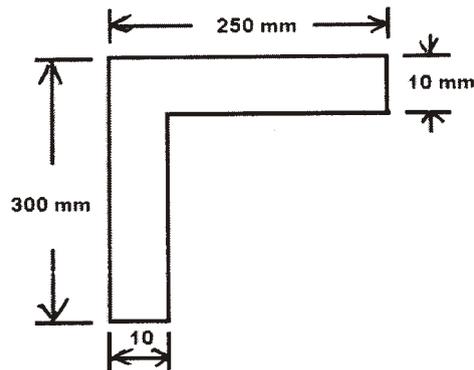
12. Find the centroid \bar{Y} from the base for the inverted T-section shown below :



13. Find the moment of inertia about the centroidal axes for the channel shown below :



14. (a) Find the centroid \bar{Y} from top of the figure shown below :



- (b) Find the moment of inertia of hollow circular section of outer diameter 100 mm and inner diameter 80 mm.

15. A steel bar of 2500 mm long and 10 mm in diameter was stretched by 1.5 mm under an axial pull of 50 kN. Determine the Young's modulus and shear modulus. Take Poisson's ratio as 0.25.
16. A steel rod of 50 mm diameter and 2.0 m long is subjected to axial pull of 60 kN. Calculate the stress and elongation in the rod.
 $E = 2 \times 10^5 \text{ N/mm}^2$

17. Draw SFD and BMD for a simply supported beam of span 10 m subjected to point loads of 30 kN and 20 kN acting at 4 m and 6 m from left-hand support respectively. State the maximum values of SF and BM.
18. Draw SFD and BMD for a cantilever of span 5 m subjected to point loads 50 kN and 10 kN acting at 3 m and 5 m from left-hand support respectively. Give the values of maximum SF and BM.
