



c09-c-106

3016

BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2017

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 triangle law of forces.
2. Define couple. List any two properties of couple.
3. Define centroid. Show the position of centroid of a right-angled triangle with one side vertical.
- * 4. State perpendicular axis theorem.
5. State Hooke's law.
6. A steel bar of 25 mm diameter and 5 m long is stretched by 2 mm by applying an axial pull of 80 kN. Determine the modulus of elasticity of the bar.
7. Define the terms (a) 'hardness', (b) 'brittleness' and (c) 'stiffness'.

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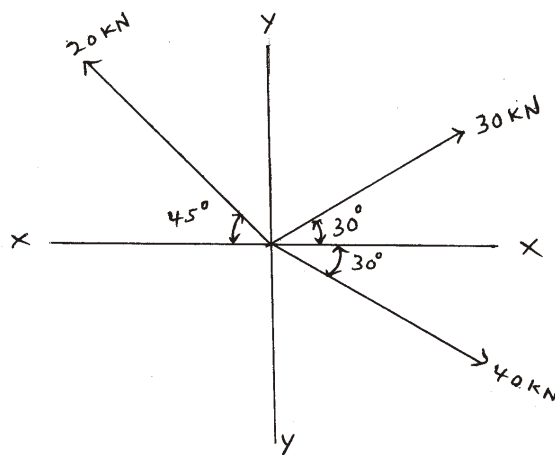
8. List any three ^{*} types of beams.
9. A cantilever of span 5 m carries a uniformly distributed load of 4 kN/m on whole span. Determine the maximum shear force and maximum bending moment.
10. A simply supported beam of span 8 m carries a uniformly distributed load of 15 kN/m over the entire span. Find the maximum shear force and maximum bending moment.

PART—B

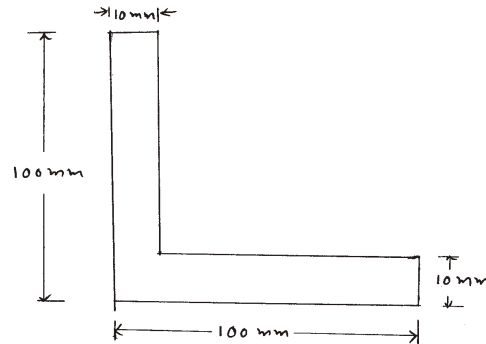
10×5=50

- 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.

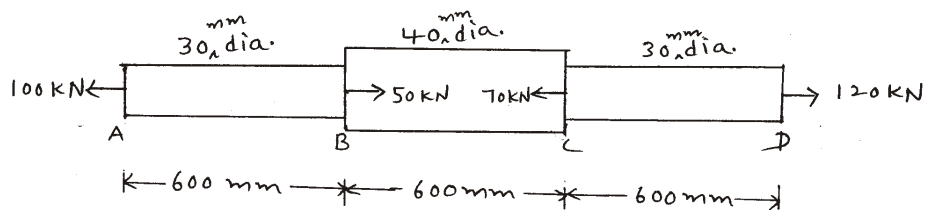
11. Find the magnitude and direction of the resultant of the system of coplanar forces as shown in the figure below :



12. Find the ^{*} position of centroid for the angle section shown below :



13. (a) Find the centroid of T-section whose flange is 100 mm × 20 mm and web is 20 mm × 100 mm. 5
- (b) A hollow circular shaft has an internal diameter of 30 mm and thickness of 6 mm. Determine the moment of inertia and radius of gyration about its diameter. 5
14. An I-section has top flange 200 mm × 25 mm, bottom flange 200 mm × 25 mm and web 25 mm × 400 mm. Determine the moment of inertia of the I-section about its centroidal XX-axis and YY-axis.
15. A steel bar of 1.8 m long is acted upon by forces as shown in the figure below. Find the total elongation of the bar. Given $E = 200 \text{ GPa}$:



16. An RCC column of 200 mm × 400 mm size is reinforced with 4 no. of 20 mm dia. steel rods. It is subjected to an axial load of 750 kN. Determine the stresses developed in the steel and concrete. Take $E_s = 200 \text{ GPa}$ and $E_c = 20 \text{ GPa}$.
17. A simply supported beam of 6 m span carries a central point load of 10 kN in addition to uniformly distributed load of 4 kN/m over the entire span. Draw shear force diagram and bending moment diagram and indicate the values at salient points.

18. A cantilever of span 5 m carries a point load of 20 kN at the free end and uniformly distributed load of 10 kN/m over a length of 3 m from the fixed end. Draw shear force diagram and bending moment diagram and indicate the values at salient points.
