C16-C-105

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5016
BOARD DIPLOMA EXAMINATION, (C-16)
OCTOBER/NOVEMBER-2018
DCE-FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

Time : 3 Hours] [Total Marks: 80

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PART-A

2X15=30

Instructions   :   1. Answer **Any Fifteen** questions.

2. Each question carries TWO marks.

3. Answers should be brief and straight to the point and shall not exceed four simple sentences.

1. Define "Dynamics " and " Statics " ?

2. Define "Kinematics" and "Kinetic" ?

3. Find the magnitude and direction of the resultant of the two forces 260 N and 180 N acting at mutually perpendicular directions ?

4. State the Law of parallelogram of forces ?

5. Define "Moment of a force" and write its units ?

6. A simply supporter beam of span 6m, carrying point loads of 15 KN and 10 KN at 2 m and 4 m respectively from left hand support. Find the support reactions ?

7. A trapezoidal lamina has uniform batter on both sides. Its top width is 200 mm and bottom width is 300 mm and height is 600 mm. Determine the position of centroid from the base ?

8. Find the position of centroid from base of an equal angular section 120 mm x 120 mm x 120 mm ?

9. Find the position of centroid from the base of T-section, top flange 100 mm x 10 mm and web 10 mm x 140 mm ?

10. Find the moment of inertia (a) about X-X axis and (b) about its base of a rectangular section 400 mm wide and 800 mm deep ?

11. Find the moment of inertia of a hollow circular section whose external diameter 60 mm and internal diameter is 50 mm about its centroidal axis ?

12. Find radius of gyration of a triangle whose base is 40 mm and height is 60 mm about an axis passing through C.G and parallel to base ?

13. Find the polar moment of inertia of a hollow square shaft with external side of 120 mm and internal side of 80 mm ?
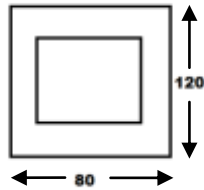
14. Define perpendicular axes theorem ?

15. Draw stress-strain curve for tensile test mild steel and indicate salient points ?

16. A mild steel rod of 10 mm diameter and 300 mm long elongated 0.18 mm under an axial pull of 10 KN. Determine stress and stain ?

17. A wooden tie bar of 50 mm x 100 mm size is 2 m long. It is subjected to an axial pull of 20 KN. Find the elongation of the tie if the modulus of elasticity of wood is 10 KN/mm^2 ?

18. The rigidity modulus of material is 0.8×10^5 N/mm^2 and the young's modulus is 2×10^5 N/mm^2, what is its bulk modulus ?

19. A load of 500 N is applied on a steel wire of diameter 2 mm and of 1 m length. Calculate the strain energy stored in the material when the load is gradually applied. Take $E = 2 \times 10^5$ N/mm^2 ?

20. Define " Elasticity" and "Ductility" ?

PART-B

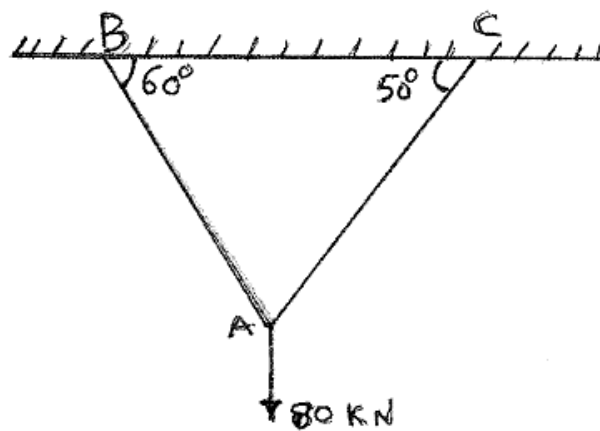*Instructions* : 1. Answer any **five** questions.

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

21. a) State "Law of Triangle of force" ?

b) Calculate the forces in the rope AB and AC of the arrangement as shown in the figure:

22. Four forces 200 N inclined at 30^0 to the North of East, 250 N towards North, 300 N towards North 45^0 West and 350 N inclined at 40^0 to the South of West. Find the magnitude and direction of the resultant of force ?

23. Determine centroid ($\bar{y}$ and $\bar{x}$) of the lamina as shown in figure.

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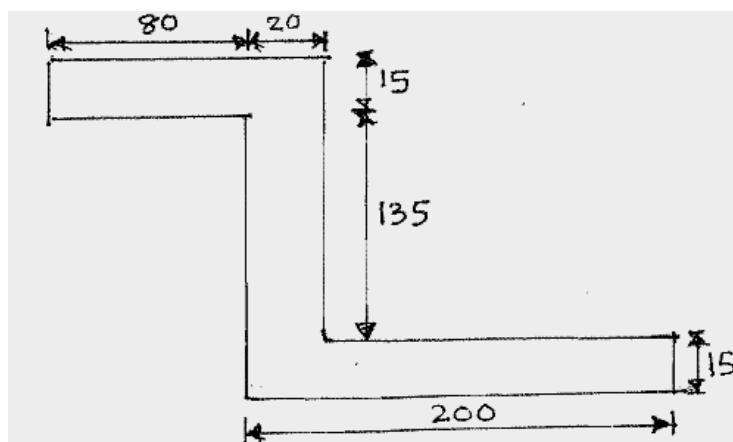
24. Find the moment of inertia of an I-section about X-X axis, given that, Top flange = 100 x 10 mm, Web = 10 x 200 mm, Bottom flange = 160 x 10 mm ?

25. Find the moment of inertia (I_{xx} & I_{yy}) of an un equal angle 125 mm x 75 mm x 10 mm about the centroidal axes. Assume longer leg placed vertical ?

26. A bar ABCD of 12 mm in diameter is subjected to axial forces as shown in fig. The material is the same through the bar. Find the deformation of the bar under the applied loads ? Take E as 120 KN/mm^2 ?
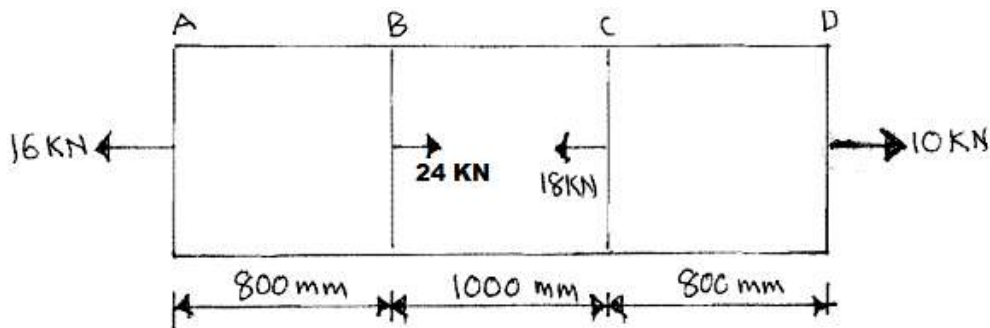
27. A 30 mm diameter metal bar carrying a load of 54000 N, extended by 0.112 mm on a gauge length of 300 mm. the contraction in diameter was 0.00366 mm. Calculate the four elastic constants of the material ?

28. A solid steel cylinder of 80 mm diameter is inserted inside a hollow aluminum tube of 80 mm internal diameter and 120 mm external diameter and rigidly fixed at ends. The composite section is subjected to an axial compression of 170 KN. Determine the stresses in each material. Take E_a as 0.7×10^5 N/mm^2 and E_s as 2.1×10^5 N/mm^2 ?

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