C16–C–106

6022

BOARD DIPLOMA EXAMINATION, (C–16)

OCTOBER—2020

DCE—FIRST YEAR EXAMINATION

ENGINEERING MECHANICS

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

PART—A

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. 3

2. Locate the position of centroid with neat diagram for the following : 1+1+1=3

(a) Semi-circle

(b) Rectangle

(c) Right angled triangle with one side vertical

3. A trapezoidal lamina has uniform batter on both sides. Its top width is 250 mm, bottom width is 350 mm and height is 700 mm. Determine the position of centroid from base. 3

4. Define radius of gyration and mention its units. 2+1=3

5. A mild steel rod of 15 mm diameter and 400 mm length elongates 0·20 mm under an axial pull of 13 kN. Determine 'the Young's modulus of the material. 3

6. Define Bulk Modulus and Modulus of Rigidity? 1½+1½=3

7. A material has Young's Modulus of $1{\cdot}25\times10^5$ MPa and Poisson's ratio of 0·25, calculate Modulus of Rigidity and Bulk Modulus? 1½+1½=3

8. What are the different types of end supports? Show any two of them with neat sketch. 3

9. Define the term shear force and bending moment at a section. 1½×1½=3

10. A simply supported beam 5 m in length and carries a point load of 40 kN at centre. Calculate the maximum shear force and bending moment. 3

PART—B

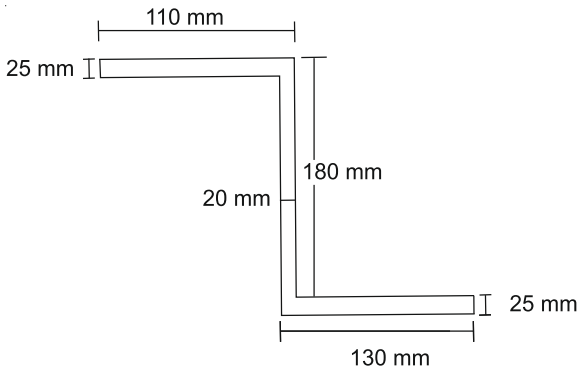
Instructions **:** (1) Answer *any* **five** questions.

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

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

11. A wheel has 5 spokes which are equispaced. The forces acting in three consecutive spokes are 12 kN, 14 kN and 10 kN. Find the forces acting in the other two spokes for the wheel to be in equilibrium.

12. Find the position of centroid of the section shown in figure.

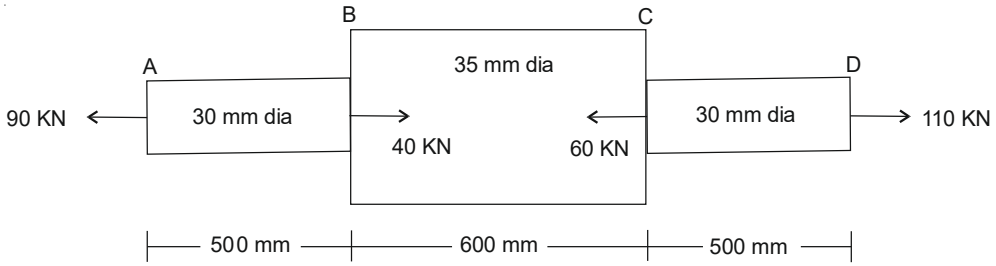


13. Find the moment of inertia of the unequal angle section of size 160 mm × 110 mm × 30 mm about centroidal axes, with its longer leg placed vertical.

14. Find the moment of inertia of an I-Section with top flange 90 mm × 15 mm, bottom flange 120 mm × 15 mm and web 15 mm × 110 mm about its centoidal axes.

15. A copper bar 40 mm in diameter is rigidly attached at both ends to the inside of steel tube of 50 mm external diameter and 5 mm thick. Find the stresses in each metal of composite section length of 1000 mm, when it is subjected to an axial load of 200 KN. Take E_s=200 GPa and E_c=100 GPa.

16. A steel bar 1·6 m long is acted upon by forces as shown in fig. Find the elongation of the Bar E = 200 GPa.



17. A cantilever beam 6 m long, carries three point loads of 20 kN, 30 kN and 60 kN at 2 m, 3 m and 5 m respectivelty from free end. Calculate shear force and bending moment and also draw SFD and BMD.

18. A simply supported beam of 7 m span carries an UDL of 20 kN per meter run over its entire span and also it carries two point loads of 5 kN and 8 kN at a distance of 3 m and 5 m from right hand support. Calculate shear force and bending moment and also draw SFD and BMD.

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