6022
BOARD DIPLOMA EXAMINATION
JUNE - 2019
* DIPLOMA IN CIVIL ENGINEERING
ENGINEERING MECHANICS
FIRST YEAR EXAMINATION

Time: 3 Hours   **Total Marks: 80**

PART - A   (3m x 10 = 30m)

Note 1:Answer all questions and each question carries 3 marks

*2:Answers should be brief and straight to the point and shall not exceed 5 simple sentences*

1. **Two forces 90 kN and 70 kN are acting at 120^0 to each other. If 90 kN force is acting horizontal, Find the Magnitude and direction of the resultant**

2. **Determine the position of centroid of a T-section of flange 120 x 20 mm and web 160 x 20 mm from the top of the flange**

3. **A Trapezoidal lamina has uniform batter on both sides. Its top width is 200 m, bottom width is 300 mm and height is 600 mm. Determine the position of the centroid from base**

4. Find the M.I for T-Section its top with Flange =200 x 15mm and Web =20x100 mm. About its centroidal vertical axis

5. **The Poisson's ratio and the Modulus of Rigidity of steel are 0.25 and 0.8×10^5 N/mm^2 respectively. Find the Bulk Modulus.**

6. **A steel rod of 20mm diameter and 400mm long is subjected to an axial pull of 30kN. Find a) intensity of stress b) elongation of rod.**

7. **Define the terms:**
        (i) Strain energy   (ii) Resilience
        (iii) Proof resilience   (iv) Modulus of resilience

8. **A cantilever 1.5 m long is subjected a point load of 150kN load acting at its middle. Draw the SFD & BMD for the beam. Calculate SF & BM at a distance of 0.5m from the fixed end**

9. **Draw the sketches of :**

   (a) Cantilever beam with UDL w/m run

   (b) Simply supported beam with central point load 'W'

   (c) Over hanging beam with left side over hang carrying UDL w/m throughout

10. **Define (i) Shear Force (ii) Bending Moment**

PART - B   (10m x 5 = 50m)

Note 1:Answer any five questions and each carries 10 marks

   2:The answers should be comprehensive and the criteria for valuation is the content but not the length of the answer

11. **Determine the magnitude and direction of the Resultant of the given system of coplanar concurrent system of forces acting as shown below**
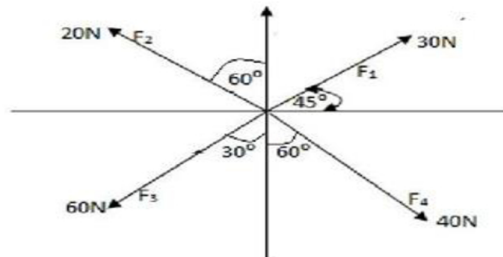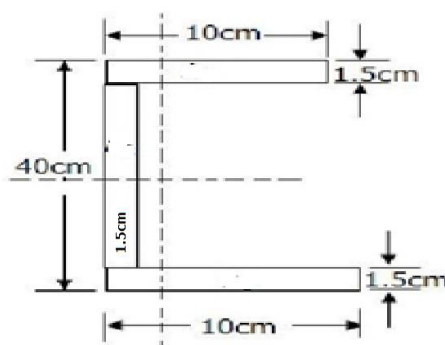

12. **Determine the centroid of the angle section shown in fig**
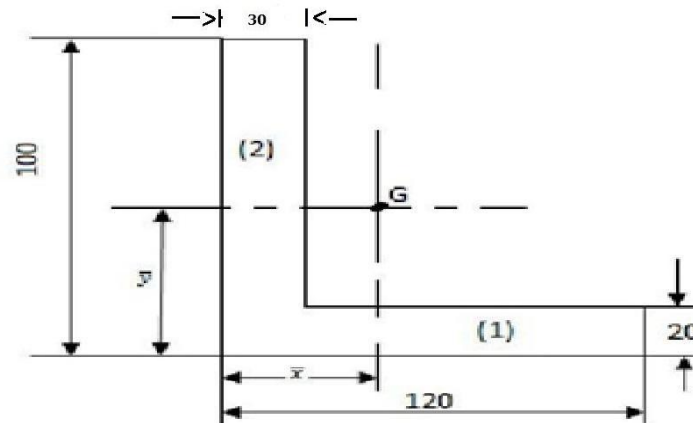
All dimensions are in mm.

13. **Determine I$_{XX}$ and I$_{YY}$ for the channel section shown in the fig. below**

14. **A built up section consists of two channels ISLC 300 placed back to back at 100 mm clear distance with two cover plates 300mm x 20 mm, placed one each at top and bottom. Determine the moments of inertia of the section about the horizontal and vertical centroidal axes For a given channel I$_{xx}$ = 6.05 x 10^7 mm^4, I$_{yy}$ = 3.46 x 10^6 mm^4,   A = 4210 mm^2 ; C$_{yy}$ = 25.5 mm**

15. .A round bar 400 mm² cross sectional area and 100 mm in length is subjected to an axial thrust of 80 kN. If the length of bar decreases by 0.17 mm and its diameter increases by 0.01 mm, determine the poisson's ratio and the three elastic moduli for the material of the bar .

16. A member of elastic materials is 700 mm long and has cross- section area 1100 mm2. The elastic limit for the material is 130 MPa and modulus of elasticity 185 GPa. Find
    (i) The proof resilience (ii) Modulus of resilience

17. A simply supported beam 8m long is loaded with a udl of 5 kN/m on a length of 4m from right hand support and a concentrated load of 10 kN at a point 3m from left hand support. Draw SFD and BMD of the beam

18. Draw S.F. and B.M diagrams for the cantilever beam loaded as shown in the figure. State the Max values.