

6022
BOARD DIPLOMA EXAMINATION
MARCH/APRIL - 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. **List out various types of beams**
2. **Locate the centroid of a T- Section with its flange of size 200 mm x 10 mm and Web 250mm x 20mm with its flange at bottom**
3. **A masonry dam is trapezoidal in section with one face vertical. Its Top width is 4m, Bottom width is 10 m, and height of dam is 18 m. Find the position of Centroid from vertical face and bottom of the dam**
4. **Find the Moment of inertia of a T-section having flange 150 x 50 mm and web 50 x 150 mm about centroidal Y-Y axis**
5. **Define the terms (a) Modulus of Elasticity (b) Modulus of Rigidity**
6. **Write the formulae and expand the notations for instantaneous stress under :**
 - a) Gradual loading,
 - b) Sudden loading and
 - c) Impact loading
7. **Define volumetric strain**
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. **List the different types of beams and sketch them**
10. **Define (i) Shear Force (ii) Bending Moment**

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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. Find the magnitude and direction of the resultant of the concurrent forces of 8 N, 12 N, 15 N and 20 N making angles of 30° , 70° , 120° , and 155° respectively with a fixed line

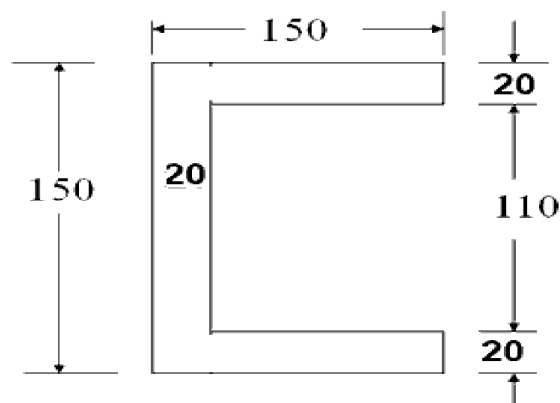
12. Determine the position of the centroid of I-section having

Top flange = 100 x 20 mm

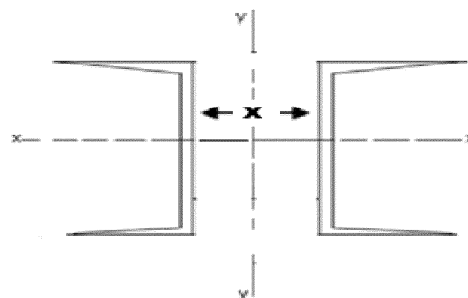
Web = 20 x 250 mm

Bottom flange = 150 x 30 mm

13. Calculate I_{XX} & I_{YY} for the given figure



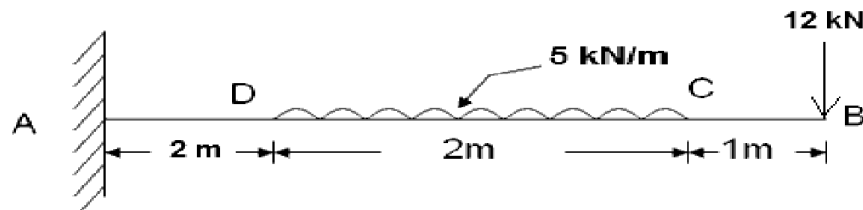
14. A section is built-up of two 225 x 85 mm channels placed back to back at a distance of x mm apart as shown in fig. which are connected by battens. Determine the value of x so that I_{XX} of the built-up section is equal to I_{YY} of built-up section. The properties of each channel section are $A=3301 \text{ mm}^2$, $C_{YY} = 23 \text{ mm}$, $I_{XX} = 2694.6 \times 10^6 \text{ mm}^4$, $I_{YY} = 187.2 \times 10^6 \text{ mm}^4$



15. A 250 mm x 250 mm R.C.C column is reinforced with 4 steel rods of 12mm diameter. Determine the stresses in steel and concrete when the column is carrying a load of 450kN. Take $E_s = 2.11 \times 10^5 \text{ N/mm}^2$ and $E_c = 0.14 \times 10^5 \text{ N/mm}^2$.

- * 16. A hollow cast iron column carries an axial load of 2000 kN. If the outer diameter of the column is 300 mm and the permissible stress is 80 N/mm^2 . Find out the thickness of the column.

17. A simply supported beam of span 8m carries a udl of 10kN/m over a length of 2m from the right hand support and another udl of 15kN/m over a length of 3m from the left hand support. Calculate the maximum BM and draw SFD and BMD
18. Draw S.F and B.M diagrams for the cantilever beam loaded as shown in the figure



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