

II B.Tech I Semester Examinations, December 2011
FOUNDATION OF SOLID MECHANICS
 Aeronautical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

1. A cantilever of length 2 m carries a uniformly varying load of zero intensity at the free end, and 45 kN/m at the fixed end. If $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 10^8 \text{ mm}^4$, find the slope and deflection of the free end. [16]
2. A cast iron pipe has 300 mm bore and 10 mm metal thickness, and is supported at two points 8 m apart. Find the maximum stress in the metal when it is running full. Take unit weight of cast iron as 70 kN/m^3 and that of water as 9.81 kN/m^3 . [16]
3. A cylinder of thickness 2 cm has to withstand maximum internal pressure of 2.5 N/mm^2 . If the ultimate tensile stress in the material of the cylinder is 350 N/mm^2 , factor of safety 3.0 and joint efficiency 85%, determine the diameter of the cylinder. [16]
4. For the steel bar shown in figure 4. determine the longitudinal force P and stress p at all cross-sections. Determine also the vertical displacement Δ of all cross-sections of the bar Take $E=2 \times 10^5 \text{ N/mm}^2$. Also, locate the section of zero displacement. [16]

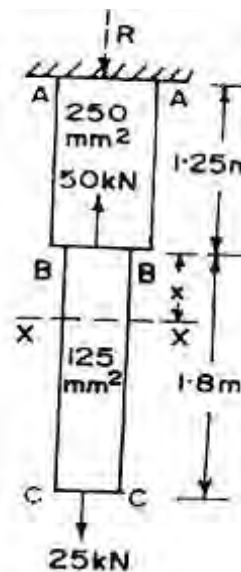


Figure 4

5. Draw the S.F. and bending moment diagrams, indicating principal values, for an overhanging beam shown in Figure 5. [16]

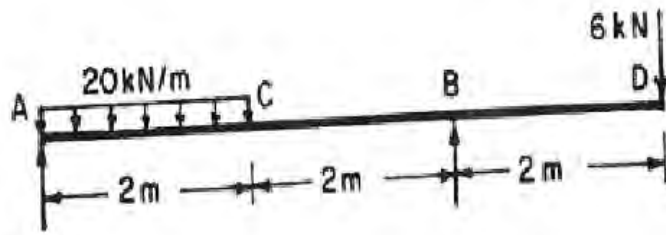


Figure 5

6. A cast iron bracket has a cross-section of I-shape with unequal flanges as shown in Figure 6. If the section is subjected to a S.F. of 100 kN, draw the shear stress distribution over the depth of the section giving salient values. [16]

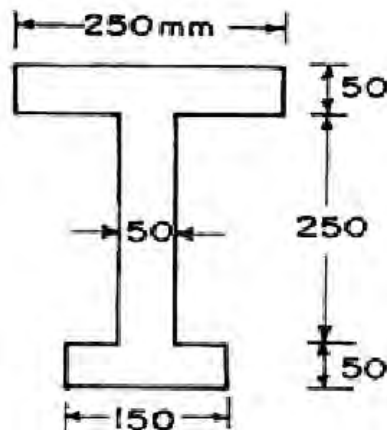


Figure 6

7. Find the size of the fillet weld required to connect the bracket plate to the column as shown in figure 7. The stress in the weld is not to exceed 100 MPa. [16]

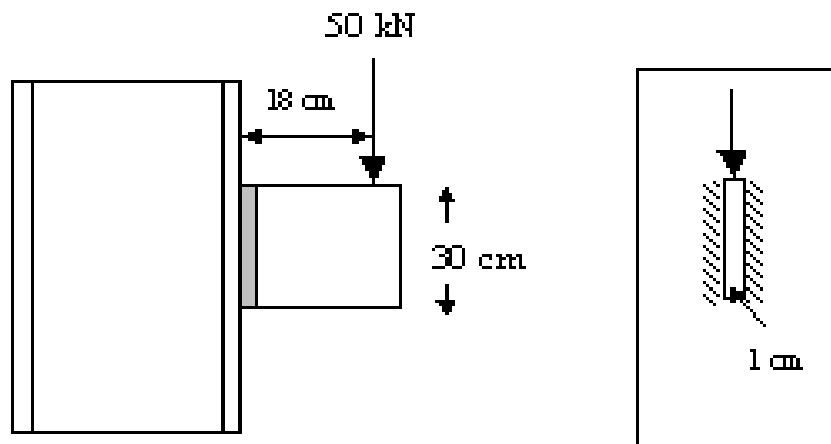


Figure 7

8. Locate the shear centre of the section shown in Figure 8. [16]

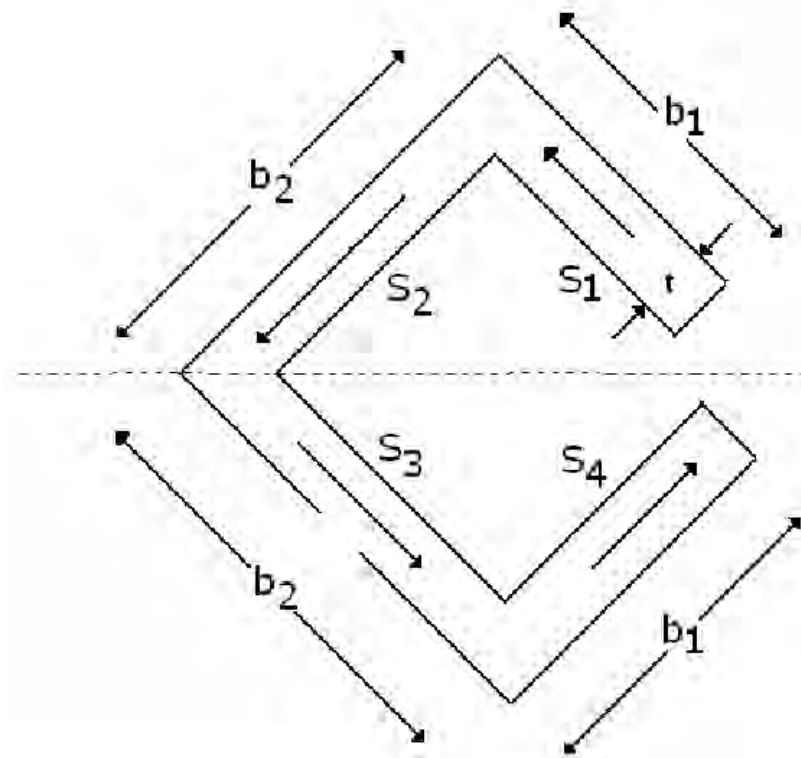


Figure 8

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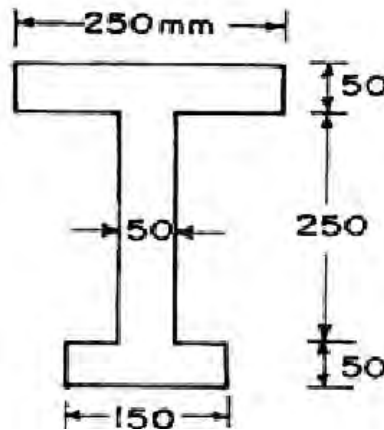


Figure 1

2. Locate the shear centre of the section shown in Figure 2. [16]

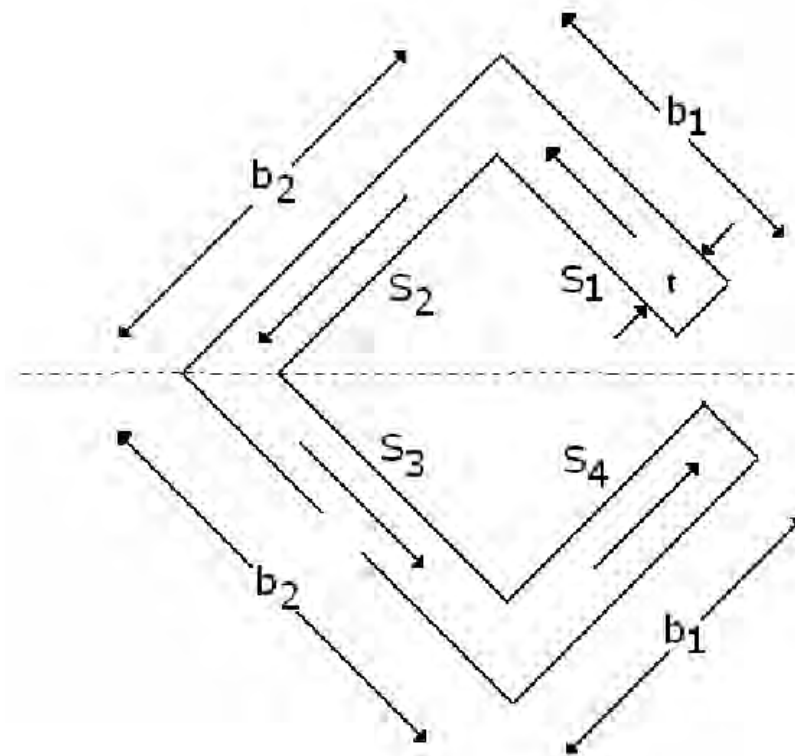


Figure 2

3. A cylinder of thickness 2 cm has to withstand maximum internal pressure of 2.5 N/mm². If the ultimate tensile stress in the material of the cylinder is 350 N/mm², factor of safety 3.0 and joint efficiency 85%, determine the diameter of the cylinder. [16]
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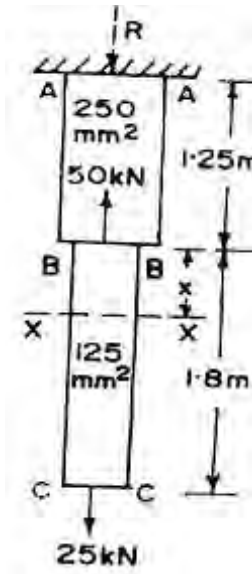


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6. A cast iron pipe has 300 mm bore and 10 mm metal thickness, and is supported at two points 8 m apart. Find the maximum stress in the metal when it is running full. Take unit weight of cast iron as 70 kN/m^3 and that of water as 9.81 kN/m^3 . [16]
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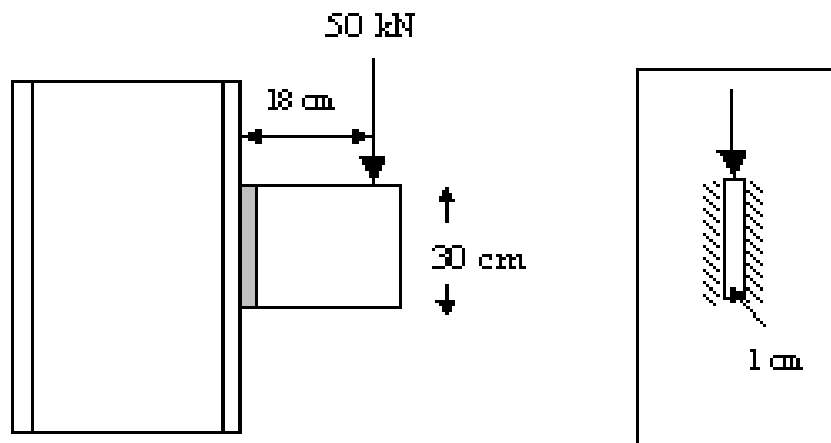


Figure 7

8. Draw the S.F. and bending moment diagrams, indicating principal values, for an overhanging beam shown in Figure 8. [16]

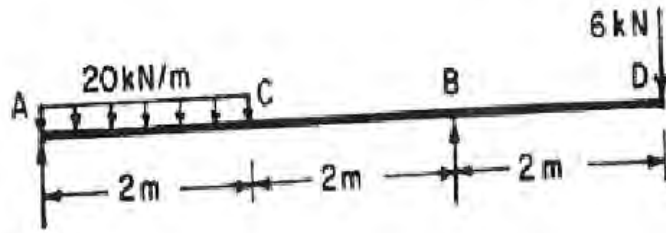


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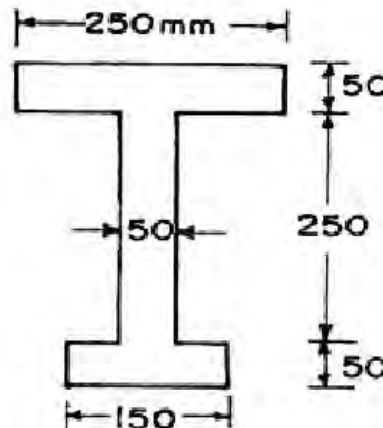


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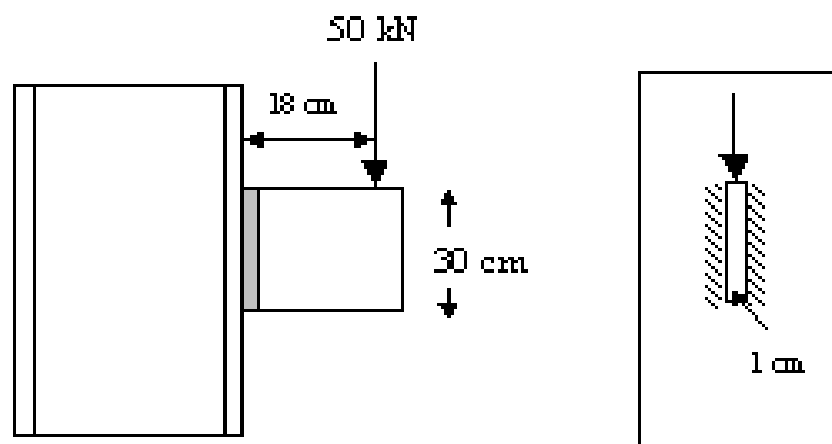


Figure 2

3. A cylinder of thickness 2 cm has to withstand maximum internal pressure of 2.5 N/mm². If the ultimate tensile stress in the material of the cylinder is 350 N/mm²,

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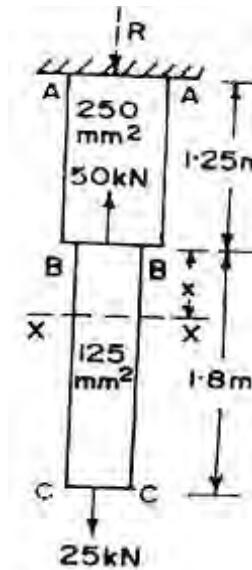


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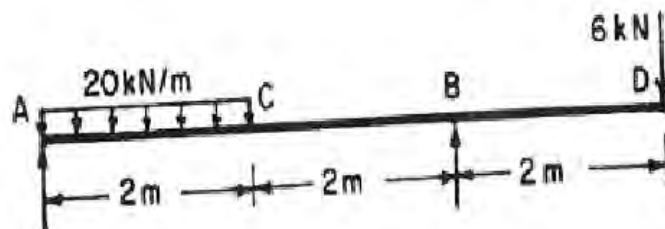


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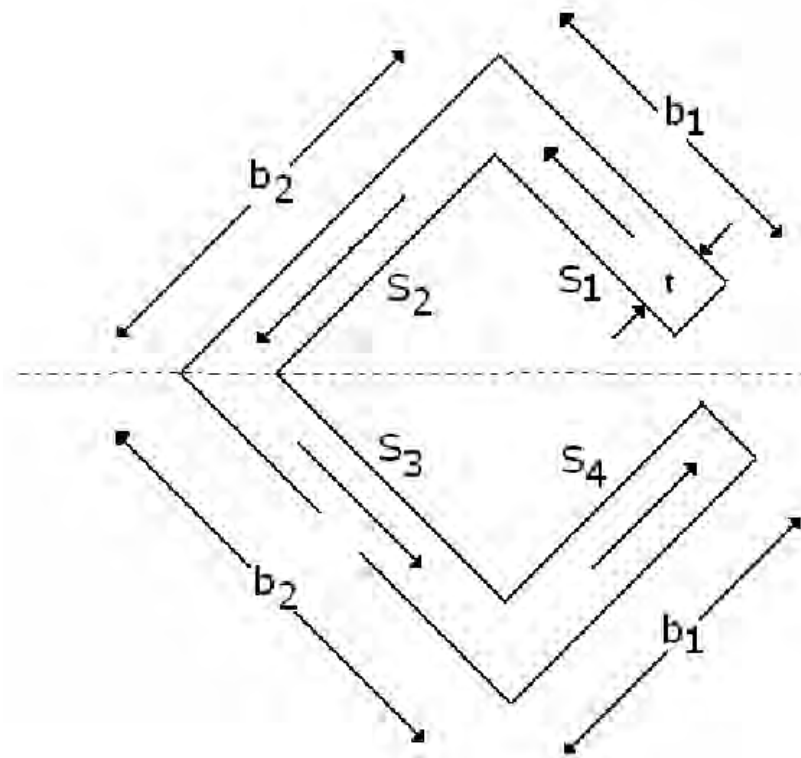


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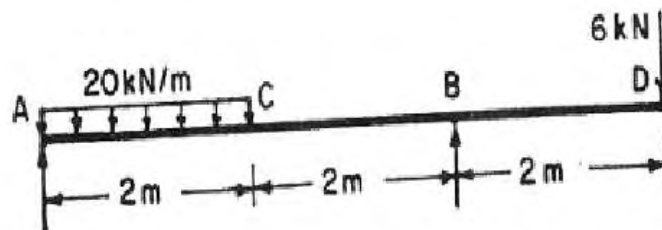


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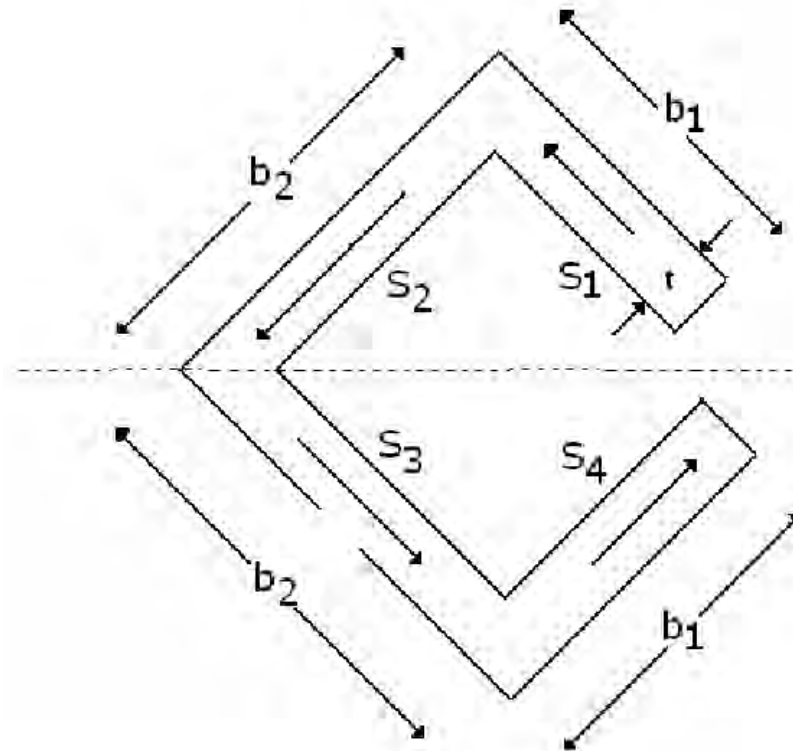


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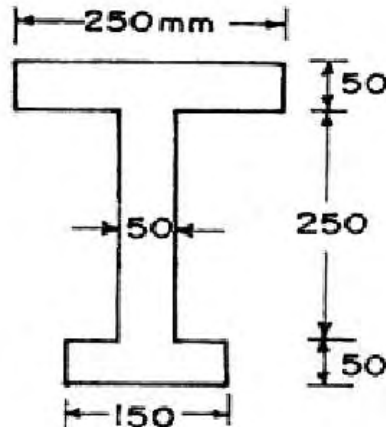


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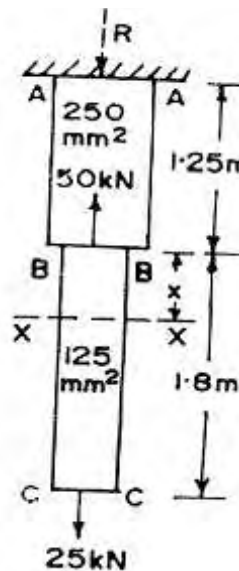


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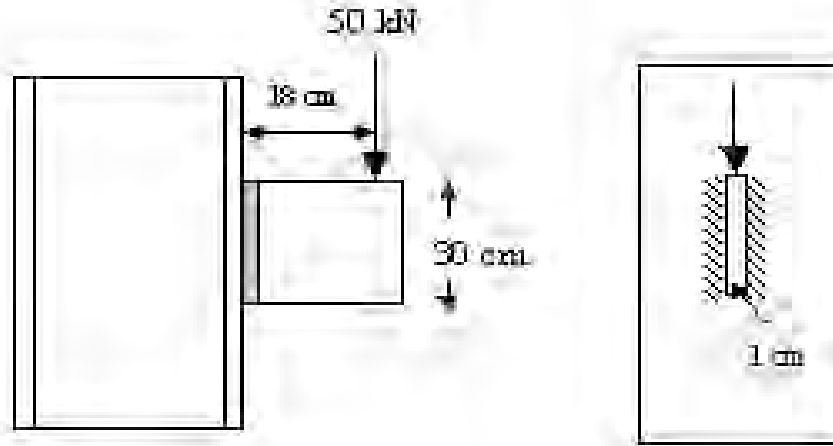


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