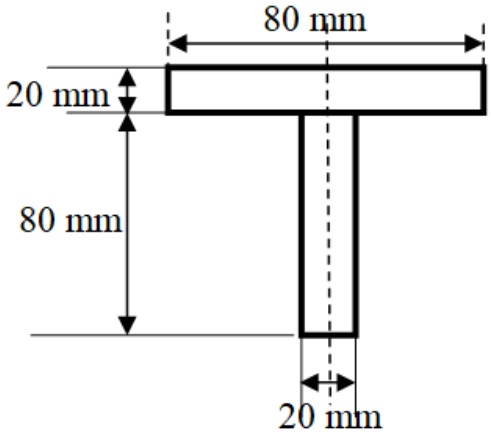
19ASB201 AERO MECHANICS OF SOLIDS
IAE 2 QUESTION BANK

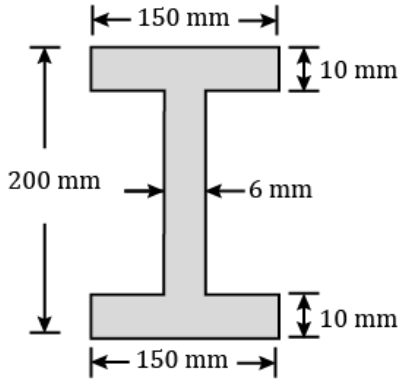
1. Label the Euler's theory in structural engineering, and why is it important in designing load-bearing columns?
2. Sketch the variation of bending normal stress and bending shear stress in a rectangular cross-section.
3. Define point of contra flexure? In which beam it occurs?
4. List the methods for finding out the slope and deflection at a section?
5. Illustrate the Rankine‘s formula for columns.
6. Outline the assumptions made in the theory of simple bending.
7. Show the bending normal stress & Bending Shear Stress formula and explain each term involved.
8. Sketch the variation of bending normal stress and bending shear stress in a I-section.
9. Tell the advantages of Macaulay’s method over double integration method?
10. Define Slenderness Ratio.

11. Measure and sketch the distribution of maximum bending normal stress in the simply supported beam AB of span 4 m is subjected to a uniformly distributed load of 10 kN/m for the entire span. The cross-section of the beam is a symmetric T-section as shown in the figure.



12.

13. Could you provide a case study that gives practical applications of symmetric bending in structural engineering, focusing on how it influences the design and behavior of beams and other structural elements?
14. Elaborate a case study that illustrates how Macaulay's method was applied in the analysis and design of overhanging beams, highlighting how this approach simplifies complex calculations and optimizes the design of such structures?
15. Determine and sketch the distribution of maximum bending normal stress in the Cantilever beam AB of span 5 m is subjected to a uniformly distributed load of 20 kN/m for the entire span. The cross-section of the beam is a symmetric I-section as shown in the figure. beam.



16. Influence the distribution of maximum bending normal stress in the cross-section of the simply supported beam of span 6 m is subjected to a concentrated (point) load of 3 kN acting at a distance of 4 m from the left support. The cross-section of the beam is a rectangle with breadth 30 mm and depth 60 mm.
17. Formulate of the simple bending equation for a prismatic beam subjected to a bending moment (M).
18. i) Assess the maximum bending shear stress in beam is subjected to a maximum shear force of 10 kN at a section. The cross-section of the beam is a rectangle with breadth 20 mm and depth 80 mm.
19. ii) Deduct the Slope of the cantilever at the free end and (deflection at the free end, For a cantilever of length 3m is carrying a point load of 25kN at the free end. If the moment of inertia of the beam = 108 mm4 and value of E = 2.1 × 105 N/mm2.
20. Contrast the calculation of bending stress (σ) for different points along a prismatic bar under pure bending.
21. Construct the magnitude of the load W, and the slope at the free end. For a cantilever beam 4m long carries a load of 50kN at a distance of 2m from the free end, and a load of W at the free end. If the deflection at the free end is 25mm, E = 200kN/mm^2, I = 5 × 107 mm4.

22. Can you share a real-life example of how columns in buildings or structures have experienced buckling and describe the measures taken to address this issue?
23. Develop the Euler's Buckling Load Formula for Pin-end Condition

24. Discuss about the cantilever beams apply to the structural components of aircraft, and can you provide a case study that delves into the stress and deformation characteristics of a critical cantilever beam?