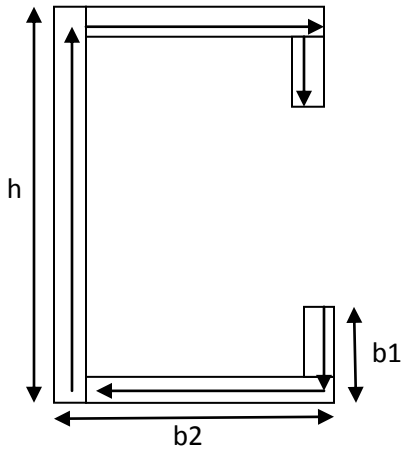
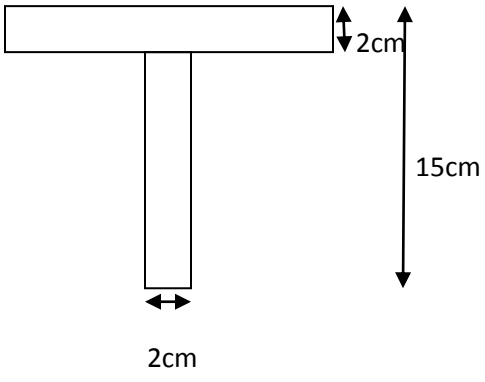
Question Bank

1. A static concentrated load of 8KN applied at the mid-span of a simply supported beam produces a maximum deflection of 0.5cm and a maximum bending stress of 12 MPa. Calculate the instantaneous stress produced in the beam when a load of 5KN is allowed to fall through a height of 2.5cm at the mid-span of the beam.
2. A simply supported beam of span 3m is carrying a concentrated load of 15KN at the mid-span. Determine the strain energy stored in the beam due to horizontal shear.The beam is 8cm wide and 10cm deep. E = 200GPa, v=0.3.
3. Find the shear centre of the section shown in figure below.



4. A simply supported beam of T-sction, 2.5cm long carries a central concentrated load inclined at 30^o to the y-axis as . If the maximum compressive and tensile stresses in bending are not to exceed 75MPa and 35MPa respectively, find the maximum load the beam can carry.



5. Obtain an expression for the stresses induced in a chain link.
6. Obtain an expression for the stresses induced in a ring.
7. Explain Winkler – Bach theory and derive an expression for the stresses in a curved beam.
8. Explain various theory of failure for
    i. Ductile materials.
    ii. Brittle materials.
9. Show that in thin cylinder shells subjected to internal fluid pressure, the circumferential stress twice the longitudinal stress.
10. Find an expression for the maximum radial stresses of a rotating hollow cylinder.
11. List the assumptions made in the derivation of stresses in a curved beam which is subjected to bending moments.
12. Find an expression for bending stress produced in a curved beam which is subjected to bending moment.
13. Prove that the deflection of a closed coiled helical spring at the centre due to axial load W is given by $\delta = 64*W8R^3n/(CD^4)$.
14. Find the expression for central deflection of leaf springwhen subjected to load W.
15. Find the expression for strain energy stored in a body when subjected to shear stress.
16. Find the expression for the stresses due to unsymmetrical bending.
17. Find the shear centre for an unsymmetrical channel section.
18. Find expressions due to various types of loading.
19. State and prove castigliano's theorem of strain energy.
20. State and prove Maxwell's theorem of strain energy.
21. Explain Lame's theory of thick pressure vessels.
22. Derive an expression for the deflection of a closed ring.
23. Derive an expression for the deflection of a chain link.
24. Derive an expression for the deflection of a curved bar by castigliano's theorem.
25. Obtain shear centre for an equal leg angle section.