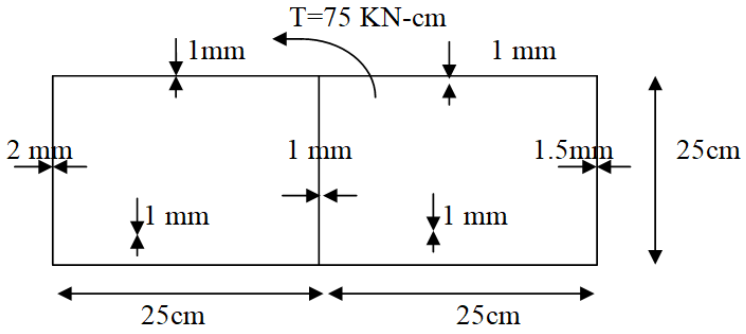
QUESTION BANK
IAE 3
19AST203 Aircraft Structural Mechanics

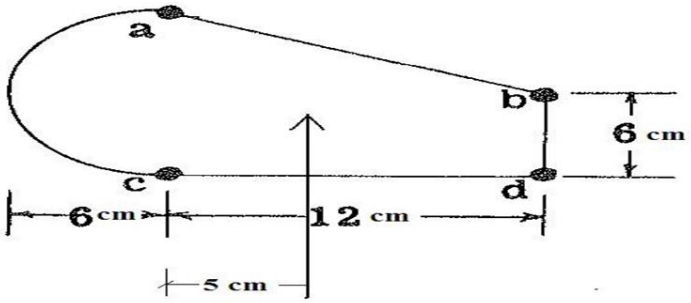
1. Explain the use of Bredt-Batho formula and how shear stress is computed using the same.
2. Justify Semi Monocoque structure is heavier than Monocoque structure.
3. Why is a Multi-Cell tube subject to a Torque Statically Indeterminate?
4. Differentiate Primary Buckling and Secondary Buckling
5. Define Factor of Safety

6. Define shear center and elastic axis.
7. Show that for a curved web, Shear Center Distance is $e = 2A/L$.
8. In an Aircraft where do you find curved webs? What is the advantage of a curved Web?
9. What are the various Miscellaneous Loads Acting On An Aircraft?
10. What is a V-n Diagram?

11. (a) Find the shear flow and twist per unit length of the two cell structure shown in fig. the material used is aluminum with E=70GPa , Poisson's ratio 0.3



12. (b) Plot the shear flow distribution for the given closed section with vertical load of 1200N and each boom area a=b= 2.5 cm^2 and c=d=2cm^2.



13. (a)i Determine the short notes on effective sheet width.

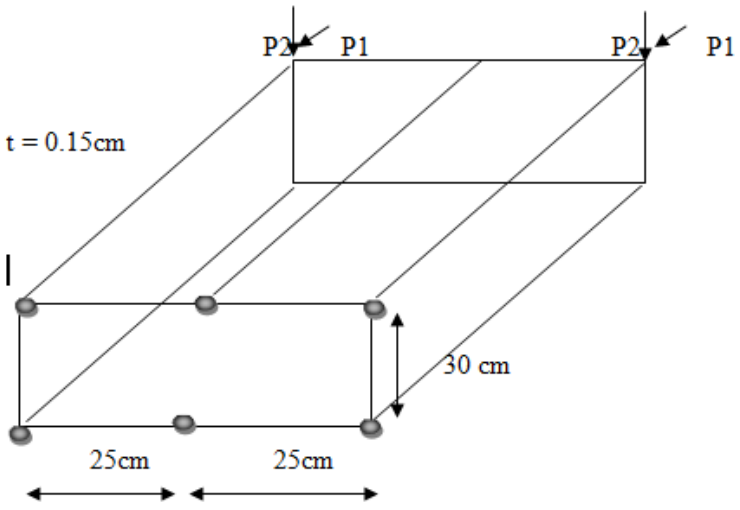
14. ii) Explain the stress analysis in fuselage.

15. (b)i Write short notes on shear resistant web beam.

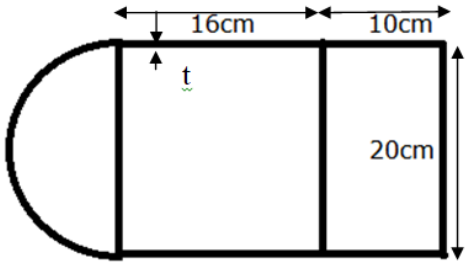
16. ii) Estimate the shear and bending moment distributions for semi-cantilevered beam.

17. (a) Derive an expression for shear flow of a closed tube of arbitrary cross section subjected to shear loads S_x and S_y without twist and modify this expression for a closed section.

18. (b) Check whether the box beam shown in figure will withstand the load without buckling and also find the margin of safety. Given $P_1=P_2=6000N$. Uniform skin thickness t=2.5mm. Area of each stringer A=2 cm^2 .assume skin is effective in bending. For a/b=2, $K_c=5$, $K_s=6.5$.



19. (a) Find the angle of twist of the given multi-cell made of aluminum alloy as shown in fig. Take E=70GPa, T=100KN, Poisson ratio is 0.3. t = 3 mm everywhere,

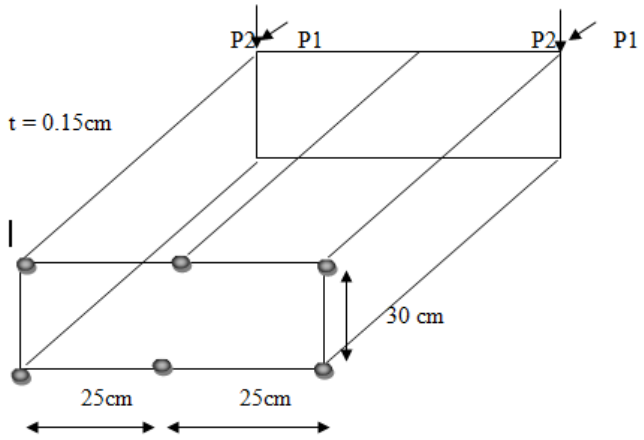


(or)

20. (b)i Derive the expression for angle of twist (θ) due to torsion of the thin walled tube.

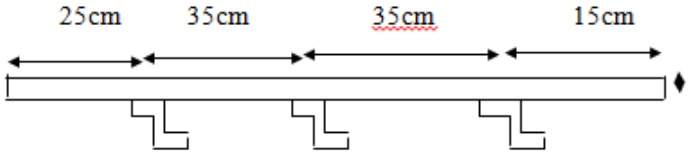
21. ii Derive and establish the relationship $T=2A_1q_1+2A_2q_2$ for a thin-walled, 2-cell structure subject to a pure torque T. State all the assumptions involved.

22. (a) Check whether the box beam shown in figure will withstand the load without buckling and also find the margin of safety. Given $P_1=P_2=4000N$. Uniform skin thickness t=3 mm. Area of each stringer A=2 cm^2 .assume skin is effective in bending. For a/b=3, $K_c=5$, $K_s=6.5$.

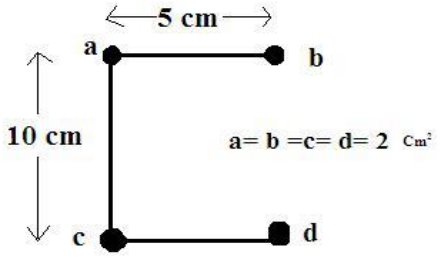


(or)

23. (b) Obtain the compressive load taken by the sheet stringer combination panel are the following condition (i) when the sheet buckles first, (ii) when the stringer stress is 1200Mpa. Each stringer area is 1.35.cm2, take E= 70 GPa. t== 1.5cm



24. (a)i Plot shear flow due to bending for given section with load Sy=1200N and consider webs are ineffective in bending.



25. ii) Give a detailed explanation of the Wagner Beam Theory.

(or)

26. (b) Deduct crippling stress by using of Needham's method for the formed section if the material is AL2024. Where, F_{cy}=50000 N/cm^2 .E=107*10^5 N/cm^2.