

III B.Tech I Semester Supplementary Examinations, November 2006
AERO SPACE STRUCTURES-I
(Aeronautical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. A fixed end cantilever beam of 0.05m diameter and 0.25m. long is carrying at the free end, a concentrated load of 2750N and a torque of 250Nm. Determine tensile, compressive and shear stress.
2. Explain maximum shearing stress theory of failure, by citing some examples.
3. (a) Write a note on 'Designing against Fatigue' in aircraft applications.
 (b) A flat bar 30mm wide and 10mm thick is loaded by a steady tensile load of 85kN. The material is mild steel with yield point stress of 315 N/mm^2 . Find the factor of safety based on yield point.
4. A simple rivetted lap joint is to be made of 10mm plates. Find the diameter of rivets, their pitch and the efficiency of the joint. Take $f_s = 64.0 \text{ N/mm}^2$, $f_t = 80.0 \text{ N/mm}^2$. Design the joint such that its strength to withstand shear of rivets equals its strength to withstand tearing of the plate across the line of rivet holes.
5. (a) Explain salient features of designs of joints under eccentric loading.
 (b) Write a note on stress concentration in structural members.
6. Consider a uniformly loaded Cantilever beam of 3m length, with the total load being 24kN. The second moment of area of X-Section is $85 \times 10^6 \text{ mm}^4$. Take $E = 200 \text{ GN/m}^2$. Determine deflection and slope at the free end of the beam.
7. Consider a beam supported at left end and clamped at the right end as shown below. (figure1)

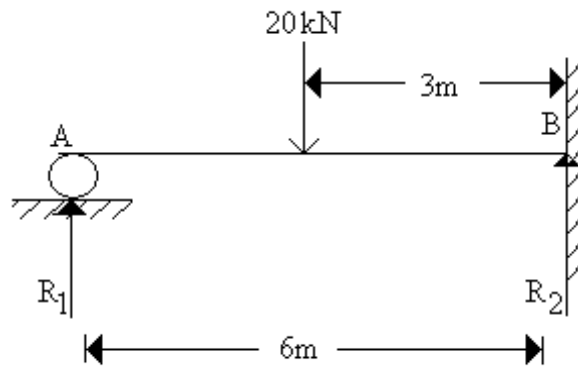


Figure 1:

The Z-beam is 200 mm deep with a second moment of area of $40 \times 10^6 \text{ mm}^4$ and the load at the mid-pt is 20 kN. Determine the reactions and the maximum bending stresses in the beam.

8. State and prove Castigliano's theorem. Hence obtain maximum deflection at the free end of a Cantilever.

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