

III B.Tech I Semester Supplementary Examinations, November 2005
AERO SPACE STRUCTURES-I
(Aeronautical Engineering)

Time: 3 hours**Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

1. Determine the diameter 'd' of a circular shaft subjected to a bending moment M and a torque T, according to
 - (a) Octahedral shear stress theory, and
 - (b) Maximum energy theory. [16]
2. (a) A cantilever member 0.1 m long having cross-section of $0.05 \text{ m} \times 0.25 \text{ m}$ supports a load of 27.5 kN, what is the maximum shear stress and where does it occur?
 - (b) Define the following
 - i. Dynamic load
 - ii. Static load
 - iii. Live load
 - iv. Impact load and
 - v. Inertia load [16]
3. (a) Describe the term Factor of Safety and its use in engineering design.
 - (b) Explain the effect of fluctuating stresses on the life of a component. What steps are essential towards ensuring safety against these stresses? [16]
4. (a) What are relative merits of Rivetted joints/bolted joints over each other. Explain with live examples.
 - (b) Write a note on 'Stress concentration'. [16]
5. Obtain the differential equation of the deflection curve of a beam loaded by lateral forces. Hence determine the deflection at every point of a cantilever subject to single concentrated load P, at the free end. [16]
6. A simply supported beam with overhang is loaded as shown in figure 1
Find the vertical deflection of point C using Castigliano's theorem. [16]
7. Consider a beam as shown below in figure: 2 The second moment of area of the this beam $40 \times 10^6 \text{ mm}^4$. If $L=6\text{m}$, and $a=3\text{m}$, determine
 - (a) Reactions and maximum bending stresses in the beam
 - (b) Deflection at the point of application of 20kN load on the beam. [16]

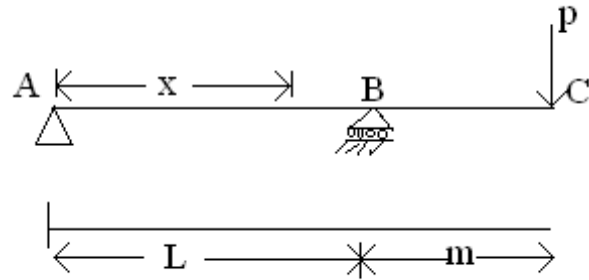


Figure 1:

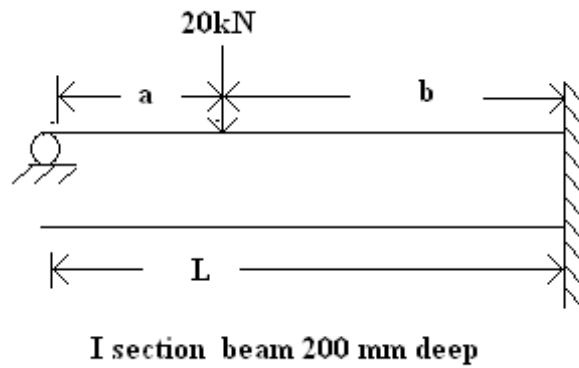


Figure 2:

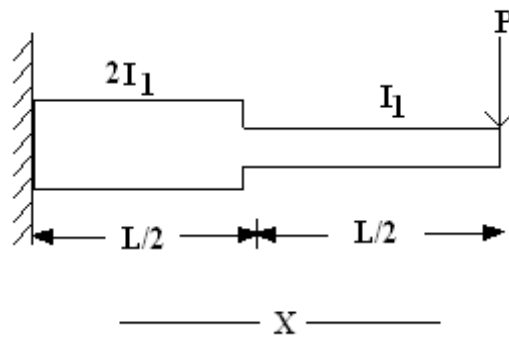


Figure 3:

8. A catilever beam of stepwise constant crosssection, as shown in fugure 3 below is loaded with a concentrated load at its tip. Determine the deflection at pt. P, making use of Castigliano's theorem. [16] [16]
