2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS
AERO SPACE STRUCTURES -I
(AERONAUTCAL ENGINEERING)

NOVEMBER 2005

TIME – 3 HOUR
MARK - 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.   [8+8]

2. (a) A cantilever member 0.1 m long having cross-section of 0.05 m × 0.25 m supports a load of 27.5 kN, what is the maximum shear stress and where does it occur?   [6]

(b) Define the following
i. Dynamic load
ii. Static load
iii. Live load
iv. Impact load and
v. Inertia load   [10]

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?   [8+8]

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'.   [8+8]

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 × 106 mm 4. If L=6m, ad a=3m, determine

(a) Reactions and maximum bending stresses in the beam
(b) Deflection at the point of application of 20kN load on the beam.   [8+8]

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]