JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
IV .B.TECH – I SEM REGULAR EXAMINATIONS JANUARY- 2010
STRUCTURAL ANALYSIS AND DETAILED DESIGN
(AERONAUTICAL ENGINEERING)

Time: 3hours   Max.Marks:80
Answer any FIVE questions
All questions carry equal marks
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1. a) Explain the working procedure of oleo struct? Explain construction detail with neat sketch.
   b) Explain design procedure for landing gear.   [8+8]

2.   A fuselage has the circular cross-section as shown in figure. The cross sectional area of each
     stringer is 100 mm^2 and the fuselage is subjected to bending moment of 200KNm applied in the
     vertical plane of symmetry, at thin section. Calculate the divert stress distribution. Take skin
   thickness (t) as 0.8mm   [16]
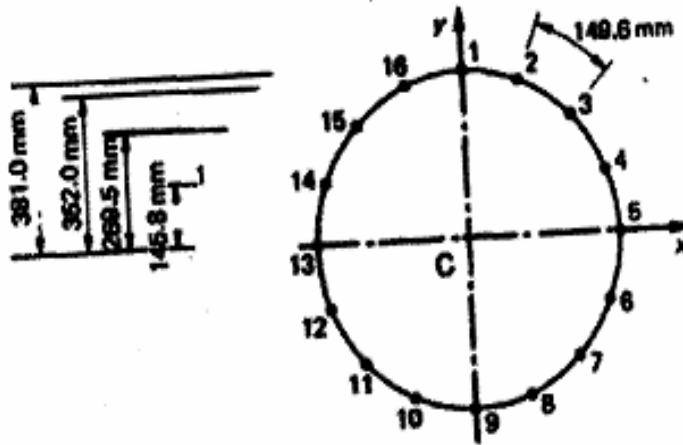
3. a)   Determine the stress in a stiffened cylindrical structure under external loads.
    b)   With a neat sketch, derive the boom area of any cross-section and also find out boom areas for
   axial loading and prove boarding moment.   [8+8]

4.   A Circular cylinder has radius (r) = 1250mm a length L = 1875mm and wall thickness (t) =
        1125mm. What compressive load will it carry? Using design values based on 90% probability,
        95% confidence level (for this case F_{ccr}/E = 0.000121) and 99% probability , 95% confidence
        level (for this case F_{ccr}/E= 0.000082). Discuss above two levels. Take

        µ = 0.3, E = 74 KN/mm^2 and for curve r/t = 1000   [16]

Geometrical Parameter(z)	Buckling Coefficient (K_c)
2000	260
3000	400

5. a) Explain the different types of structural measures that are used in air craft structures.
   b) Explain different types of fuselage structures
   c) What are the monocoque and semi monocoque structures? Explain briefly with suitable example. [6+5+5]

6. Calculate the shear flows in the web panels and the axial loads in the flanger of the wing rib shown in fig. Assume that the web of the rib is effective only in shear while the resistance of the wing to bending moments is provided entirely by the three flanges 1, 2 and 3. [16]
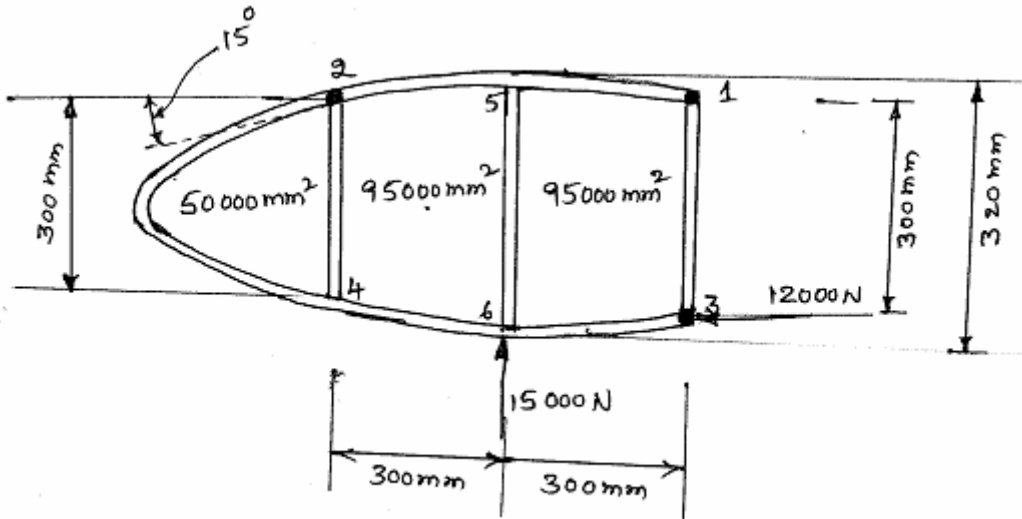
7. A cantilever beam of constant cross-section carrying a 60kN load at the free end. The beam will be strength checked for the given load. The material properties are as shown in figure.

   Web. : 2024-T3   alum.sheet $F_{tu} = 442$ $F_{ty} = 290$ E = 72500

   Flanger : 7075-T6 $F_{tu} = 538$ $F_{cy} = 486$ E = 71000   [16]
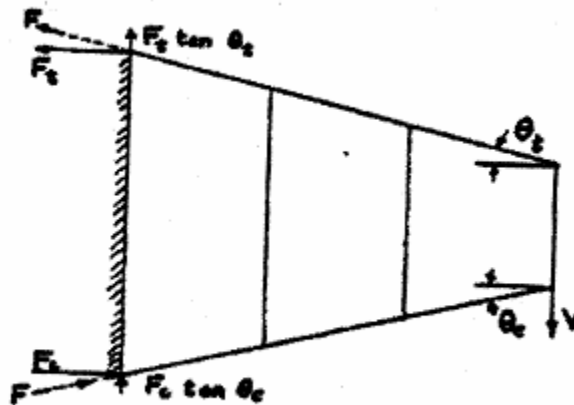
8. a) Explain why residual stress are important in failure analysis.
   b) Describe the concept of fatigue crack propagation. [8+8]

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