Code.No: 37152 | R05 | SET-1

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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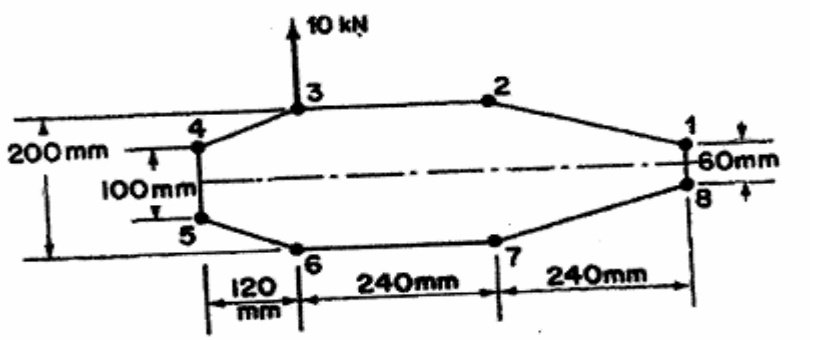
1. a) What are the types for landing gear.
   b) Write the design procedure for single wheel landing gear with neat sketches. [16]

2. The thin- walled single cell beam has been idealized into combination of direct stress carrying booms and shear stressesaly carrying walls. If the section supports a vertical shear bond of 10KN acting vertical plane through booms 3 and 6. Calculate the distribution of shear flow around the section. Boom areas $B_1 = B_8 = 200mm^2$, $B_2 = B_7 = 250mm^2$, $B_3 = B_6 = 400mm^2$, $B_4 = B_5 = 100mm^2$ as shown in figure. [16]

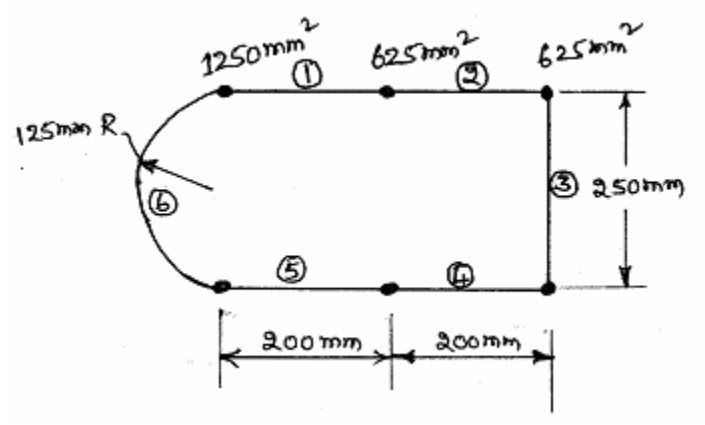


3. a) Explain the construction of fuselage structure.
   b) Explain with neat sketches skin instability, panel instability and general instability. [6+10]

4. Monocoque cylinder radius r = 1250mm, thickness t = 1.25mm, length L = 1875mm, E = 74 KN/mm^2 . The cylinder subjected to an axial compressive bond of 225KN and internal pressure of 0.3447 N\$mm^2$. What is the margin of safety under this combined load system with 90% Probability and 95% confidence level (for thin interval $F_{ccr} / E = 0.000121$) take $\mu = 0.3,\ \eta = 1.0, K_c = 280$. [16]

5. Explain the phenomenon of distribution of concentrated loads on thin webs in aircraft structure. [16]

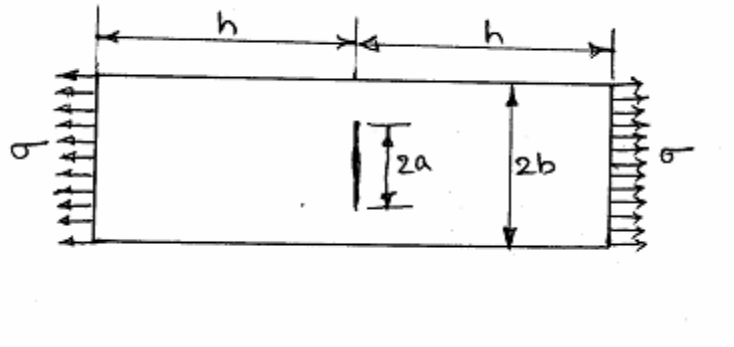
6. Find the shear centre for the wing section shown in figure. Web 3 has a thickness 1.6mm, and the other webs have thickness of 1mm. Assume G is constant for all cross- sections. The cross section is symmetrical about a horizontal. [16]



7.a) Explain in detail the shear forces in tapered webs.

b) Derive the relationships for shear force at any section of a tapered diagram tension field beam, subjected to a load at its free end perpendicular to the axis in the plane of the beam. [8+8]

8. A steel ship deck plate G 2.5mm thick, 10m wide and 20m long (in the tensile stress direction). It is loaded with a normal tensile stress of 50 MPa. It is operated below its ductile to brittle transition temperature with K_{IC} equal to 28.3Mpa$\sqrt{m}$. If a 65mm long central hole transverse crack is present, estimate tensile stress at which catastrophic failure will occur. Compare thin stress with the yield strength of 240 Mpa for the steel. [16]



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