Code.No: 37152 | R05 | SET-2

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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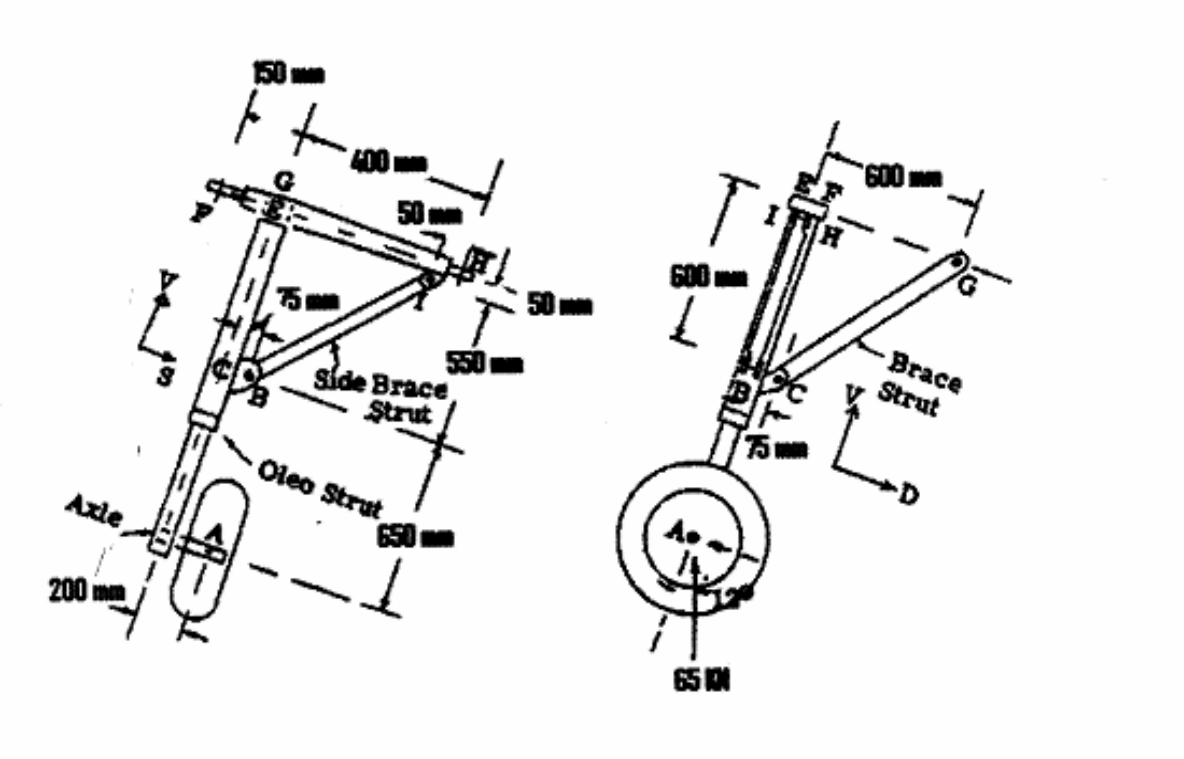
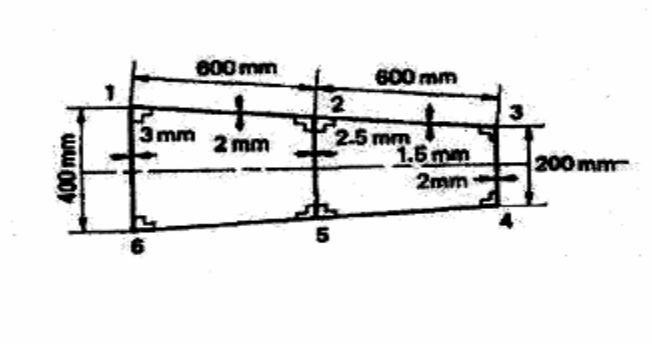
1. a) Tricycle type of landing gear shown in fig.



Find the forces G_v, F_v, H_d, F_d, H_v of brace struts. Assume the data if necessary. [16]

2. a) Discuss the structural functions of the various components of an aircraft with particular reference to the wing of a medium sized transport aircraft.
   b) Explain briefly what area the air forces acting in a wing of aircraft. [10+6]

3. a) How the structural idealization helpful for analysis of structure?
   b) Part a wing section in the form of a two-cell box shown-figure in which the vertical spars are connected to the wing skin through angle sections having a cross-sectional area of $300\,mm^2$. Idealize the section into an arrangement of direct stress carrying booms and shears stress only carrying panel suitable for resisting bending moments in a vertical plane. Position the boom at the spar/skin junctions. [4+12]



4.a) Write about the classification of cylinders.

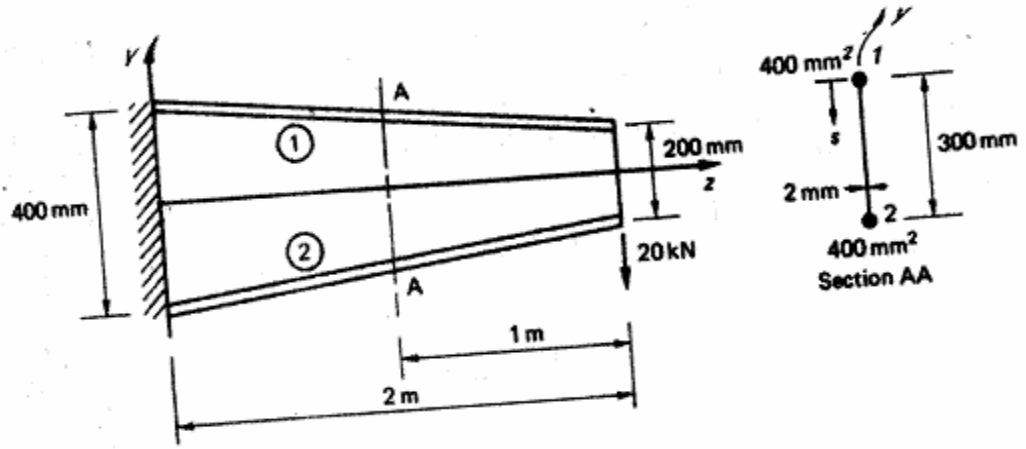
b) Derive compressive buckling stress (F_{cr}) and buckling coefficient (K_c) for monocoque circular cylinder under axial compression. [6+10]

5. a) Write difference between monocoque and semimonocoque cylinder.

b) A circular cylinder has a radius r = 1250mm length, length L = 1875mm and wall thickness (F) = 1125mm. What compressive load it will carry and also calculate geometrical parameter (Z), take μ = 0.3 . Buckling coefficient $Kc = 280$, E= 74KN/ mm^2 . [6+10]

6. Derive the general wagner equation for the tension field beam theory. [16]

7. Determine the shear flow distribution in the web of the tapered beam shown in the figure below at a section midway along its length. The web of the beam has a thickness of 2 mm and is fully effective in resisting direct stresses. The beam tapers symmetrically about its horizontal centroidal axis and the cross section area of each flange is 400 mm^2 . [16]



8. A plate of width 1.4 mm and length 2.8m is required to support tensile force in the 2.8m direction 5.0MN. Inspection procedure will only detect through thicken edge cracks larger than 2.7mm. The two Ti-6Al- 4 V alloys in table are being considered for this application, for which the safety factor must be 1.3 and minimum weight is important. Which alloy should be used? [16]

Metal	K_{IC} MPa $\sqrt{m}$	S_y Mpa
Ti- 6A1-4V	115	910
Ti- 6A1-4V	55	1035

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