

R09

Code: 9A21704

B.Tech IV Year I Semester (R09) Regular & Supplementary Examinations December 2015

STRUCTURAL ANALYSIS & DETAILED DESIGN

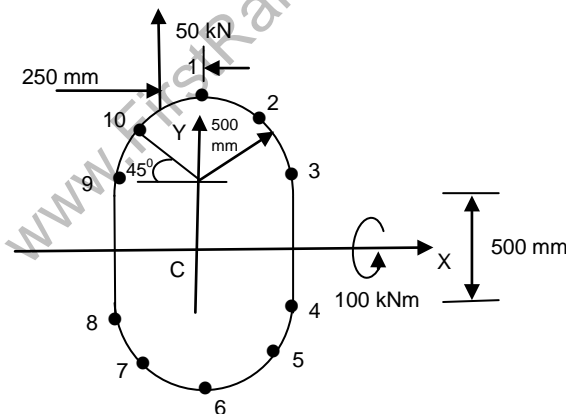
(Aeronautical Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What is meant by structural integrity?
(b) Explain the design requirements involved in the construction of an aircraft.
- 2 (a) What is meant by ultimate load and explain about proof load condition.
(b) Explain briefly about fuselage load act on the aircraft.
- 3 (a) What are the phases involved in design?
(b) What are different aircraft materials and their properties? Explain briefly.
- 4 (a) Differentiate between forward and aft fuselage.
(b) The doubly symmetrical fuselage section shown in figure has been idealized into an arrangement of direct stress carrying booms and shear stress carrying skin panels; the boom areas are all 150 mm^2 . Calculate the direct stress in the booms and the shear flows in the panels when the section is subjected to a shear load of 50 kN and a bending moment of 100 kN m .

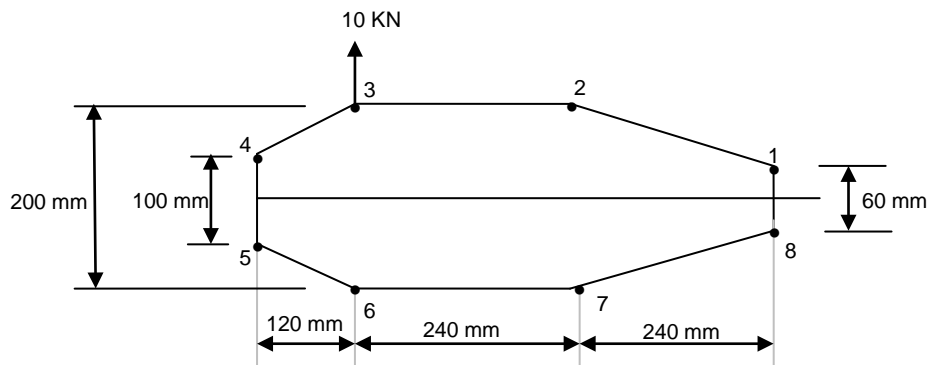


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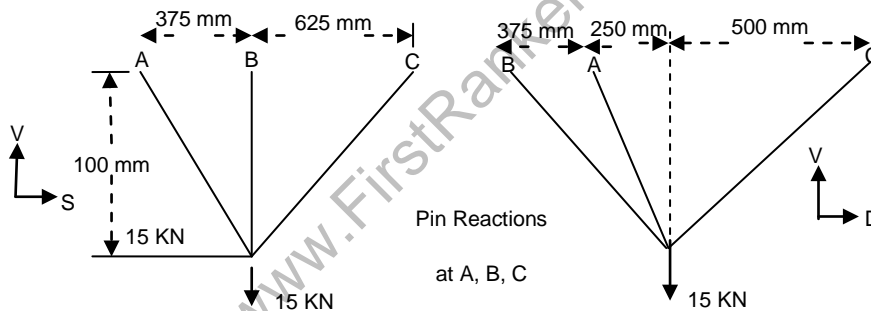
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- 5 (a) What is structural idealization?
(b) The thin-walled single cell beam shown in figure has been idealized into a combination of direct stress carrying booms and shear stress only carrying walls. If the section supports a vertical shear load of 10 kN acting in a vertical plane through booms 3 and 6, calculate the distribution of shear flow around the section.



- 6 Determine the axial loads in the members of the landing gear structure shown in figure. The members are pinned to supports at A, B and C.



- 7 What is mean by S-N curve and explain its significance in Fatigue failure.
8 A plate of width 1.4 mm and length 2.8 m is required to support tensile force in the 2.8 m direction 5.0 MN. Inspection procedure will only detect through thicken edge cracks larger than 2.7 mm. The two Ti-6Al-4V 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?

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