Code No: 09A52103 | R09 | SET-1

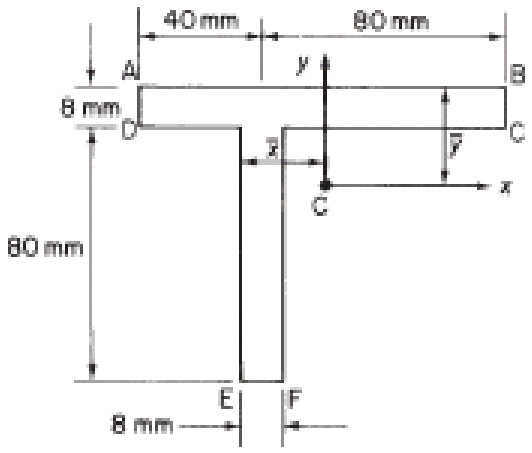
B. Tech III Year I Semester Examinations, December-2011
AEROSPACE VEHICLE STRUCTURES - II
(AERONAUTICAL ENGINEERING)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

1.a) What is the difference between monocoque and semi monoque structure.

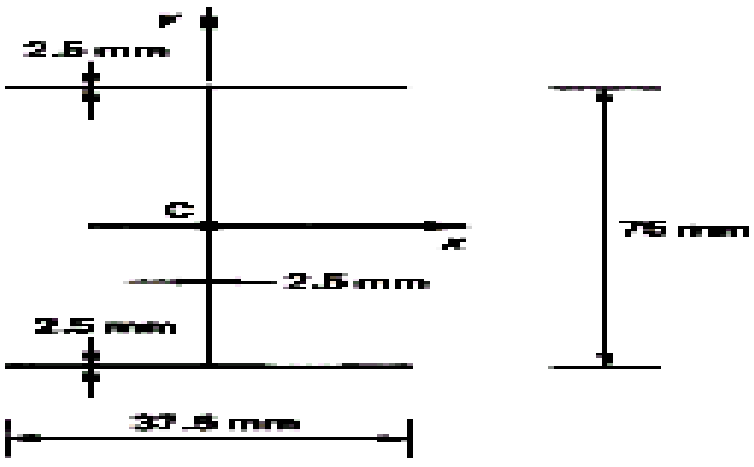
b) A beam having the cross-section is shown in the figure below subjected to a bending moment of 1500nm in a vertical plane. Calculate the maximum direct stress due to bending stating the point at which it acts. [7+8]



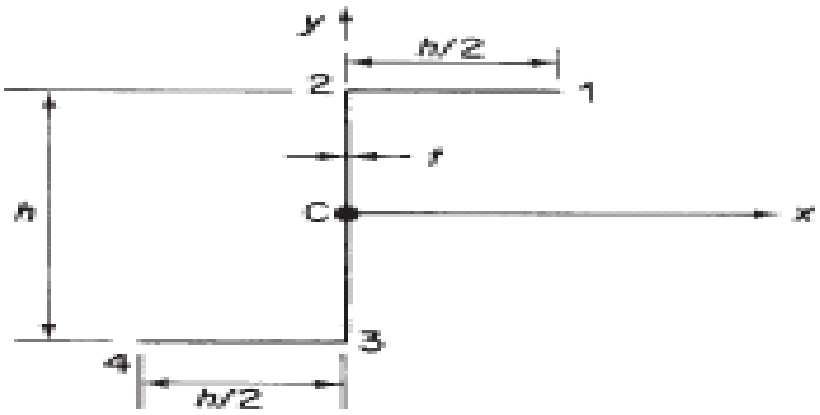
2. Illustrative give the examples of Aircraft sheet stringer elements through free-Body diagram. [15]

3. A thin walled pin ended column is 2m long and has the cross – section shown in figure below if the ends of the column are free to wrap determine the lowest value of axial load which will cause buckling and specify the buckling mode. [15]

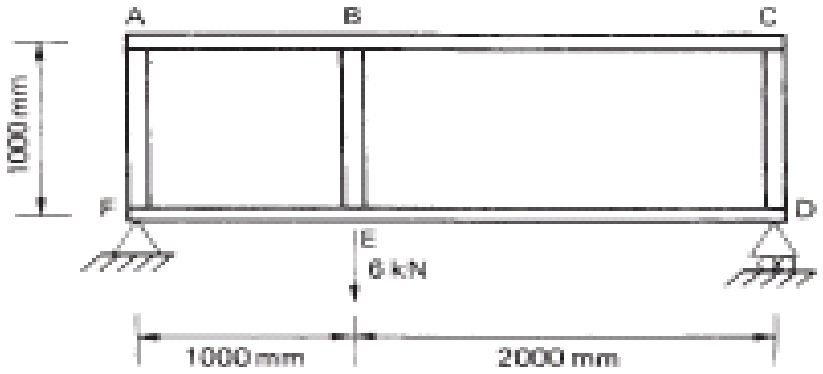
Take E = 75000 N/mm² and G = 21000 N/mm²



4. Determine the direct stress distribution in the thin–walled Z–section figure. Below produced by a positive bending moment **Mx.** [15]



5. The beam shown in figure below is simply supported at each end and carriers a load of 6000N. If all the direct stresses are resisted by the flanges and stiffeners and the web panels are effective only in shear, calculate the distribution of a axial load in the flange ABC and the stiffener BE and the shear flows in the panels. [15]



6.a) Discuss about torsion of an arbitrary section beam.
b) Explain brief on I – section beam subjected to torsion with neat sketch. [7+8]

7.a) Explain the principles of stiffener/web construction?
b) Write a short note on:
i) Fuselage frames ii) Wing ribs. [9+6]

8.a) Explain the following terms:
i) Ductility ii) Brittleness iii) Orthotropic materials IV) Plasticity
b) Discuss about the torsion of a narrow Rectangular strip. [8+7]

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AEROSPACE VEHICLE STRUCTURES - II
(AERONAUTICAL ENGINEERING)

Time: 3 hours **Max. Marks: 75**

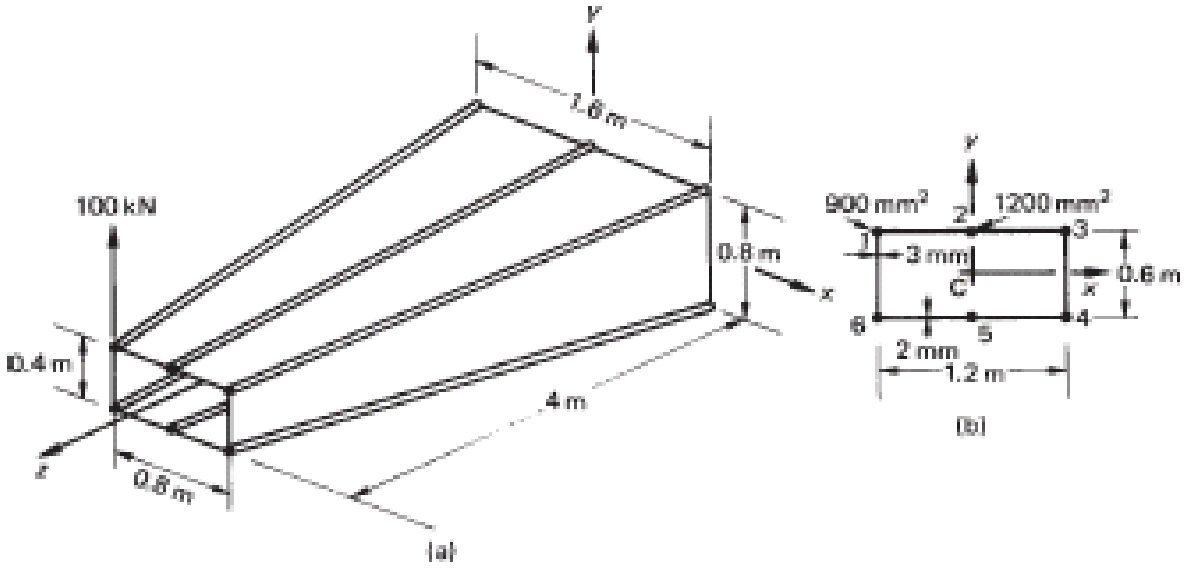
Answer any five questions
All questions carry equal marks

1.a) Explain about the tension field webs and give some examples with neat sketch?
b) What is the difference between Semi tension and complete tension field beams? [7+8]

2. Write about the failure stress in plates and stiffened panels? With neat sketch. [15]

3. The skin of the upper side of an airplane wing made of 2024 –T6 Alclad. The Stringer spacing is 5", and the rib spacing is 20" .Assuming the edges to be simply supported, find the compression buckling stress for skin gages of:
a) 0.040" b) 0.084" [15]

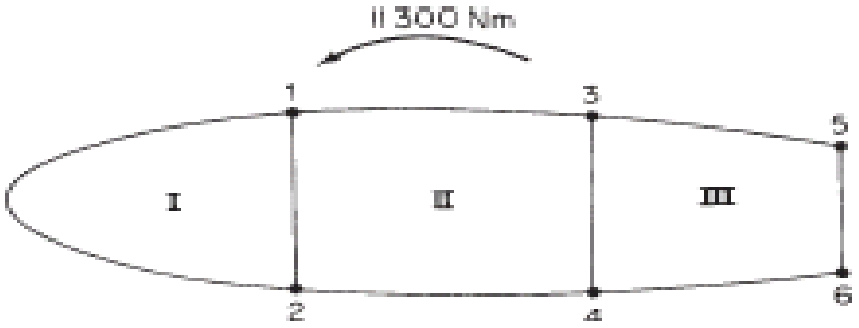
4. The cantilever beam is uniformly tapered along its length in both X and Y directions and carriers a load of 100kn at its free end. Calculate the forces in the booms and the shear flow distribution in the walls at a section 2m from the built-in end if the boom resists all the direct stresses while the walls are effective only in shear. Each corner boom as a cross- sectional area of 900mm². While both central booms have cross- sectional areas of 1200mm². [15]



5.a) Explain briefly about types of wings and Fuselages with a neat sketch.

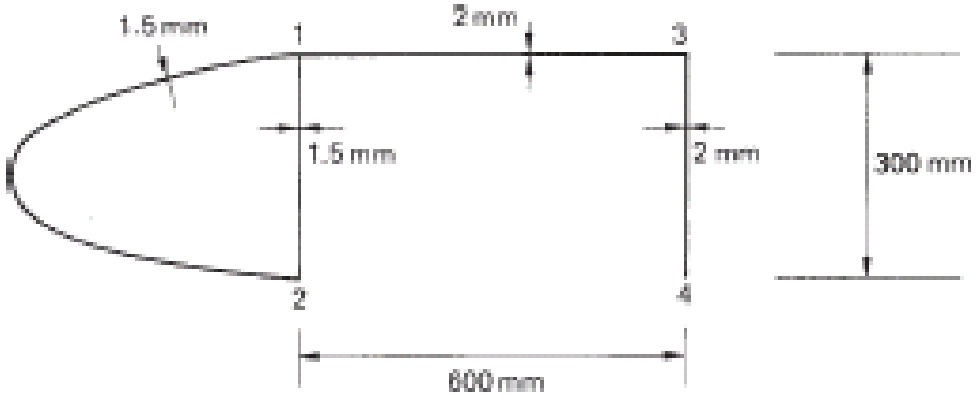
b) Calculate the shear stress distribution in the walls of the three – cell wing section shown below .when it is subjected to an anti-clock wise torque of 11.3KNM. [7+8]

Wall	Length (mm)	Thickness (mm)	G (N/mm^2)	Cell area (mm^2)
12^o	1650	1.22	24200	A_I = 258 000
12^i	508	2.03	27 600	A_{II} = 355 000
13, 24	775	1.22	24200	A_{III} = 161 000
34	380	1.63	27 600	
35, 46	508	0.92	20700	
56	254	0.92	20700	



6. Explain the condition for zero warping at a section, and derive the warping of the cross – section. [15]

7. Find the angle twist per unit length in the wing whose cross –section is shown figure below. When it is subjected to a torque of 10KNM. Find also the maximum shear stress in the section. G = 25000 N/mm²; wall12 (outer) =900m. Nose cell area = 20,000mm². [15]



8. Explain the following terms.
   a) Parallel axis theorem.
   b) Theorem of perpendicular axes.
   c) Three boom shell.
   d) Fuselage frames. [15]

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B. Tech III Year I Semester Examinations, December-2011
AEROSPACE VEHICLE STRUCTURES - II
(AERONAUTICAL ENGINEERING)

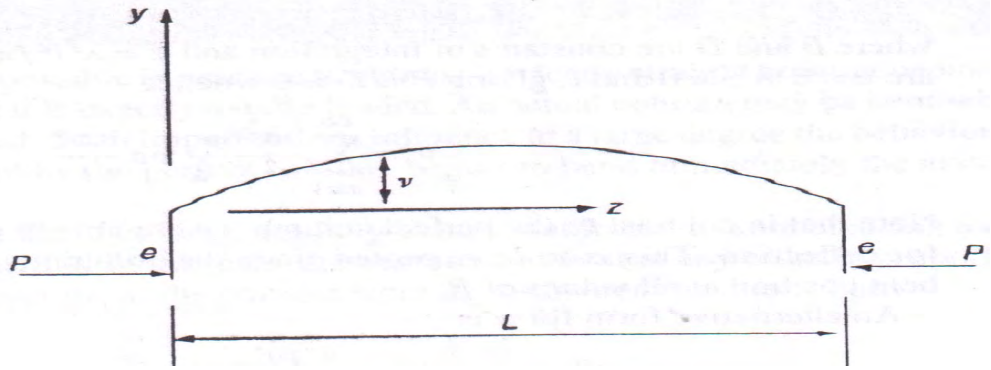
Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

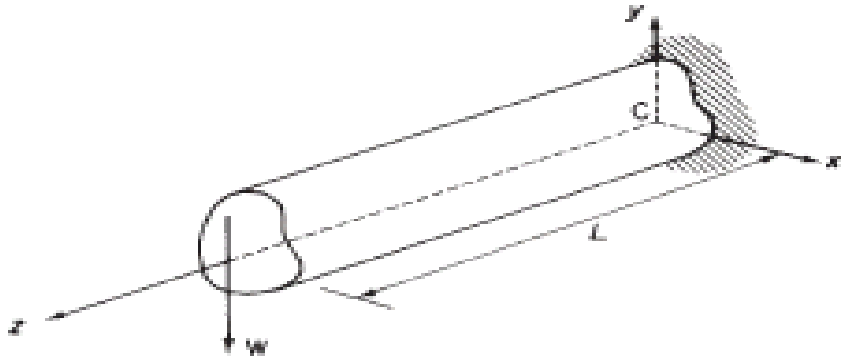
1.a) Explain the Euler buckling of columns? Draw a buckling load for a perfect column and buckling load for a pin ended column?
b) Write a short note on in elastic buckling? [8+7]

2.a) Draw an axial load flow diagrams for Boom in stiffened panels?
b) Determine the deflection curve and the mid – span deflection of the simply Supported beam shown in below. The beam has a doubly symmetrical Cross – section. [6+9]

3. The pin-jointed column shown in figure below carries a compressive load applied eccentrically at a distance from the axis of the column. Determine the maximum bending moment in the column. [15]



4.a) Show that 1/R = M/EI of Direct stress distribution with a neat sketch.
b) Determine the horizontal and vertical components of the tip deflection of the cantilever shown below the second moment of area of its un symmetrical section are Ixx, Iyy and Ixy. [7+8]



5. Draw a layout of quarter fuselage with neat sketch and layout the labels. [15]

6. A thin walled circular section beam has a diameter of 200mm and is 2m long it is firmly restrained against rotation at each end. A concentrated torque of 30KNM is applied to the beam at its mid span point. if the maximum shear stress in the beam is limited to 200N/mm and maximum angle of twist to 2 degrees . Calculate minimum thickness of the beam walls. Take G =25000 N/mm². The minimum thickness of beam corresponding to the maximum allowable shear stress of 200 N/mm² is obtained directly in which Tmax =15KNM. [15]

7. Write short notes on the following
   a) Complete diagonals and in complete diagonal tension.
   b) Cut-outs in fuselages and cut-outs in wings. [7+8]

8. Write a short note on the following:
   a) Wing torsional Divergence [Two dimensional case]
   b) Swept wing Divergence. [7+8]

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B. Tech III Year I Semester Examinations, December-2011
AEROSPACE VEHICLE STRUCTURES - II
(AERONAUTICAL ENGINEERING)

Time: 3 hours **Max. Marks: 75**

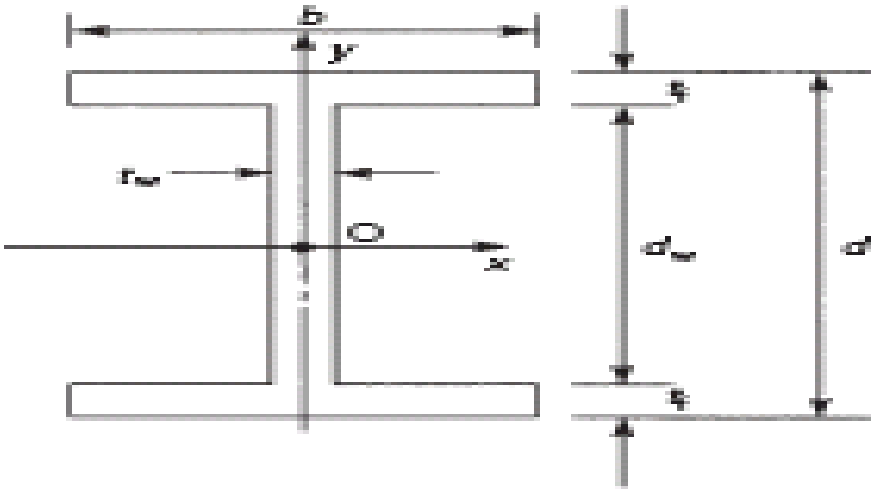
Answer any five questions
All questions carry equal marks

1.a) Explain about the Wagner's theory of beams? Give example with neat diagram.
b) What is the Tensional field beams? And explains its importance. [7+8]

2.a) Write short notes on the following:
i) Symmetrical bending
ii) Unsymmetrical bending
iii) Anticlastic bending
b) Discuss the direct stress distribution due to bending with a neat sketch. [5+10]

3. Write a short note on the following :
a) Stability of beams under transverse and Axial loads
b) Discuss about the Effective width. [7+8]

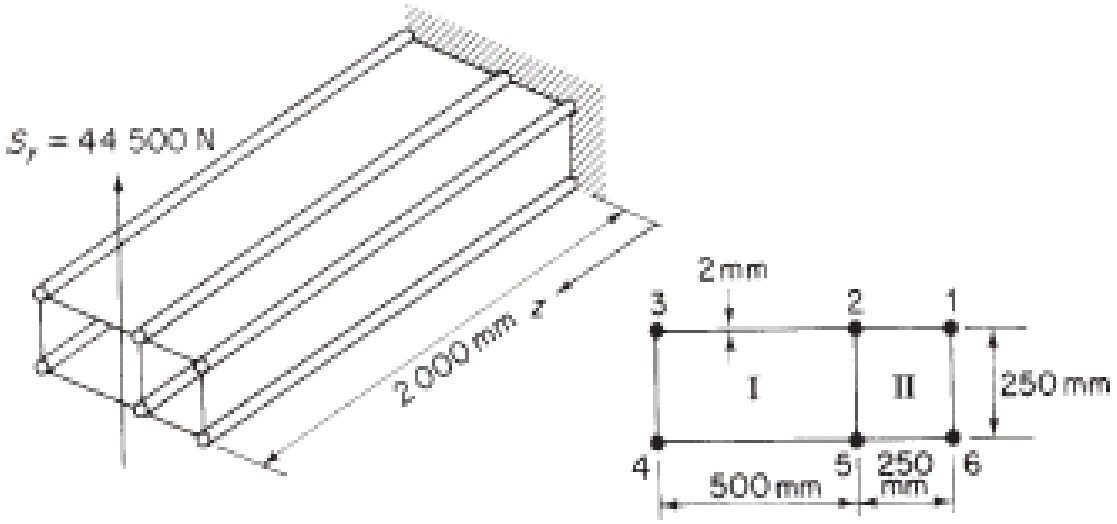
4. Determine the second moments of area Ixx and Iyy of the I – section below. [15]



5. Explain briefly about the wing torsional divergence (Finite wing) with neat diagram. [15]

6. Determine the rate of twist and the stress and the stress distribution in a circular section bar of radius R which is subjected to equal and opposite torque T at each of its free ends. [15]

7. Calculate the deflection at the free end of the two cell beam shown in figure below. Allowing for both bending and shear effects. The boom carries all constant thickness throughout, are effective only in shear. Take E =69000 N/mm² and G =25900 N/mm². Boom areas: B1 =B3 =B4 =B5 =B6 =650mm²; B2 =B5 =1300mm². [15]



8. Explain the following terms:
a) Creep and Relaxation
b) Miner's cumulative damage theory. [7+8]

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