R09

Code No: C7607

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.Tech I Semester Examinations March/April-2011
FLIGHT VEHICLE STRUCTURES
(AEROSPACE ENGINEERING)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks
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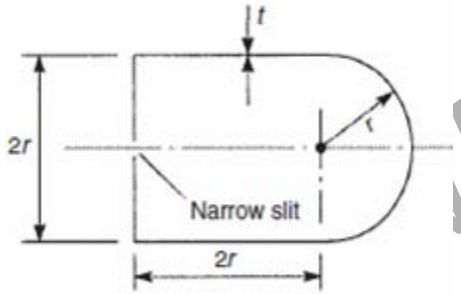
1. a) Explain the loads acts on aircraft structural components with the help of neat sketches.
   b) Explain Flight envelop (v-n diagram) with the help of neat sketches. [6+6]

2. Define the term 'shear centre' of a thin-walled open section and determine the position of the shear centre of the thin-walled open section shown in Fig. below [12]



3. A thin rectangular plate a ×b is simply supported along its edges and carries a uniformly distributed load of intensity q_0. Determine the deflected form of the plate and the distribution of bending moment. [12]

4. a) Derive the Equation to find out the shear centre of a channel section uniform thickness 't' , web height 'h', Equal Flange width 'b' Assume web is in vertical position.
   b) A simply supported beam has a span of 2.4 m and carries a central concentrated load of 10 kN. The flanges of the beam each have a cross-sectional area of 300 mm^2 while that of the vertical web stiffeners is 280 mm^2. If the depth of the beam, measured between the centroids of area of the flanges, is 350 mm and the stiffeners are symmetrically arranged about the web and spaced at 300 mm intervals, determine the maximum axial load in a flange and the compressive load in a stiffener. It may be assumed that the beam web, of thickness 1.5 mm, is capable of resisting diagonal tension only. [6+6]

5. The beam section shown in figure below is subjected to a bending moment of 100 kNm applied in a plane parallel to the longitudinal axis of the beam but inclined at 30^0 to the left of vertical. The sense of the bending moment is clockwise when viewed from the left-hand edge of the beam section. Determine the distribution of direct stress. [12]

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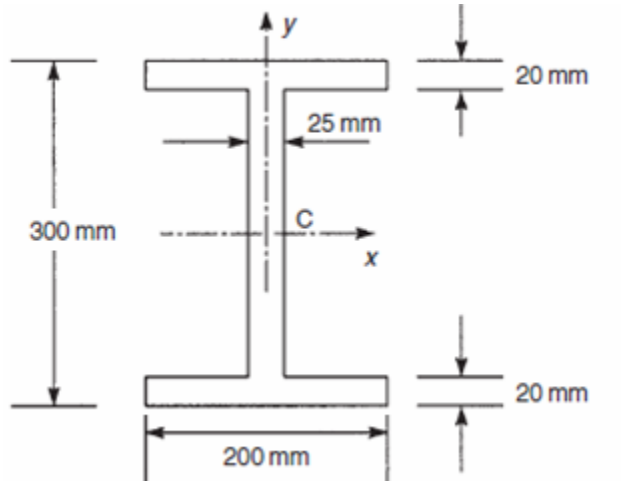
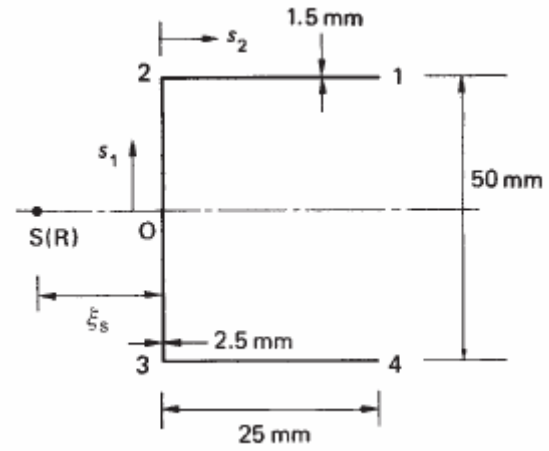
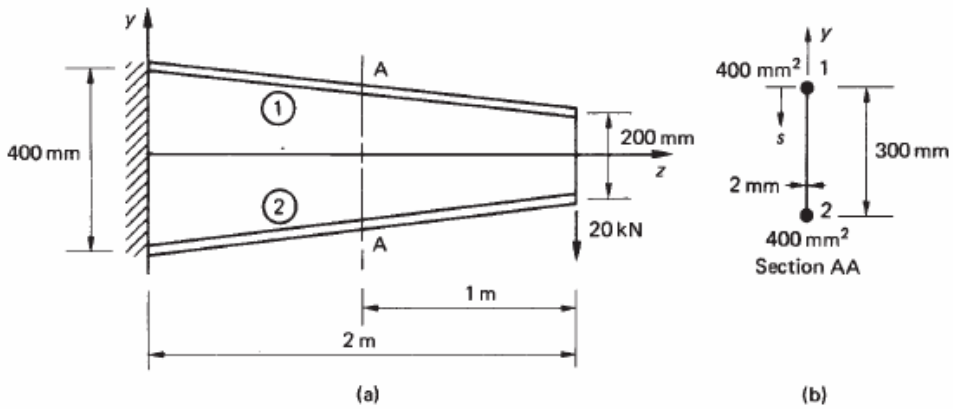


6. Determine the maximum shear stress and the warping distribution in the channel section shown in figure below when it is subjected to an anticlockwise torque of 10Nm. G = 25 000 N/ mm^2. [12]



7. Determine the shear flow distribution in the web of the tapered beam shown in 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 stress. The beam tapers symmetrically about its horizontal centroidal axis and the cross-sectional area of each flange is 400 mm^2. [12]



8. Explain the following.
   a) Aerospace Applications of Smart materials.
   b) Magneto structive transducers.
   c) Adaptive structures. [12]

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