

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. Sem. - V - Examination – June- 2011****Subject code: 150103****Subject Name: Aircraft structure II****Date: 24/06/2011****Time: 10:30 am – 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) State and prove with usual notations Castigliano's first theorem **06**
 (b) What do you mean by Airworthiness of an Aircraft? **03**
 (c) A beam of size 600 x 400 mm is subjected to a bending moment of 10 kNm at an angle of 60° with respect to y axis. Locate the neutral axis and determine the stresses at all corners. **05**
- Q.2** (a) Explain Flight envelop diagram. **07**
 (b) Find deflection at point B & C for the cantilever beam as shown in figure.1 using unit load method. Take $EI=32000 \text{ kN.m}^2$. **07**
- OR**
- (b) Find horizontal deflection at point D for the truss shown in figure.2 Castigliano's first theorem. Take $EI= 2 \times 10^5 \text{ N/mm}^2$, $A=600 \text{ mm}^2$. **07**
- Q.3** (a) Find vertical deflection at point D for the frame shown in figure. 3 using any method. Take $EI=32000 \text{ kN.m}^2$. **06**
 (b) Analyze the beam shown in figure. 4 using Castigliano's second theorem. **08**
- OR**
- Q.3** (a) A quadrant ring beam of radius 'r', supports a concentrated load 'P' at the free end, Calculate vertical & horizontal deflection at free end. **05**
 (b) Analyze the truss shown in figure.5 using flexibility system approach. **09**
- Q.4** (a) State and explain with usual notations Castigliano's second theorem **03**
 (b) Analyze the beam as shown in figure. 6 using flexibility system approach. **11**
- OR**
- Q.4** (a) Differentiate Flexibility and Stiffness **03**
 (b) Analyze the beam as shown in figure. 6 using stiffness system approach. **11**
- Q.5** (a) A box beam as shown below is subjected to a vertical shear force of 125 kN. The bending analysis, neglecting bending stress gives axial stiffener between cross section 1 cm apart as Shown in figure.7. Determine the shear flow in the box beam. **07**
 (b) The vertical shear action on a channel section is 10 KN. Find the shear flow and shear center of the section as shown in figure.8. Assume constant thickness of 10 mm throughout the section. $I = 1.21 \times 10^8 \text{ mm}^4$ **07**
- OR**
- Q.5** (a) The vertical shear action on a I- section is 200 KN. Find the shear flow and shear center of the section as shown in figure.9. Assume thickness in flange as 9.7 mm and thickness of web 6.7 mm $I = 71.97 \times 10^6 \text{ mm}^4$ **07**
 (b) Explain thin walled open sections & closed sections and define shear center with its practical significance. **07**

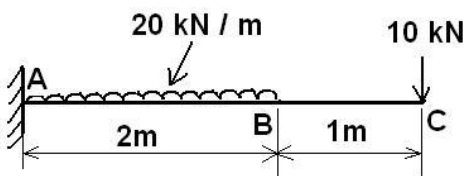


Fig. 1

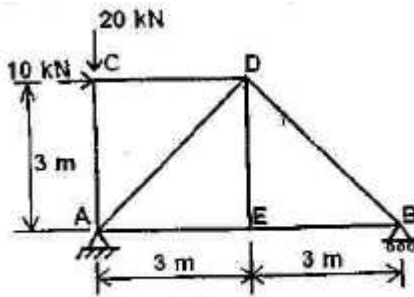


Fig. 2

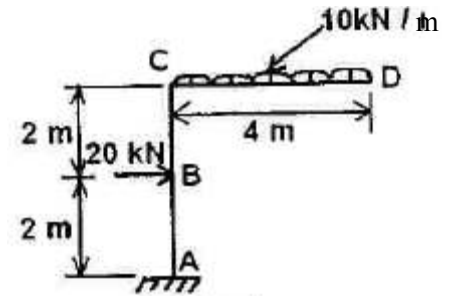


Fig. 3

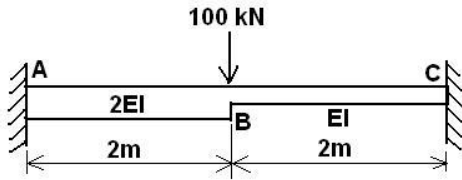


Fig. - 4

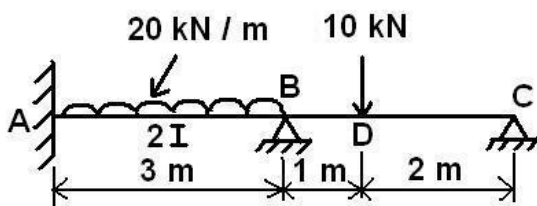


Fig. 6

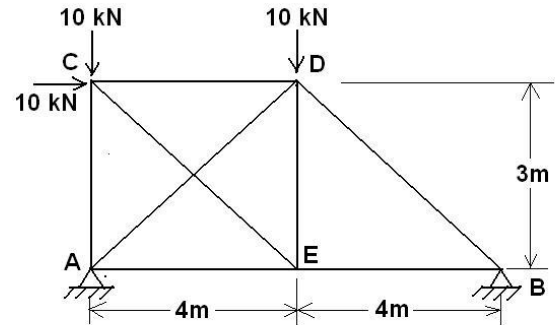


Fig. 5

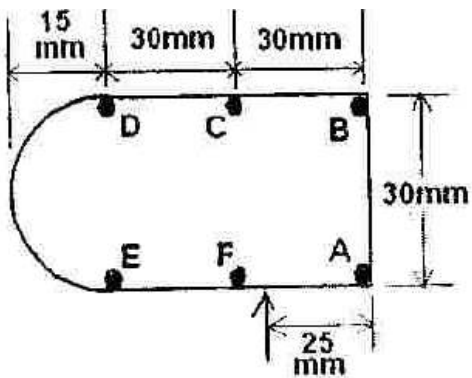


Fig. 7 (a)

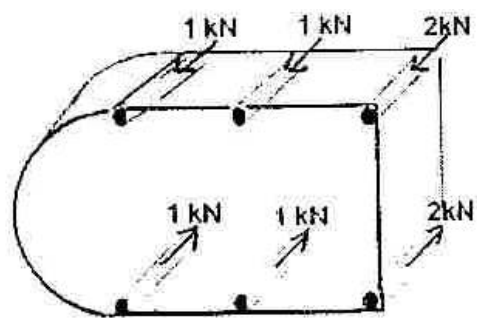


Fig. 7 (b)

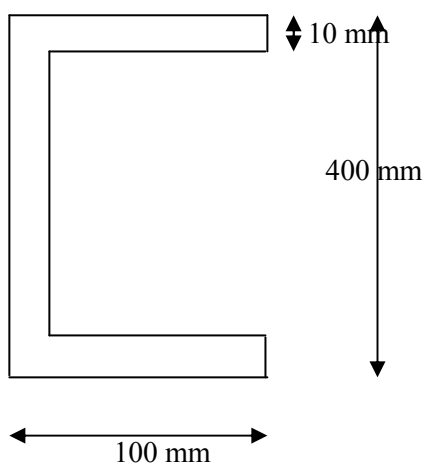


fig. 8

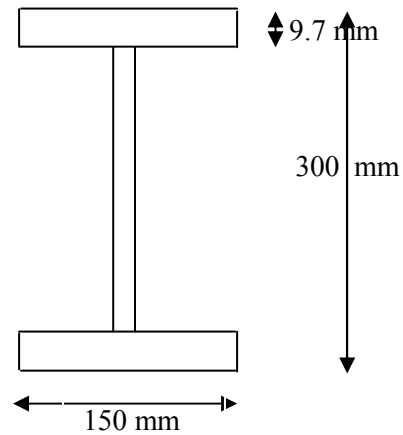


fig. 9