Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Sem - IV Examination - June- 2011

Subject code: 140101

Subject Name: Aircraft structure-1

Date:08/06/2011 **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)**	Find static indeterminacy of structures given in **figure 1 (a, b, c, d)**	**04**
	(b)	Find kinematic indeterminacy of structures given in **figure 1 (a, b, c, d)**	**04**
	(c)	Explain the Principle of Super position with its statement.	**04**
	(d)	Explain Hook stress	**02**
Q.2	**(a)**	What do you mean by Plane-stress condition? With help of example explain that stress is tensor quantity.	**07**
	(b)	Analyse the plane frame as shown in **figure 2.** Draw shear force diagram, Bending moment diagram, and axial force diagram.	**07**
		OR	
	(b)	A space-curved bar of circular in cross section is loaded as shown in **figure 3**. Calculate maximum and Minimum stresses at the critical section p-q	**07**
Q.3	**(a)**	Define Moment area theorems.	**02**
	(b)	Derive the differential equation of deflected curve.	**05**
	(c)	Calculate slope and deflection at point D for the beam as shown in **figure 4** using Macaulay's method. Take EI = 32000 $kN.m^2$.	**07**
		OR	
Q.3	**(a)**	Which points should be take care while using Macaulay's Method.	**02**
	(b)	Find Slope and Deflection at the free end of the cantilever beam subjected to uniformly distributed load over the entire span.	**05**
	(c)	Calculate slope and deflection at point C for the beam as shown in **figure 5** using conjugate beam method. Take EI = 32000 $kN.m^2$.	**07**
Q.4	**(a)**	Define strain energy, Proof resilience and modulus of resilience	**03**
	(b)	Derive the equation of the strain energy stored in a member due to Shear.	**04**
	(c)	Calculate the strain energy in a bar 3m long and 40mm diameter, when it is subjected to a tensile load of 100KN. What will then a modulus of resilience of the material of the bar?	**07**
		OR	
Q.4	**(a)**	Define Crippling load, Slenderness ratio, Crushing load	**03**
	(b)	Derive Euler's crippling load formula for the long column pinned at both ends.	**04**
	(c)	A square column of size 500mm depth and 350 mm width, 4.2 m in length with its both ends are hinged. Find it's load carrying capacity of the column by 1) Euler's formula 2) Rankine's formula. Take f_c=320 N/mm^2 , E = 2 x 10^5 N/mm^2 , α = 1/8000	**07**
Q.5	**(a)**	Starting from fundamental equation derive equation of equilibrium.	**07**
	(b)	State function of fibers and classify composite materials.	**07**
		OR	

Q.5 **(a)** Starting from fundamental equation derive equation of equilibrium. **07**

(b) Define composite material. Compare metallic material with composite material. **07**

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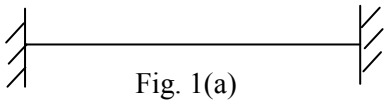

Fig. 1(a)

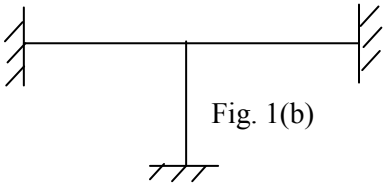

Fig. 1(b)

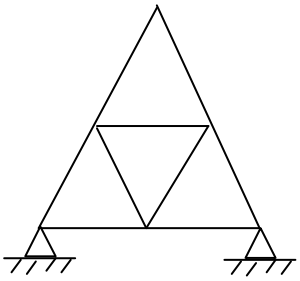

Fig. 1(c)

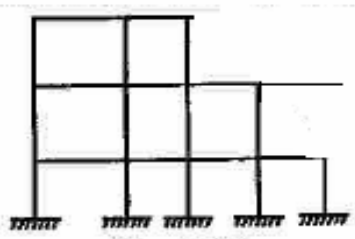

fig. 1(d)

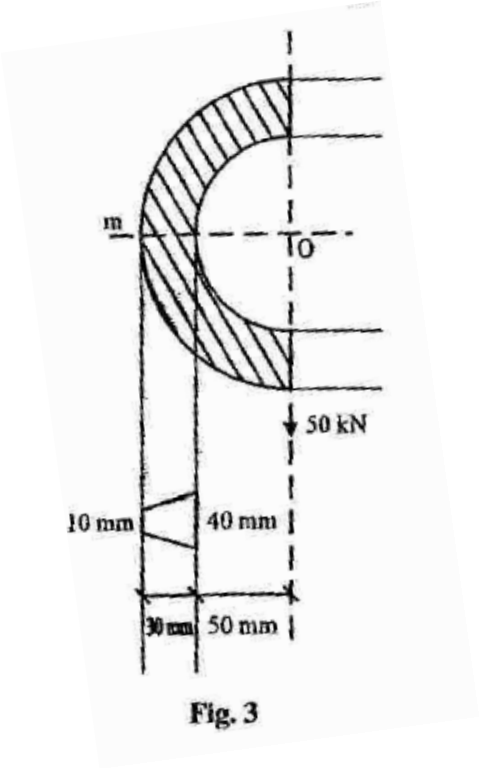

Fig. 3

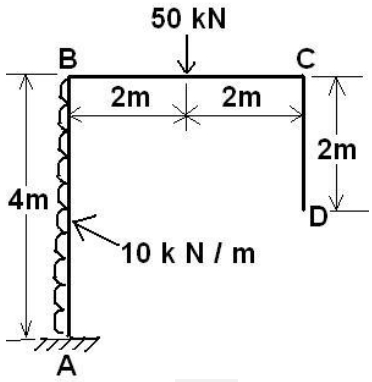

Fig. 2

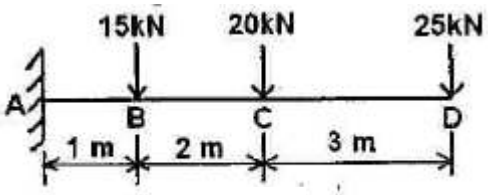

Fig.4

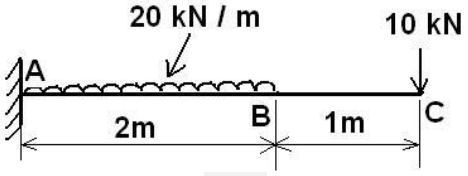

Fig. 5