Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV (New) EXAMINATION – WINTER 2019

Subject Code: 2140101 **Date: 17/12/2019**

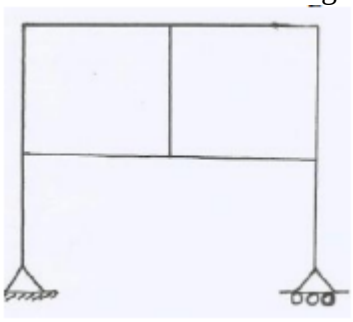
Subject Name: Aircraft Structures I

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

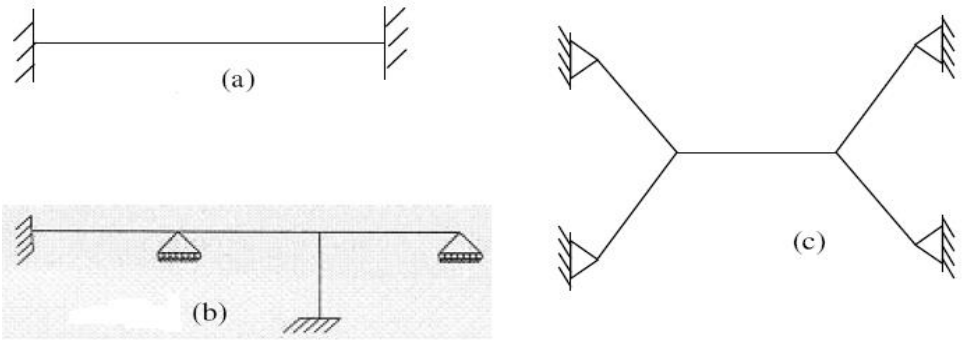
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARK
Q.1	**(a)**	Define : Stress,Strain,Shear Modulus	**03**
	(b)	State and Explain " Maxwell's Reciprocal Theorem "	**04**
	(c)	Define the following term : Strain Energy,Radious of gyration,moment of inertia,resilience,proof resilience,Young's Modulus	**07**
Q.2	**(a)**	Explain the principal of superposition with its statement.	**03**
	(b)	Enlist the criteria to identify the geometric instability of the structure	**04**
	(c)	Define the terms: Static Indeterminacy and Kinematic Indeterminacy. Find the S.I and K.I of a plane frame as shown in below Figure	**07**



OR

	(c)	Find static and kinematic indeterminacy of structures given in below figure.	**07**



Q.3	**(a)**	Suggest different way of reducing the effect of buckling in long column.	**03**
	(b)	Define the term Effective Length of Column. Draw the probable sketch which represent the buckled shape of the column with different support conditions.	**04**
	(c)	Enlist various methods to find slope and deflection. Mention the assumptions required for deriving the differential equation.	**07**

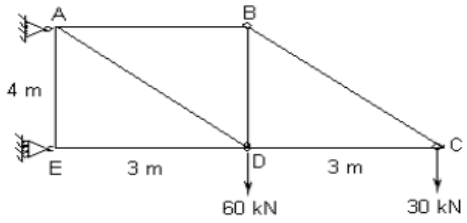
OR

Q.3	**(a)**	Differentiate between short and long column.	**03**
	(b)	Enlist various methods to find slope and deflection. Mention the assumptions required for deriving the differential equation.	**04**
	(c)	Derive euler's buckling load for fixed pinned column.	**07**
Q.4	**(a)**	Explain Simple Harmonic Motion for the vibratory body.	**03**

	(b)	Differentiate: Simple Truss, Compound Truss and Complex Truss with suitable sketch.	**04**
	(c)	A strut 3 m long is 50 mm in diameter. One end of the strut is fixed while its other end is hinged. Find the safe load for the member using Euler's Theory, allowing Factor of Safety as 3. Take E = 2.1 x 10^5 N/mm^2 .	**07**

OR

Q.4	**(a)**	Derive the strain energy equation for a member subjected to shear force.	**03**
	(b)	Differentiate: Simple Truss, Compound Truss and Complex Truss with suitable sketch	**04**
	(c)	Calculate the total strain energy stored in a 6 m long cantilever beam subjected to a point load of 80 kN at free end due to flexure and shear. The cross section of a beam is rectangle having dimension 120 mm x 300 mm. Take E = 180 kN/mm^2 and G = 80 kN/mm^2.	**07**
Q.5	**(a)**	Define: Time Period, Amplitude and Natural Frequency	**03**
	(b)	Derive the differential equation of deflected curve with neat sketch.	**04**
	(c)	Find the internal forces in truss members for a plane truss as shown in below fig. using Method of Tension Co-efficient.	**07**



OR

Q.5	**(a)**	Explain De'alembert Principal.	**03**
	(b)	A hollow rectangular column having outside dimensions 200 mm x 150 mm and inside dimensions 150 mm x 100 mm. It's length is 6.0 m and both ends are fixed. Find the Euler's Load if E = 2 x 10^5 N/mm^2.	**04**
	(c)	A solid circular shaft is subjected to a bending moment of 30 kN-m and a torque of 15 kN-m. Design the diameter of the shaft according to maximum principle stress theory. Take stress at elastic limit as 200 N/mm^2 and Factor of safety as 2.	**07**

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