Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2019

Subject Code: 2150103 **Date: 31/05/2019**

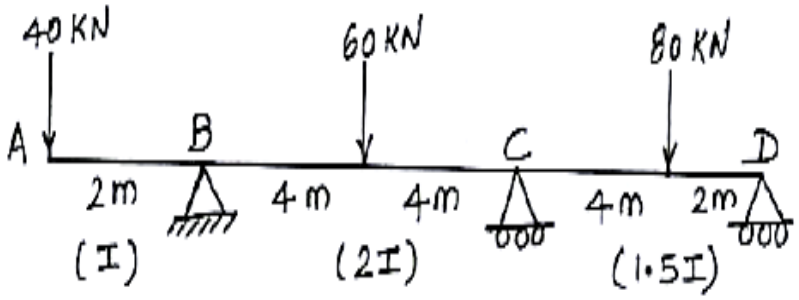
Subject Name: Aircraft Structures II

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

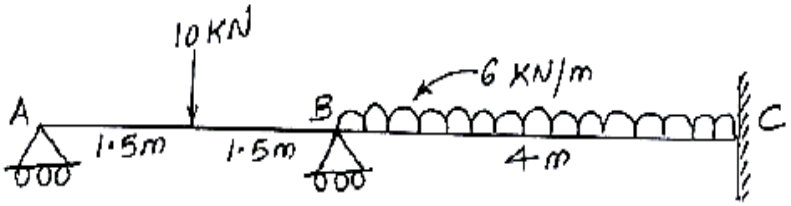
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	What are the failures occur in structural components of aircraft in different flight conditions?	**03**
	(b)	Explain the role of bulkheads and longerons in detail.	**04**
	(c)	Explain Flight Envelope (V-n diagram) with the help of neat sketch.	**07**
Q.2	**(a)**	Define : Plane stress,plane strain	**03**
	(b)	Explain the loads acting on an aircraft for different flight conditions with neat sketches.	**04**
	(c)	Define Neutral Axis; Derive the equations for direct bending stress distribution. Also sketch the direct bending stress distribution of an I-section.	**07**
		OR	
	(c)	Derive equation of equilibrium for 3D elastic body.	**07**
Q.3	**(a)**	Enlist the different ways of making the section free from torsion.	**03**
	(b)	Derive compatibility equation.	**04**
	(c)	Calculate the value of reactions for the continuous beam shown in below Figure using Stiffness System Approach.	**07**



OR

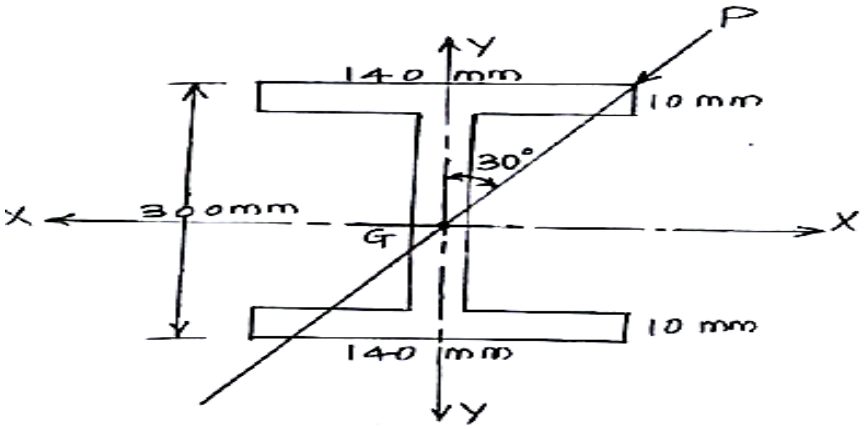
Q.3	**(a)**	State the difference between Symmetrical Bending and Unsymmetrical Bending.	**03**
	(b)	Explain the Saint Venant's Principle for 2D beam problems.	**04**
	(c)	Determine the value of the redundants for the beam shown in the below Figure using Flexibility Method. Consider redundants in the form of moments.	**07**



Q.4 **(a)** Define Flexibility and state the characteristics of Flexibility Matrix. **03**

(b) Write the basic equations of equilibrium, compatibility and stress-strain relations for plane stress condition in polar coordinate system. **04**

(c) An Indian Standard I-section ISMB 300 is shown in Figure- 3. The properties of the section are as below: Ixx = 7719 cm^4, Iyy = 450 cm^4. The plane of loading is inclined at 30 to the Y-axis. Find moment 'M' if the maximum bending stress induced is 120 N/mm^2. **07**

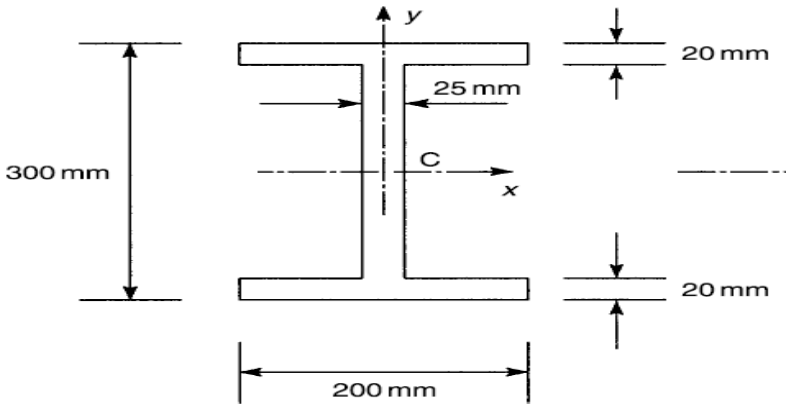


OR

Q.4 **(a)** Explain torsion of multi cell open section beams. **03**

(b) Explain Framed Structures and Continuum Structures with the help of neat sketch. **04**

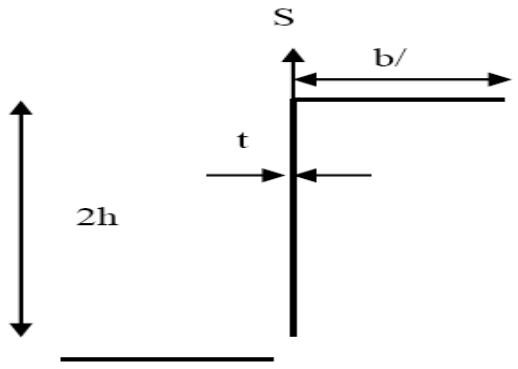
(c) The cross section of a beam has the dimensions shown in below fig. If the beam is subjected to a negative bending moment of 100kNm applied in a vertical plane, determine the distribution of direct stress through the depth of the section. **07**



Q.5 **(a)** Define the terms: Shear Centre, Shear Flow **03**

(b) Derive the equation of torque for a bar from Prandtl Stress Function **04**

(c) Determine the shear flow of the section shown in Figure Explain each step. **07**



OR

Q.5	**(a)**	Explain the role of skin and ribs in with figure.	**03**
	(b)	Explain displacement associated with Bredt-Batho Shear flow for closed sections.	**04**
	(c)	Derive the equation for computation of shear centre for a channel section.	**07**

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