

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

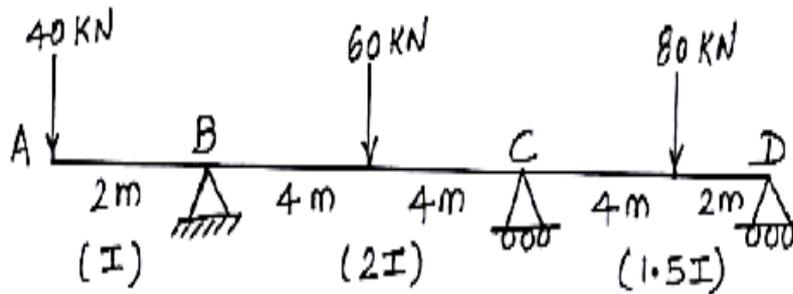
Instructions:

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

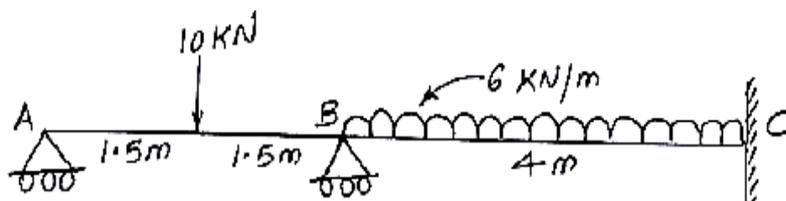
OR

Q.3	(c) Derive equation of equilibrium for 3D elastic body.	07
	(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

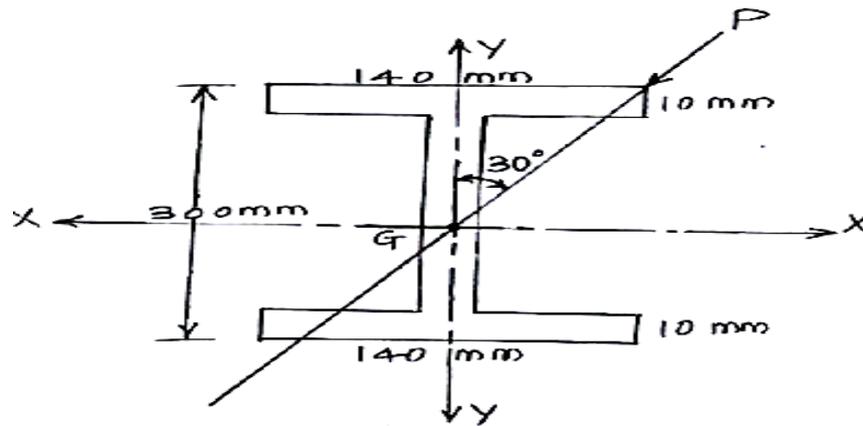


OR

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

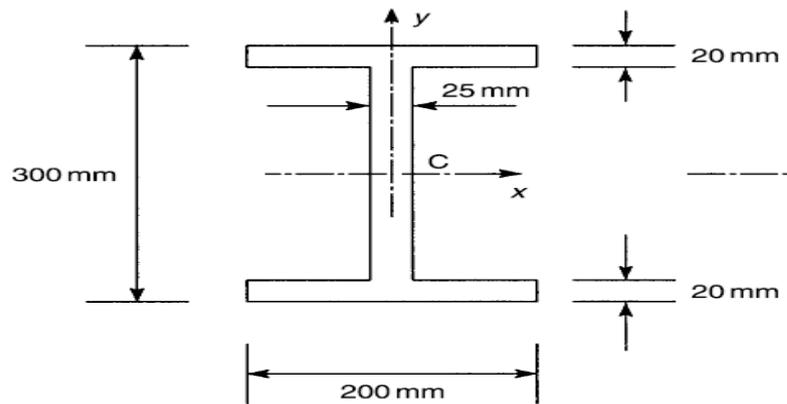


- Q.4** (a) Define Flexibility and state the characteristics of Flexibility Matrix. **03**
 (b) Write the basic equations of equilibrium, compatibility and stress-strain relations for plane stress condition in polar coordinate system. **04**
 (c) An Indian Standard I-section ISMB 300 is shown in Figure- 3. The properties of the section are as below: $I_{xx} = 7719 \text{ cm}^4$, $I_{yy} = 450 \text{ cm}^4$. 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**

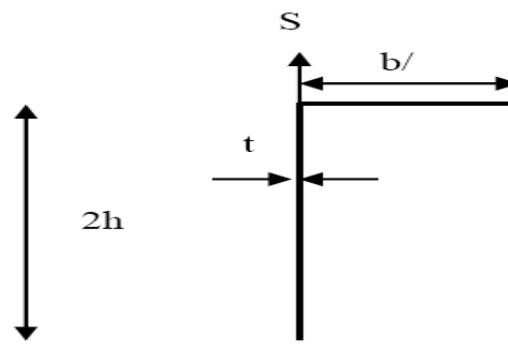


OR

- 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 100 kNm 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**
