

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2150103

Date:30/04/2018

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) Clearly explain the loads acting on an aircraft for different flight conditions with neat sketches.	03
(b) What do you understand by the term buckling of a structure? Give an example of an aircraft structural component prone to buckling.	04
(c) How the structure of passenger aircraft is different from fighter aircraft? Discuss in detail.	07
Q.2 (a) Discuss about the failures occur in structural components of aircraft for different flight conditions.	03
(b) Explain with neat sketch the state of stress at a point in three dimensions.	04
(c) Explain Flight Envelope (V-n diagram) in a structural point of view with the help of neat sketch.	07
OR	
(c) Derive the equations for direct bending stress distribution. Also sketch the direct bending stress distribution of an I-section.	07
Q.3 (a) What is the difference between Symmetrical Bending and Unsymmetrical Bending?	03
(b) Explain the State of Plane Stress.	04
(c) Derive the equation of torque for a bar from Prandtl stress function.	07
OR	
Q.3 (a) Define Principal Moment of Inertia.	03
(b) Write the basic equations of equilibrium, compatibility and stress-strain relations for plane stress condition in polar coordinate system.	04
(c) Derive the equation of torsion of rectangular strip.	07
Q.4 (a) Write down the different ways of making the section free from torsion.	03
(b) Briefly explain about the load bearing members of wing, fuselage and empennage section with neat sketches.	04
(c) An aircraft having a total weight of 45 kN lands on the deck of an aircraft carrier and is brought to rest by means of a cable engaged by an arrester hook, as shown in Fig.1 If the deceleration induced by the cable is 3g, determine the tension, T, in the cable, the load on an undercarriage strut, and the shear and axial loads in the fuselage at the section AA; the weight of the aircraft aft of AA is 4.5 kN. Calculate also the length of deck covered by the aircraft before it is brought to rest if the touch-down speed is 25 m/s.	07

OR

- Q.4** (a) Explain torsion of multi cell open section beams. **03**
(b) Prove that the “Product of Stiffness Matrix and Flexibility Matrix is Unity”. **04**
(c) State the difference between Stiffness and Flexibility Methods of Structural Analysis. **07**
- Q.5** (a) Define: Principal Centroidal Axis. **03**
(b) Explain Framed Structures and Continuum Structures with the help of neat sketch. **04**
(c) Explain Prandtl’s torsion theory for solid sections. **07**

OR

- Q.5** (a) Write down the difference between torsion of open and closed sections. **03**
(b) Explain displacement associated with Bredt-Batho Shear flow for closed sections. **04**
(c) 1. Define shear center and its significance. Give examples of locations of shear center in angle, T and plus sections. **07**
2. Explain Neutral Axis with a neat sketch. Derive the formula for finding out the co-ordinates of Neutral Axis.

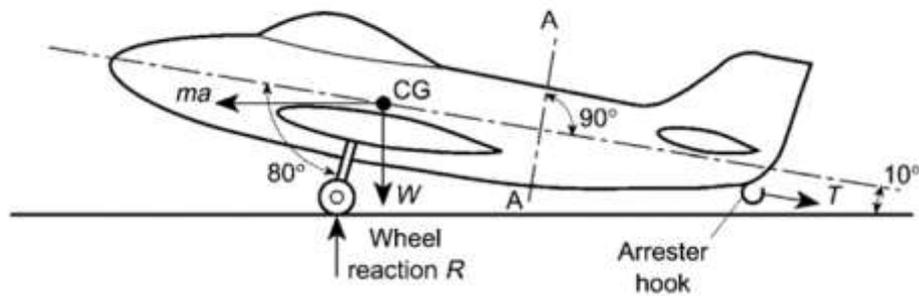


Fig.1
