

**B.TECH. IN AEROSPACE ENGINEERING
(BTAE)**

Term-End Examination

June, 2011

BAS-017 : FLIGHT MECHANICS

Time : 3 hours

Maximum Marks : 70

Note : Answer any seven questions. Use of calculator is permitted. All questions carry equal marks.

1. Validate the statements with brief explanations. 10
- (a) Two Aircrafts turn through 360° in the same time, but radius of one is twice that of the other aircraft. So both of them will have same angles of bank.
 - (b) The Forward C.G. Limit of an aircraft is decided by stability considerations.
 - (c) Measurement of elevator angle for Trim versus coeff. of lift C_L is carried out during the flight test at various C.G. positions to estimate STICK FIXED NEUTRAL POINT.
 - (d) The stick fixed Maneuver point lies FORWARD of stick fixed Neutral point.
 - (e) For elevator hinge moment coefficient $C_H = b_1\alpha + b_2\eta + b_3\beta$ the coefficient b_1 is always positive, so also b_2 and b_3 .

2. Explain the purpose of Aerodynamic balancing and Mass balancing of control surfaces. 10
3. Explain Control Reversal phenomenon. What is the design criteria to contain this situation ? 10
4. How does the Wing Dihedral affect stability ? Explain with diagrams. 10
5. What is meant by adverse YAW ? How is this reduced by proper design parameters ? 10
6. How is an aircraft flown in a level flight in case all engines on the starboard side fail ? What is design consideration for the Rudder ? 10
7. How is STICK FIXED MANEUVER POINT determined by Flight Testing method ? Explain with the Graphs. 10
8. An aircraft of 10,000 kg Mass is designed with the line of Thrust 0.9 meters above the line of Drag. In normal flight the Drag is 18.2 kN and the Centre of Pressure on the main plane is 150 mm behind the C.G. if the Centre of Pressure of the Tail Plane is 10 meters behind the C.G. What is the load on the Tail Plane is TRIM condition ? 10

9. Explain what are co - ordinated turns. Derive relation between the angle of bank with the velocity and Turning Radius. 10
10. The Stalling Speed of an aircraft during level flight is 31 meters/second. Find the stalling speeds for Turning with Bank angles of 10
- (a) 60° (b) 84°
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