No. of Printed Pages : 2

BAS-017

00481

B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

December, 2013

BAS-017 : FLIGHT MECHANICS

Time : 3 Hours *Maximum Marks : 70*

Note : *Attempt **seven** questions in all. Q.No. 1 is **compulsory**. Attempt **any six** questions from the remaining questions.*

---

1. Write short notes on :

(a) Stick - Free longitudinal static stability **2**

(b) Asymmetric power **3**

(c) Wing dihedral and its effects **3**

(d) Damping in roll **2**

2. Define adverse yaw. Explain design criteria for rudder in adverse yaw. **10**

3. Explain the purpose of Aerodynamic balancing and mass balancing of control surface. **10**

4. Explain control reversal phenomenon. What is done to contain this situation ? **10**

5. Derive the expression for the slope of the pitching moment curve for stick-fixed condition. **10**

6. Derive the expressions for the gradient of elevator angle per 'g' for pull-up and turn maneuvering flights. **10**

7. Derive the expression for Hinge Moment parameters. 10

$C_h = C_{h_0} + C_{h_\alpha} . \alpha C_{h_\delta} . \delta$ where

C_h – the hinge moment, C_{h_0} – the hinge moment at zero angle of attack and deflection for cambered surface,

$$C_{h_\alpha} = \left(\frac{\partial C_h}{\partial C\alpha}\right), \; C_{h_\delta} = \left(\frac{\partial C_h}{\partial C_\delta}\right),$$

δ - the elevator deflection and

α - the angle of attack

8. Explain the methods for achieving longitudinal control of an airplane. 10

9. (a) Validate the statement - "The stick fixed manoeuver point lies forward of stick - fixed neutral point". 6

(b) The stalling speed of an aircraft during level flight is 31 meter per second. Find the stalling speeds for turn with bank angle of 45 degrees. 4