

**B.Tech. AEROSPACE ENGINEERING  
(BTAE)****Term-End Examination**

00765

**December, 2014****BAS-017 : FLIGHT MECHANICS***Time : 3 hours**Maximum Marks : 70*

---

**Note :** Question no. 1 is **compulsory**. Answer any **five** questions of the remaining seven. Use of scientific calculator is permitted.

---

1. Write short notes on the following :  $8 \times 2 \frac{1}{2} = 20$
- (a) Parasite Drag
  - (b) Drag Divergence Mach Number
  - (c) Load Factor
  - (d) Snaking Mode
  - (e) Autorotation
  - (f) ISA
  - (g) Dorsal Fin
  - (h) Aerodynamic Balancing

2. Derive the two equations given below and represent it graphically :

$$D = AV^2 + \frac{B}{V^2}$$

$$P = AV^3 + \frac{B}{V}$$

where D is drag, P is power, V is velocity, A and B are constants.

10

3. Obtain the expression for turn radius and turn rate for pull up and pull down manoeuvre. 10

4. (a) Describe in brief 'Dihedral Effect'. 5

(b) "The statically stable aircraft may be dynamically stable or unstable. Similarly dynamically stable aircraft may be statically stable or unstable." Are both the statements true? Justify. 5

5. Show that the elevator angle for trim is given by

$$\delta_{e_{trim}} = - \left[ \frac{C_{m_0} C_{L_\alpha} + C_{m_\alpha} C_{L_{trim}}}{C_{m_\delta} C_{L_\alpha} - C_{m_\alpha} C_{L_\delta}} \right]$$

where all coefficients have their standard meanings. 10

6. Explain the effects of fuselage and nacelle on static longitudinal stability. 10

7. (a) Draw and explain power available and power required curves for both propeller and jet airplanes. 5

(b) Discuss briefly the effect of compressibility and highly swept back wing on longitudinal stability. 5

8. Explain briefly the following :

(a) Pure rolling 5

(b) Stick fixed longitudinal stability 5