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BAS-017

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B.TECH. (AEROSPACE ENGINEERING) (BTAE)

Term-End Examination

June, 2014

BAS-017 : FLIGHT MECHANICS

Time : 3 Hours *Maximum Marks : 70*

Note : *Q.No. 1 is **compulsory**. Answer **any five** questions from the remaining **seven** questions. Use of scientific calculator is **permitted.***

1. Write short notes on the following : **8x2.5=20**
   (a) Induced Drag
   (b) Service and Absolute Ceiling
   (c) Neutral Point
   (d) Dihedral Effect
   (e) Static and Dynamic Stability
   (f) Dutch Roll
   (g) Weathercock Stability
   (h) Critical Velocity (V-n diagram)

2. Draw the V-n diagram and explain it in detail. Also explain structural and aerodynamic boundary. **10**

3. Discuss, in detail the determination of neutral and maneuver point from flight test. **10**

4. Explain minimum drag speed and minimum power speed and their importance in aircraft performance analysis. **10**

5. Explain the following in brief 5+5
   (a) Aileron reversal
   (b) Adverse yaw

6. An aircraft weighing 250000 N has a wing area of 80 m^2 and its drag equation is $C_D = 0.016 + 0.04 C_L^2$. Calculate 10
   (a) Minimum thrust required (T_{min})
   (b) Minimum power required (P_{min}) for straight and level flight and the corresponding true air speeds (V_{md} and V_{mp}) at sea level and at an altitude where $(\sigma)^{1/2} = 0.58$. Assume sea level air density to be 1.226 kg/m^3.

7. Discuss briefly the following : 5+5
   (a) Basic requirements of the rudder
   (b) Phugoid Motion

8. Explain, in detail the contribution of various components of the airplane to static directional stability. 10