

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-Vth Examination December 2010

Subject code: 150101

Subject Name: Flight Mechanics

Date: 13 /12 /2010

Time: 03.00 pm - 05.30 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define ISA conditions with neat sketch of altitude vs. Temperature graph. Define "isothermal layer" and "Inversion layer". 07
(b) Explain "aerofoil nomenclature" with neat sketch. 07
- Q.2** (a) Give a short note on "Classification of Drag forces" with neat sketch. Write the methods to reduce them. 07
(b) Differentiate between "Angle of Attack" and "Angle of Incidence". How they useful applicable in flying performance. Explain with neat sketch. 07
- OR**
- (b) Differentiate between "Local Mach No" and "Critical Mach No" with necessary sketch. 07
- Q.3** (a) Define wave drag. Write advantages of sweep back wing with neat sketch. 07
(b) What is the meaning of "Multi element aerofoil"? What is the need of it? Explain with neat sketch. 07
- OR**
- Q.3** (a) Give a short note on "Power Augmented Lift". Explain with neat sketches and vector diagram. 07
(b) Define "High Lift system". How lift is increased by increasing wing area. Explain with neat sketch. 07
- Q.4** (a) Define Pressure Altitude, Density Altitude, Temperature Altitude, and True Altitude. 07
(b) Define Lift Coefficient, Drag Coefficient, Moment and Centre of Pressure. 07
- OR**
- Q.4** (a) Draw an aerofoil section and explain How lift is generated by an aerofoil. 07
(b) Give a short note on "Types of Flaps" with neat sketch. 07
- Q.5** (a) Give a short note on "Stick free and Stick fixed Static stability" with neat sketch. 07
(b) Explain "Total pitching moment about C.G" with neat sketch. 07
- OR**
- Q.5** (a) Give a short note on "Trimming of Control Surface" with neat sketch. 07
(b) A sail plane weighs 4500N and has a wing loading of 600 N/m². Its drag equation is $C_D = 0.01 + 0.022C_L^2$. After completing launch at 350 m in still air, what is the greatest distance the sail plane can cover, and what is the greatest duration of flight possible? Assuming in both the cases flight over level ground. Find also corresponding speed of flight. Ignore changes of density of the atmosphere. 07
