

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V • EXAMINATION – SUMMER • 2014****Subject Code: 150101****Date: 11-06-2014****Subject Name: Flight Mechanics****Time: 10.30 am - 01.00 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)** Explain critical Mach number and drag divergence Mach number. Explain how to flow physics associated with drag divergence Mach number and critical Mach number. **07**
- (b)** Explain velocity – load factor diagram in detail. What is use of this diagram? What types of information generally available from this diagram? **07**

- Q.2 (a)** Define stability, control and moments? Explain effect these on performance of airplane? **07**
- (b)** Derive equation for range and endurance for propeller driven aircraft. Base on mathematical equation justify dependency of range and endurance on various parameters. **07**

OR

- (b)** Derive equation for range and endurance for jet engine propelled aircraft. Base on mathematical equation justify dependency of range and endurance on various parameters. **07**
- Q.3 (a)** What do you understand by compressibility correction? Under what circumstances compressibility play a major role? Explain and justify your answer on the basis of airspeed measurement. **07**
- (b)** Explain swept back wing with diagram. List advantages, disadvantages and difference of swept back wing compare to conventional wing. **07**

OR

- Q.3 (a)** Aircraft is propelled using jet engine. Derive condition for available power under level unaccelerated flight condition **07**
- (b)** What is available power and required power for jet engine propelled airplane? Explain effect of various parameters on required power condition. Justify your answer with the help of proper suitable diagram. **07**

- Q.4 (a)** Define geopotential altitude, geometric altitude, pressure altitude, density altitude and temperature altitude. Show relationship between geopotential and geometric altitude. **07**
- (b)** What is International Standard Atmosphere (ISA)? What is usefulness of defining ISA? **07**

OR

- Q.4 (a)** Define pressure coefficient and critical pressure coefficient. Explain effect of compressibility on pressure coefficient calculation. **07**

- (b) Define temperature, pressure and density variation with altitude with the help of suitable diagram. Define stratosphere, stratopause, troposphere and tropopause. 07
- Q.5** (a) Write notes on wave drag and induced drag. 07
- (b) What do you understand about high lift system? What are the necessities to use such device? Explain power augmented lift system. 07
- OR**
- Q.5** (a) Write notes on drag reduction techniques 07
- (b) What are leading edge and trailing edge devices used in high lift system? How they are used as high lift devices? Justify your answer using proper diagrams. 07
