

**PAE5I103 AIRCRAFT PERFORMANCE(3-0-1)**

**OBJECTIVE:**

To make the student understand the performance of airplanes under various flight conditions like take off, cruise, landing, climbing, gliding, turning etc.

**Module – I GENERAL CONCEPTS:**

International Standard atmosphere, IAS, EAS, TAS, Propeller theory- Froude momentum and blade element theories, Propeller co-efficients, Use of propeller charts, Performance of fixed and variable pitch propellers, High lift devices, Thrust augmentation

**Module – II DRAG OF BODIES**

Streamlined and bluff body, Types of drag, Effect of Reynold's number on skin friction and pressure drag, Drag reduction of airplanes, Drag polar, Effect of Mach number on drag polar

**Module – III STEADY LEVEL FLIGHT**

Steady level flight, Thrust required and Power required, Thrust available and Power available for propeller driven and jet powered aircraft, Effect of altitude, maximum level flight speed, conditions for minimum drag and minimum power required, Effect of drag divergence on maximum velocity, Range and Endurance of Propeller and Jet airplanes.

**Module – IV GLIDING AND CLIMBING FLIGHT**

Shallow and steep angles of climb, Rate of climb, Climb hodograph, Maximum Climb angle and Maximum Rate of climb- Effect of design parameters for propeller, Absolute and service ceiling, Gliding flight, Glide hodograph

**Module – V ACCELERATED FLIGHT**

Estimation of take-off and landing distances, Methods of reducing landing distance, level turn, minimum turn radius, bank angle and load factor, Constraints on load factor, Pull up and pull down maneuvers, maximum turn rate, V-n diagram.

**TEXT BOOKS:**

1. Houghton, E.L. and Carruthers, N.B. Aerodynamics for engineering students, Edward Arnold Publishers, 1988.
2. Anderson, Jr., J.D. Aircraft Performance and Design, McGraw-Hill International Edition, 1999

**REFERENCES:**

1. Kuethe, A.M. and Chow, C.Y., Foundations of Aerodynamics, John Wiley & Sons, 1982.
2. J.J. Bertin, Aerodynamics for Engineers, Prentice-Hall, 1988.
3. L.J. Clancey, Aerodynamics, Pitman, 1986
4. Anderson, Jr., J.D. Introduction to Flight, McGraw-Hill International Edition, 1999