

MODULE 8. BASIC AERODYNAMICS

8.1 Physics of the Atmosphere

International Standard Atmosphere (ISA), application to aerodynamics.

8.2 Aerodynamics

Airflow around a body;

Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation;

The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio;

Thrust, Weight, Aerodynamic Resultant;

Generation of Lift and Drag: Angle of Attack, Lift coefficient,

Drag coefficient, polar curve, stall;

Aerofoil contamination including ice, snow, frost.

8.3 Theory of Flight

Relationship between lift, weight, thrust and drag;

Glide ratio;

Steady state flights, performance;

Theory of the turn;

Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.

8.4 Flight Stability and Dynamics

Longitudinal, lateral and directional stability (active and passive).