

Syllabus for Ph.d Entrance Examination
Department of Aerospace Engineering

Definition, basic thermodynamics laws, processes, energy, work, Law of conservation of energy, Irreversible process, Steady state energy equation, Flow processes, Throttling process, Second law of thermodynamics, Reversible process, Entropy, Heat engine, Heat pump, Thermal efficiency of Heat pump, Entropy change during process, Temperature entropy diagram.

Aerodynamics, aerodynamic forces and moments, Centre of pressure, dimensional analysis, Fluid statics, fundamental Principles and equations, Continuity equation, Momentum Equation, energy equation, stream function, Bernoulli's Equation, Governing Equation for Irrotational, Incompressible flow, Laplace's Equation, definition of compressibility, Governing equations for in viscous, compressible flow, special forms of energy equation, calculation of normal shock wave properties, Prandtl-Meyer expansion waves, wind tunnels, Velocity potential equation, Critical Mach number, Elements of hypersonic flow, Newtonian theory, The lift and drag of wings at hypersonic speeds, Navier –Stokes equation, The viscous flow energy equation.

Aircraft basic science, The physics of lift, Bernoulli's principle, Critical angle of attack, Drag, Reynold's number, parasite drag, Induced drag, Centre of pressure, Mach number, Types of high speed flight, Aerofoil characteristics, Shapes and dimensions of aerofoils, sweep angle, Mean aerodynamic chord, wing flaps, Leading edge flaps, slots and slats, Angle of incidence, Stalls and their effects, Super critical wing, Forces on the airplane in flight, lift and weight, drag and thrust, Aircraft stability, Static stability, Dynamic stability, Axes of air plane, Longitudinal stability, Lateral stability, Directional stability, Aircraft control, Fixed Airfoils, Horizontal stabilizers, Vertical fins, Movable control surfaces, Ailerons, Rudders, Elevators, wind turbines.

Basic propulsion theory, Newton's third law of motion, Ram jet theory. Rocket as a form of Jet propulsion, Gas turbine Engine, Turbojet, Turboprop. Turbofan, Turbo shaft engines, Centrifugal compressor engines, axial compressor engines, general trends in the future development of Gas turbine engine, Pulse detonation Engine, Ramjet, Pulse jet, Scram jet engine.