

Department of Aerospace Engineering, MIT Campus

Aerodynamics

Fluid Flow Equations – Incompressible Viscous and Inviscid flows – Dimensional analysis – Fluid Machinery- Basic aspects of boundary layer theory _ Fundamentals of computational fluid dynamics – Grid generation_ Time dependent methods and finite volume methods_ Airfoil theory – Subsonic wing theory_ Fundamentals of supersonic flows – High speed flows over airfoils, wings and airplanes – Experimental techniques for high speed flows.

Structure

Stresses in beams – Deflection of beams – Torsion –Statically determinate and indeterminate structures – Energy methods – Failure theories- **Symmetric and** Unsymmetrical bending – Shear flow in open and closed sections – Buckling of plates_ **Functions of Airframe components**-**Convergence criteria in FEM** – **Source of Error** –**Element discretization**- Continuum and isoparametric elements – composite materials.

Propulsion

Basic concepts in thermodynamics – Basics of propulsion and heat transfer – Air standard cycles –Properties of pure substance- Flow through compressors, combustion chambers, gas turbines and nozzles of gas turbine engines_ Fundamentals of hypersonic air breathing and rocket propulsion systems

Flight Performance

Steady and manoeuver performance– Aircraft configurations – Airplane structures – Airplane power plants– Airplane control systems – Aircraft instruments – Aircraft engine, air conditioning and pressurization system_ Steady level flight, gliding and climbing flight and accelerated flight of airplanes – **Stability and control of fixed wing aircraft.**