
DEPARTMENT OF
AEROSPACE ENGINEERING
IIT-KHARAGPUR

Syllabi of M.Tech Course in Aerospace Engineering

AE60001 AERODYNAMICS (3-1-0 4)

Governing equations for inviscid incompressible Velocity potential, stream function, circulation, source, doublet and vortices. Concept of superposition. Thin airfoil theory. Lifting line theory. Governing eqn. For inviscid compressible flow. Thin airfoils in supersonic flow.

Concept of boundary layer and deviation of boundary layer equations. Some exact solutions of incompressible boundary layer equations. Approximate solution by integral methods. Introduction to Compressible boundary layer, boundary layer equations and similarity solutions.

AE60003 STRUCTURES (3-1-0 4)

Brief historical review of development of Aerospace structural systems. Flight environments. Aerospace structural materials and stress-strain characteristics. Structural analysis methods-analytical and numerical. Elasticity approach to solution of structural problems and its limitations. Displacement and force methods for analysis of skeletal systems. Bending and torsion of thin-walled members. Bending and buckling of thin plates and stiffened plates. Analysis of pressurized shells. Variational and numerical methods of structural analysis Ritz, Galerkin, Finite Difference, Finite Element, Advanced concepts fracture mechanics, damage mechanics etc.

AE60005 PROPULSION (3-1-0 4)

Classification and characteristics of various propulsive devices for aircraft and space applications. Thermodynamic cycle analysis and thrust equation. Propeller Theory. Introduction to various components of jet engine and their performance.

Fundamentals of chemical rockets. Calculation of equilibrium compositions and adiabatic flame temperature. Nozzle design. Performance of liquid Propellant Rocket Engine- Propellant chemistry. Injector and combustion camber design. Cooling systems. Classification of solid propellants. Solid propellant combustion mechanism and burning rate laws. Design and performance of end burning and slid burning grains.

AE60007 FLIGHT MECHANICS (3-1-0 4)

Performance characteristics of aircraft take off, landing and steady climb concept and definition of stability; static stability, longitudinal, directional and lateral; dynamic stability, stability derivatives, characteristics equation, typical modes of longitudinal and directional motions; stability criterion and stability diagrams. Analysis of unsteady flight, trajectory optimization, automatic control and guidance.

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