

PAE5I102 Aerodynamics – II(3-0-1)

Module – I ONE DIMENSIONAL COMPRESSIBLE FLOW

Energy, Momentum, continuity and state equations, velocity of sound, adiabatic steady state flow equations, Flow through convergent- divergent passage, Performance under various back pressures.

Module – II NORMAL, OBLIQUE SHOCKS

Prandtl equation and Rankine – Hugoniot relation, Normal shock equations, Pitot static tube, corrections for subsonic and supersonic flows, Oblique shocks and corresponding equations, θ - β - M relation, Hodograph and pressure turning angle, shock polar, flow past wedges and concave corners, strong, weak and detached shocks,

Module – III EXPANSION WAVES, RAYLEIGH AND FANNO FLOW

Flow past convex corners, Expansion hodograph, Reflection and interaction of shocks and expansion, waves. Method of Characteristics Two dimensional supersonic nozzle contours. Rayleigh and Fanno Flow,

Module – IV SUPERSONIC AND TRANSONIC FLOW

Lift, drag pitching moment and center of pressure of supersonic profiles. Lower and upper critical Mach numbers, Lift and drag divergence, shock induced separation, Characteristics of swept wings, Effects of thickness, camber and aspect ratio of wings, Transonic area rule.

TEXT BOOK

1. Rathakrishnan, E., “Gas Dynamics”, Prentice Hall of India, 2003.

REFERENCES

1. Shapiro, A.H., “Dynamics and Thermodynamics of Compressible Fluid Flow”, Ronald Press, 1982.
2. Zucrow, M.J. and Anderson, J.D., “Elements of gas dynamics”, McGraw-Hill Book Co., New York, 1989.
3. Anderson Jr., D., – “Modern compressible flows”, McGraw-Hill Book Co., New York 1999.