

**AE8401 AERODYNAMICS – I**

**L T P C 3 0 0 3**

**UNIT I INTRODUCTION TO LOW SPEED FLOW 9**

Euler equation, incompressible bernoulli's equation. circulation and vorticity, green's lemma and stoke's theorem, barotropic flow, kelvin's theorem, streamline, stream function, irrotational flow, potential function, equipotential lines, elementary flows and their combinations.

**UNIT II TWO-DIMENSIONAL INVISCID INCOMPRESSIBLE FLOW 9**

Ideal Flow over a circular cylinder, D'Alembert's paradox, magnus effect, Kutta joukowski's theorem, starting vortex, kutta condition, real flow over smooth and rough cylinder.

**UNIT III AIRFOIL THEORY 9**

Cauchy-riemann relations, complex potential, methodology of conformal transformation, kutta joukowski transformation and its applications, thin airfoil theory and its applications.

**UNIT IV SUBSONIC WING THEORY 9**

Vortex filament, biot and savart law, bound vortex and trailing vortex, horse shoe vortex, lifting line theory and its limitations.

**UNIT V INTRODUCTION TO BOUNDARY LAYER THEORY 9**

Boundary layer and boundary layer thickness, displacement thickness, momentum thickness, energy thickness, shape parameter, boundary layer equations for a steady, two-dimensional incompressible flow, boundary layer growth over a flat plate, critical reynolds number, blasius solution, basics of turbulent flow.

**TEXT BOOKS:**

1. Anderson, J.D., "Fundamentals of Aerodynamics", McGraw Hill Book Co., 2010
2. Houghton, E.L., and Caruthers, N.B., "Aerodynamics for Engineering students", Edward Arnold Publishers Ltd., London, 1989.

**REFERENCES:**

1. Clancey, L J., "Aerodynamics", Pitman, 1986
2. John J Bertin., "Aerodynamics for Engineers", Pearson Education Inc, 2002
3. Kuethe, A.M and Chow, C.Y, "Foundations of Aerodynamics", Fifth Edition, John Wiley & Sons, 2000.
4. Milne Thomson, L.H., "Theoretical Aerodynamics", Macmillan, 1985