

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 4 Aeronautical Engineering

Subject Code 140102
Subject Name Aerodynamics-1

Sr.No	Course content
1.	Fundamental Principles and Equations: Models of Fluid, Continuity and Momentum and energy equations, Pressure, aerofoil nomenclature.
2.	Incompressible potential Flow: Bernoulli's theorem for incompressible flow, Measurement of air speed, Errors and Corrections, Measurements of airspeed at higher speed, Angular velocity, vorticity and strain, circulation, stream function, Velocity potential, Elementary flows: Uniform flow, source flow, doublet flow, vortex flow, Principles of superposition, combination of uniform flow with a source and sink, Half body, Rankine oval body, Non-lifting flow over circular cylinder, lifting flow over a cylinder, Complex Potential, Kutta-Joukowski theorem and generation of lift.
3.	Characteristics of Low speed aerofoil: Aerodynamics forces and moments on an aerofoil, Forces and moments coefficients, Pressure distribution, effect of incidence on pressure distribution, The lift curve, Aerofoil stalling, Profile drag, Pitching moments, Three dimensional aerofoil-finite wing, geometric characteristics of finite wing, Induced drag, spanwise flow variations, Lift and downwash.
4.	Inviscid Compressible Flow: Introduction, Compressibility, governing equations for inviscid compressible flow, Total conditions. Normal Shock Waves: Introduction, Basic normal shock equations, speed of sound, calculation of normal shock wave properties, Measurements of velocity in compressible flow. Oblique Shock Waves and Expansion Waves: Introduction, oblique shockwave relations. Supersonic flow over wedges and cones, shock interaction and reflections, shockwave for blunt bodies, Prandtl - Meyer Expansion wave, Shock Expansion theory. Problems

Reference Books:

1. Aerodynamics by L.J.Clancy, Published by Sterling Book House, Indian Edition
2. Fundamentals of Aerodynamics by John D. Anderson, Jr. McGraw Hill, Inc
3. Aerodynamics for Engineering Students by Houghton and Carpenter
4. Aerodynamics for Engineering Students by Houghton and Carrathur
5. Modern Compressible Flow by John D. Anderson , Jr. McGraw Hill Inc
6. Compressible Flow by S.M.Yahya, New Age International (P) Ltd, Publisher New Delhi