

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 4

Aeronautical Engineering

Subject Code 140101

Subject Name Aircraft Structure I

Sr.No	Course content
1.	Unit- I. Characteristics of Aircraft Structures and Materials: Introduction, Basic Structural Elements in Aircraft Structure, Wing and Fuselage constructions, Aircraft Materials.
2.	Unit - II Determinate and Indeterminate structures: Concept of statically Determinate and Indeterminate structure, Concept of kinematic Indeterminacy, Principal of super position, Maxwell's Reciprocal Theorem.
3.	Unit - III Strain Energy: Resilience strain energy in tension, compression, shear, bending, torsion, proof resilience, modulus of resilience, impact loads, sudden loads
4.	Unit - IV Slope and Deflection of Determinate beam: Differential equation of the elastic curve, relation between moment slope and deflection, double integration method, Macaulay's method, Conjugate beam method, moment area method applied to beam with varying moment of inertia. Application to curved beams, hooks.
5.	Unit - V Introduction to elasticity: Basic elasticity: stress, Notation for forces and stresses, Equations of equilibrium, Plane stress, Boundary conditions, stresses on inclined plane, Principal stresses, Mohr's circle of stress, strain, compatibility equations, plain strain, strains on inclined planes, Principal strain, Mohr's circle of strain, stress-strain relationships. 2-D problems in elasticity: 2-D problems, stress functions, inverse and semi-inverse methods, St. Venant's principle, Displacements, Bending of an end-loaded cantilever.
6.	Unit - VI Column: Slenderness ratio, Different condition for loading, Buckling of column, Euler's and Rankin formula, Eccentrically loaded column, columns with lateral loading.
7.	Unit - VII Analysis of Perfect Frame: Statically determinate plane and space trusses, Estimation of forces, wind analysis.

Reference Books:

1. Mechanics of Structure Vol. I : S. B. Junarkar
2. Theory of Elasticity : Tienmo Shenko
3. Analysis of Structure Vol. I : S. S. Bhavikatti
4. Aircraft Structures : David J Peery & J J Azar
5. Introduction to Aerospace Structural analysis : David H Allen & Walter E Haisler
6. Aircraft structures for Engg Students : THM Megson, Edward Arnold
7. Mechanics of Aircraft Structures : C. T. Sun
8. Strength of Material & theory of structure : B. C. Punmia
9. Analysis of structures : V N Vazirani & M M Ratwani