

GUJARAT TECHNOLOGICAL UNIVERSITY
AERONAUTICAL ENGINEERING
B. E. SEMESTER: VII

Subject Name: **Mechanics of Composite Materials**
Subject Code: **170103**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	0	0	4	70	-	30	50

Sr. No	Course Content	Total Hrs.
1.	Introduction to Composite Materials: Definitions: Composite material, Fiber, Matrix. Types of fibers and Raw Fiber Properties, Types of Matrix, Prepegs, Fillers and other Additives	4
2.	Advantages and applications: Advantages of Composite Materials and Structures. Applications and Use of Composite materials in present world	4
3.	Basics of composites: Mechanical Behavior of Composite Materials. Lamina, Laminate: The basic building block of a composite material	6
4.	Micromechanical Analysis of Composite Strength and Stiffness: Properties of typical composite materials. Volume and Weight Fractions. Longitudinal Strength and Stiffness. Transverse Modulus. In-plane shear Modulus. Poisson's ratio	9
5.	Elastic Properties of the Unidirectional Lamina: Stress-strain relationships. Engineering Constants. Stress strain relations of a Thin Lamina. Examples	11
6.	Analysis of Laminated Composites: Laminates, Basic Assumptions, Strain-Displacement Relationship, Stress-Strain Relationships, Equilibrium Equations, Laminate Stiffness, Determination of Lamina Stresses and Strains, Types of Laminate Configuration, Balanced Laminate, Anti-symmetric Laminate, Examples	16

7.	Failure theories: Micromechanics of Failure of Unidirectional Lamina, Anisotropic Strength and Failure Theories, Importance of Shear Strength, Choice of Failure Criteria, Examples	10

Text Books:

1. Mechanics of Composite Materials and Structures – Madhujit Mukhopadhyay

Reference Books:

1. Mechanics of Composite Materials – R M Jones