

B.E Semester: VII

Mechanical Engineering

Subject Name: Mechanics of Composite Materials

A. Course Objective

- To present a problem oriented in depth knowledge of Mechanics of Composite Materials.
- To address the underlying concepts, methods and application of composite materials technology.

B. Teaching / Examination Scheme

SUBJECT		Teaching Scheme				Total Credit	Evaluation Scheme					Total Marks
		L	T	P	Total		THEORY		IE	CIA	PR. / VIVO	
CODE	NAME	Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
ME706-B	Mechanics of Composite Materials	4	0	0	4	4	3	70	30	20	0	120

C. Detailed Syllabus

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

2 Advantages and Applications:

Advantages of Composite Materials and Structures. Applications and Use of Composite materials in present world

3. Basics of Composites:

Mechanical Behaviour of Composite Materials. Lamina, Laminate: The basic building block of a composite material

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

5. Elastic Properties of the Unidirectional Lamina:

Stress-strain relationships. Engineering Constants. Stress strain relations of a Thin Lamina. Examples

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 Multichannel Integration: Look at the Big Picture Wireless Applications Enter the Mainstream Middleware: Supporting the Integration Mandate What Is Common to All These Trends?

7. Failure Theories:

Micromechanics of Failure of Unidirectional Lamina, Anisotropic Strength and Failure Theories, Importance of Shear Strength, Choice of Failure Criteria, Examples

D. Lesson planning

<u>SR.NO</u>	<u>DATE/WEEK</u>	<u>UNIT NO</u>	<u>%WEIGHTAGE</u>	<u>TOPIC NO</u>
1	1 ST , 2 ND , 3 RD	1	20	1
2	4 TH , 5 TH , 6 TH	2, 3	20	2, 3
3	7 TH , 8 TH , 9 TH	4, 5	20	4, 5
4	10 TH , 11 TH , 12 TH	6	20	6
5	13 TH , 14 TH , 15 TH	7	20	7

E. Instructional Method & Pedagogy

1. At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2. Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weightage should be given to all topics while teaching and conduction of all examinations.
3. Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4. One/Two internal Pr. / Vivo exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
5. Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6. Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

F. Students Learning Outcomes

- The student can identify different areas of Mechanics of Composite Materials.
- Can find the applications of all the areas in industry.

G. Recommended Study Materials

1. Mechanics of Composite Materials and Structures by Madhujit Mukhopadhyay
2. Mechanics of Composite Materials by R M Jones