

Course Code	Course Title	L	T	P	C
17CE015	MECHANICS OF COMPOSITE MATERIALS	3	0	0	3

Course Objectives:

1. To study the behaviour of composite materials.
2. To investigate the failure modes of composite materials.
3. To understand the fracture mechanics of composite materials.

Course Outcomes:

At the end of the course student will be able

1. Apprehend the stress strain relationship of orthotropic and anisotropic materials.
2. Analyze laminated composites.
3. Assess the failure criterion and fracture mechanics of composites.

Activities:

1. Investigation of failure and fracture characteristics of composite materials
2. Presentation
3. Case study of different composite materials

Skills:

1. Ability to investigate the failure and fracture characteristics of composite materials.
2. Ability to use the composite materials

UNIT-I: Introduction:

Introduction to Composites, Classifying composite materials, commonly used fiber and matrix constituents, Composite Construction, Properties of Unidirectional Long Fiber Composites, and Short Fiber Composites

UNIT-II: Stress Strain Relations:

Concepts in solid mechanics, Hooke's law for orthotropic and anisotropic materials, Linear Elasticity for Anisotropic Materials, Rotations of Stresses, Strains, Residual Stresses

UNIT-III: Analysis of Laminated Composites:

Governing equations for anisotropic and orthotropic plates. Angle-ply and cross ply laminates. Static, dynamic and stability analysis for simpler cases of composite plates. Inter laminar stresses.

UNIT-IV: Failure and Fracture of Composites:

Netting Analysis, Failure Criterion, Maximum Stress, Maximum Strain, Fracture Mechanics of Composites, Sandwich Construction.

UNIT-V: New Cement Composites:

FRC-Ferro cement-Nano cement composite- SIFCON-Polymer concretes.

TEXT BOOKS:

1. Daniel and Ishai, "Engineering Mechanics of Composite Materials", Oxford University Press, 2005.

1. Jones R.M., “Mechanics of composite materials” McGraw-Hill, Kogakusha Ltd., Tokyo, 1975.

REFERENCE BOOKS:

1. Agarwal.B.D. and Broutman.L.J., “Analysis and Performance of fiber composites”, John- Wiley and Sons, 1980.
2. Michael W.Hyer, “Stress Analysis of Fiber-Reinforced Composite Materials”, McGraw Hill, 1999.
3. Mukhopadhyay.M, “Mechanics of Composite Materials and Structures”, University Press, India, 2004.