

2. MECHANICS OF COMPOSITE MATERIALS

Module I (10 hours)

Introduction: Limitations of conventional engineering materials, composites-type and their nature. Control of Properties and Performance: Choice of Matrix, Reinforcements, and other additions, Analysis of Fibre Reinforced Composites: micromechanical models, Laminates, Hybrid composites, short fibre composites.

Module II (10 hours)

Strength of Composites: Tensile strength, Statistics of fibres and fibre bundles, tensile strength of laminates and its orientation dependence, compression and shear strength of short fibre reinforced composites. Strength in out of plane loading, Constitutive relationship

Module III (8 hours)

Fracture modes, Progressive failures in composites, Failure Theories (Energy Based Interaction theory, Interactive Tensor Polynomial Theory, Failure-Mode-Based Theories), Effects of holes and notches, variability effects in matrix and fibre.

Module IV (8 hours)

Fatigue Behaviour of Composites: Fatigue damage mechanics and crack propagation, S-N curve, fatigue of metal-matrix composites, reinforced plastics, Materials factors affecting fatigue of reinforced plastics, fatigue of short fibre composites. Creep.

Text and Reference Books:

1. B.Harris, Engineering Composite Materials, Instt. of Metals, London.
2. K.K.Chawla, Composite Materials, Spring-Verlong, London
3. B.D. Agarwal and Broutman, Analysis of Fiubre-Composites, Wiley, New York.