

For Syllabus, Question Papers, Notes & many More

## **AE6603 COMPOSITE MATERIALS AND STRUCTURES**

### **DETAILED SYLLABUS**

#### **UNIT I MICROMECHANICS**

Introduction - advantages and application of composite materials – types of reinforcements and matrices - micro mechanics – mechanics of materials approach, elasticity approach- bounding techniques – fiber volume ratio – mass fraction – density of composites. effect of voids in composites.

#### **UNIT II MACROMECHANICS**

Generalized Hooke's Law - elastic constants for anisotropic, orthotropic and isotropic materials - macro mechanics – stress-strain relations with respect to natural axis, arbitrary axis – determination of in plane strengths of a lamina - experimental characterization of lamina. failure theories of a lamina. hygrothermal effects on lamina.

#### **UNIT III LAMINATED PLATE THEORY**

Governing differential equation for a laminate. stress – strain relations for a laminate. different types of laminates. in plane and flexural constants of a laminate. hygrothermal stresses and strains in a laminate. failure analysis of a laminate. impact resistance and interlaminar stresses. netting analysis

#### **UNIT IV FABRICATION PROCESS AND REPAIR METHODS**

Various open and closed mould processes, manufacture of fibers, importance of repair and different types of repair techniques in composites – autoclave and non-autoclave methods.

#### **UNIT V SANDWICH CONSTRUCTIONS**

Basic design concepts of sandwich construction - materials used for sandwich construction – failure modes of sandwich panels - bending stress and shear flow in composite beams.

#### **TEXT BOOKS**

1. Dam Ishai., "Mechanics of Composite Materials,"

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2. Autar K Kaw, 'Mechanics of Composite Materials', CRC Press, 1997.
3. Madhuji Mukhapadhyay, Mechanics of Composite Materials and Structures, University Press, 2004

**REFERENCES**

1. Agarwal, B.D., and Broutman, L.J., "Analysis and Performance of Fibre Composites," John Wiley and sons. Inc., New York, 1995.
2. Lubin, G., "Handbook on Advanced Plastics and Fibre Glass", Von Nostrand Reinhold Co., New York, 1989.
3. Calcote, L R. "The Analysis of laminated Composite Structures", Von – Nostrand Reinhold Company, New York 1998.
4. Allen Baker, "Composite Materials for Aircraft Structures", AIAA Series, II Edition, 1999.

**OBJECTIVES**

To make the student understand the analysis of composite laminates under different loading conditions and different environmental conditions.