

PLPC2006 POLYMER COMPOSITE TECHNOLOGY (3-0-0)

Course Objectives: After the course students will be able to impart the fundamentals of polymer composites and its applications, know about manufacture, properties and application of polymer and fibre, explain the basic properties, characteristics and constituents of composite materials, present and apply the different fabrication processes for composite materials and define and use appropriate terminology as it relates to composite structure design and manufacturing.

Module I: (12 hours) Composites and its constituents.

Introduction of composite material, Comparison between composites and other materials- advantages and disadvantages, classification of composites. Principles of composite reinforcement- Types of reinforcements- natural fibre, glass, carbon/graphite, aramid fibres, high strength and high modulus fibers. Types of matrix: Thermosetting and thermoplastic materials for the composites and their selection for particular applications

Module II: (12 hours) Manufacturing Techniques of Composites.

Processing and production techniques i.e., Hand-lay-up, Spray-up, Bag moldings, Filament winding and Pultrusion Prepreg- manufacturing and characterization. Sheet moulding and dough moulding compounds and their processing, Preform and Resin transfer moldings. Hybrid and sandwich type composites

Module III: (12 hours) Mechanics of Composite

Bonding & Failure criteria -micro mechanics approach of composites (Lateral and Longitudinal Tensile & Compressive loading of composites). Design of composite products: Basic design practice – material considerations, product considerations and design considerations

Books:

- [1] P.K. Mallick, 'Composites Engineering Handbook', Marcel Dekker Inc.NY., 1997.
- [2] S.T.Peters, "Handbook of Composites", Chapman & Hall, 2nd Edition 1998
- [3] F.L. Matthews and R.D. Rawlings, 'Composite materials: engineering and science', Chapman and Hall, 1994
- [4] D. Hull and T. W. Clyne, "An introduction to Composite Materials 2nd Ed", Cambridge, 1996

Course outcomes: After the completion of this course, students will be able to:

- CO1 Remember: Classify the different type of polymeric composites and its applications.
- CO2 Understanding: Ability to select the process for fabrication of polymer composites
- CO3 Applying: Select different types of matrix and reinforcement materials
- CO4 Evaluate: Aware of different testing and characterization of polymer composites.
- CO5 Creating: Design of composite products