

Composite Materials (3-0-0) Credits: 03

Module I (12 Hours)

Introduction, classification, strengthening mechanism in composites, types of reinforcement-metallic and nonmetallic fibers, whiskers and particulates;

Metal matrix and ceramic matrix composites:

Technology for production of composites - liquid metal route, powder metallurgy and mechanical working for metal matrix and ceramic matrix composites - processing routes including reaction sintering combustion synthesis, infiltration and in-situ processes;

Module II (12 Hours)

Processing of intermetallic composites, Comparison of MMCs and CMCs.

Polymer composites:

Matrices, thermoplastic and thermosetting; Reinforcements - continuous and discontinuous fibres - glass, aramid, polyester, and carbon fibres; surface characteristics; hybridisation techniques, Fillers and their uses, autoclave, hand lay-up techniques etc.,

Module III (12 Hours)

Fabrication methods of polymer matrix composites:

Filament winding; Resin injection moulding; extrusion, calendering, pultrusion, degradation of fibers.

Sandwich structures, foam core type arrangements; Honey comb structures.

Application of composites: Aerospace, marine, automobile, dental products.

Design aspects, carbon-carbon and carbon - epoxy based composites, mechanical properties.

Books for reference:

1. Matthews and Rawlings, Composite Materials: Engineering and Science, CRC Press.
2. K K Chawla, Composite Materials: Science and Engineering, Springer.
3. D.Hull and T.W. Clyne, An Introduction to composite material, Cambridge University press.
4. Taya, M. and Arsenault, R.J., Metal Matrix Composites, Thermomechanical Behaviour, Pergamon Press, Oxford.
5. Suresh, S., Martensen, A. and Needleman, A., Fundamentals of Metal Matrix Composites, Butterworth, Heinemann.