

POLYMERS AND COMPOSITES

Module-I (10hours)

Polymers as a class of engineering materials – comparison with metals and ceramics - classification of polymers, Polymerization techniques along with mechanisms, advantages & limitations and statistical approach – Molecular weight determination methods of polymers

Module-II (8 hours)

Properties, processing behavior and applications of polymers, Concepts of compounding and compounding ingredients for polymers, polymer processing – basic methods and recent developments

Module-III (10 hours)

Introduction to composites, classification of composites and emphasis on polymer based composites – bonding and failure criteria – micro mechanics approach of composites(Lateral and longitudinal tensile & compressive loading of composite)

Module-IV (8 hours)

Reinforcing materials- Natural & Synthetic, overview of different manufacturing methods i.e. Hand lay-up, spray-up, Filament winding, Pultrusion, Bag moulding, and RTM process DMC /SMC etc. Technical and economic aspects – novel applications of composite materials.

Text and Reference Books:

1. Gutowski, Advanced Composite Manufacturing, Wiley
2. R.M.Jones, Mechanics of Composite Material, McGraw Hill Pub., New York, 1975.
3. J.N.Reddy and A.V. Krishna Moorthy, Composite Structures, Testing, Analysis and Design, Narosa Publishing House, New Delhi, 1992.
4. C. Soutis& P.W.R. Beaumont, Multi-scale modelling of composite material systems: The art of predictive damage modelling, Woodhead Publishing and Maney Publishing, 2005
5. Billmeyer F, 'Textbook of Polymer Science', Wiley Interscience, 1994
6. M M Schwartz, Composite Materials Handbook, McGraw Hill Book Co., NY, 1983.
7. N. L. Hancox, ed., "Fibre Composite Hybrid Materials", Applied Science Pub.
8. M.O.W., Richardson, "Polymer Engineering Composites", Applied Sc. Pub.
9. S. W. Tsai, Composites Design, Think Composites, 1986.
10. B. D. Agrawal and L.J. Broutman, Analysis and Performance of Fiber Composite, Wiley, New York, 1980.
11. Geoff Eckold, Design and Manufacture of Composite Structures, Wood -heed, Publishing Limited, Cambridge, England, 1994.
12. Stephen W. Tsai and H. Thomas Hahn, Introduction to Composite Material Technomic Publishing Company, Inc. Lancaster, 1980.
13. J. R. Vinson and T.W. Chou, Composite Materials and their use in Structures, Applied Science Publishers Ltd., London, 1975.
14. Tsu Wei Chou, Micro structural Design of Fiber Composites, CambridgeSolidState science series