

College of Engineering, Pune
Shivajinagar, Pune

B.Tech. ILOE
Syllabus of 'Polymer Technology ILE 18601'
(ILOE offered by Applied Science dept)

Test 1: 20 marks, 1 hr duration

Test 2: 20 marks, (presentation)

ESE: 60 Marks, (3 hrs duration)

Course Outcomes

- a. Able to classify between various polymer mechanisms , polymerization techniques
- b. Identify relation between structure property and application of polymers in different fields of Engineering.
- c. Students will be familiar with composites, specialty polymers, photo luminescent polymers, high strength high thermal stability polymers
- d. Appreciating impact of development in polymers in different engineering applications.
- e. Familiarizing students with various methods of Polymer characterization.

Unit – I: Introduction

(3Hrs)

Polymer & macro molecule, monomer, functionality, copolymer, polymer blend, plastic and resin, natural polymers. Classification of polymers: based on source, structure, applications, thermal behavior, mode of polymerization..

Unit-II: Properties of polymers

(6 Hrs)

Crystalline and amorphous status, melting and glass transition temperatures and their determination, effect of polymer structure on mechanical, physical, chemical, and thermal properties. Thermodynamics of polymer dissolution.

Unit –III: : Commercially important polymers

(7 Hrs)

Synthesis, properties and application of some important polymers; i) Polyethylene (HDPE&LDPE), ii) Teflon iii) Photo luminescent polymers viii) Silicones ix) conducting x)Kevlar (aramid) x) thermocole xi) Inorganic polymers xii) polymer composites

Unit-IV: Mechanisms of Polymerization and polymerisation techniques

(9 Hrs)

Condensation, and Addition polymerization; a) free radical addition polymerization, Mass or Bulk polymerization process, solution, suspension polymerization process and emulsion polymerization method comparison of merits and demerits of these methods. brief description of : i) Compression and transfer moulding ii) Injection moulding iii) Extrusion iv) Blow moulding v) Calendaring vi) Laminating and pultrusion

Unit-V: Polymer additives

(7 Hrs)

Role of the following additives in the polymers: i) Fillers and reinforcing fillers ii) Plasticizers iii) Lubricants iv) Antioxidants and UV stabilizers v) Blowing agents vi)Coupling agents vii)Flame retardents viii) Inhibitors Compounding of polymer resins,

Unit VI :

Polymer Degradation techniques, Bio compatibility, Polymer Waste Management

Polymer Characterization techniques: Thermoanalytical (TG, DSC, TMA, DMA, DTA)methods, Spectroscopic methods (UV, IR, Raman, NMR), Molecular wt measurements- Mn-, Mw-, Viscosity avg MWt.,

(7 Hrs)

Textbook & Reference:

Text book of polymer science by Billmeyer, F.W. Jr., Wiley&sons
Polymer Science by Gowarikar