Subject Code : N4B11A

POLYMER CHEMISTRY

UNIT – I

1. Basic concepts of Polymer Science- Molecular forces and chemical bonding in polymers – Classification of polymers – Chain polymerization – Step polymerization – polymerization techniques.

2. Molecular weight and size - Average molecular weight – Number – average and weight – average molecular weights – Sedimentation and Viscosity – average molecular weights – Degree of polymerization – size of polymer molecular. (18 hours).

UNIT – II

3. Kinetics of Polymerization – Free radical chain polymerization- Cationic polymerization – Anionic polymerization – Poly condensation.

4. Glass transition temperature: Glassy solids and Glass transition – associated properties – Factors influencing glass transition temperature – molecular weight – Plasticisers – melting point – importance of glass transition temperature. (18 hours)

UNIT - III

5. Crystalline Nature : Crystalline soils and their behaviour towards X-rays – Polymers and X-ray diffraction – Degree of crystallinity – crystallites – factors affecting crystallinity, Helix structures.

6. Copolyemerization : Free radical copolymerization – Ionic copolymerization – Copolycondensation – Individual monomers: Polyethylene, polypropylene, polystyrene, poly acrylonitrile, polymethyl methacrylate, polyesters, polycarbonates, polyamides, polyrethanes, polyvinyl acetate, polyvinyl chloride, poly isoprenes, silicone polymers.(18 hours).

UNIT – IV

7. Polymer degradation – Types of degradation, thermal and mechanical – photo degradation – oxidative and hydrolytic degradation.

8. Polymer reactions – Hydrolysis, acidolysis,aminolysis, hydrogenation, addition and substitution reactions – cyclisation, cross-linking reactions – Graft and Block copolymers.(18 hours).

UNIT - V

9. Experimental methods – Polymer synthesis, isolation and purification of polymers – Fractional - Molecular weight determination – Molecular weight distribution curve – determination of glass transition temperature.

10. Elastometric materials – Fibre forming materials – Plastic material Rheology of polymeric materials – compounding and processing techniques. (18 hours).

REFERENCES:

1. 'Polymer Science', V.R.Gowariker et.al., Wiley Eastern,1986.
2. 'Organic Polymer Chemistry', K.J.Saunders, Chapman and Hall, 1976.
3. 'Polymer Chemistry – An Introduction', Raymond B.Seymour, Marcel Dekker Inc., New York and Based, 1981.
4. 'Text Book of Polymer Science', Fred W.Billmeyer, Jr.John-Wiley and Sons, 3rd Edn., 1984.
5. 'Fundamentals of Polymer Science and Engineering', Kumar Gupta, Tata Mc Graw Hill, 1981.
6. "Polymer Characterization of Processing Technolgy', Stepak, Academic Press, London.
7. 'Inorganic Polymers', Stone, Academic Press, New York.
8. Polymer Chemistry, B.K.Sharma, Krishna Prakashan Mandir, Meerut.