PPE4I102 PLASTIC MATERIALS AND APPLICATIONS

Module-I

History-basicchemistryofpolymers-nomenclatureofpolymerssourcesforrawmaterials-methodsofmanufacturing- general properties-processing behavior and applications - of the following:

Natural Polymers : Shellac resin and naturalrubber.

Thermoplastics & its Applications

Commodity plastics & its applications

1. Polyolefin - Polyethylene, LDPE, HDPE,LLDPE, HMHDPE, Polypropylene Homo-polymers- Copolymers.
2. Polytyrene& Styrene copolymers- Polystyrene, HIPS, ABS,Styrene
3. Vinyl plastics - Polyvinyl chloride, Polyvinyl Acetate, Polyvinylidene chloride, Polyvinylalcohol & others.
4. Cellulosics-Cellulose nitrate, cellulose acetate, cellulose acetate butyrate, Ethyl cellulose & others.

Module-II

EngineeringPlastics & its Applications

UHMHDPE -EPDM – EVA - Polyamides - Nylons 6, 66, 6 10, 11, 12 etc. Acrylicplastics - Polymethyl Methacrylate, Polyacrylonitrile - Polyesters - Polyethylen terephthalate, polybutylene terephthalate - Polycarbonate - Polyacetals

High Performance Plastics

Aromatic ether - Polypheneylene oxide, Aromatic thioether - Polyphenylene sulphide,Polysulfone, Polyimides – Polyimidazoles, Polyurethane, luoropolymers - Polyvinyl fluoride, Polyvinylidene fluoride, Polytetrafluoroethylene, Polychlorotrifluoroethylene.

Thermosetmaterials &its Applications

Phenolformaldehyde-Ureaformaldehyde-Melamineformaldehyde–
Unsaturatedpolyesters,Alkydresins- Epoxides- Polyurethane -Silicones

End use applications -case studies onapplications (6 hours)

Module-III

Polymer blends and Alloys

Definition, advantages of polymers, blends and alloys,roleof composition, properties and applications of parameters for compability, PVC – Nitrilerubber, ABS-PVC and PP-EPDM

Preleminaryconceptsofnewmaterialssuchaselectricallyactivepolymers,
Optoelectronicplastics,Bio-polymers,
membraneplasticsinbiomedicalapplications.PolymerConcretes&Advancedceramics.

ReinforcedPlastics– principlesofcomposite reinforcement,effectofreinforcementonstrengthofplastics,Roleandnatureofbindersand coupling agents, properties and applications of fibres in reinforcement (glass and carbon), Properties and applications ofFRP's (Thermoset & Thermoplastics: un-saturated polyesters, epoxies, PU, nylon)

TextBooks:

1. *Plastic Materials Ed 7 - By Brydson, J.A*
2. *Hand Book ofPlastics Materials & Technology - By Rubin, Irwin, J*
3. *Plastics MaterialsHandBook - By Athalye, A.S*

Reference Books

1. *Plastics Engineering Hand Book Ed. 5 & Society of the Plastic Industry Inc - By SPI.*
2. *Plastics Materials and Processing - By Schwartz & Goodman*
3. *Plastics Materials (Properties & Application) - By Birley& Scott*
4. *Modern Plastics Hand Book - By Harper*
5. *Bikales; Norbert M. and Segal; Leon (Eds.), Cellulose and Cellulose Derivatives, Part IV (Volume V), Wiley- Interscience, New York (1971).*
6. *Birley; Arthur W. and Scott; Martyn J., Plastics Materials: Properties and Applications, Leonard Hill, Blackie and Sons Ltd., (1982)*
7. *Biron; Michel, Thermoplastics and Thermoplastic Composites: Technical Information for Plastics Users, Elsevier, Amsterdam (2007)*
8. *Davidson; Theodore, Polymers in Electronics, ACS Symposium Series 242, American Chemical Society, Washington D. C. (1984).*
9. *DuBois; P., Plastics in Agriculture, Applied Science Publishers Ltd., London (1978)*

PLASTIC MATERIALS AND APPLICATIONS LAB

1. *Chemical Lab : Identification of Plastics – Viscosity and Molecular Weight Determination – Determination of K.Value for PVC*
2. *Demonstration : Melting point – Carbon black content – Filler content – Environmental stress cracking resistance – PH meter – Hopper viscometer – Brookfield Viscometer.*
3. *Demonstration : Folding endurance tester – Burst strength tester*
4. *Density gradient column – Creep tester – Moisture vapour transmission rate – gas permeability – Sieve analysis.*