OC S 564: SYNTHETIC POLYMERS, DYES AND PESTICIDES

Course Outcome

Enable the students

- To acquire detailed knowledge in classification and nomenclature of polymers, methods of polymerization, mechanism and stereochemistry, properties, structure, synthesis and applications of synthetic polymers, polyesters, polyamides, phenol-formaldehyde, urea-formaldehyde and epoxy resins, polyurethanes, polycarbonates, synthetic rubber, manufacture and structural features of natural rubber and regenerated cellulose.
- To understand the modern theories of colour and constitution, classification of dyes, methods of applying dyes to the fabrics, Synthesis and applications of various types of azo dyes, triphenyl methane dyes, cyanin dyes, reactive dyes, optical brighteners and pigments.
- To gain knowledge about classification, mode of action and synthesis ofseveral organophosphorous and organochlorine insecticides, natural pyrethroid insecticides, isolation and structure of natural pyrethrins, synthetic pyrethroids.
- To study the Synthesis and uses of insect pheromones in pest control, fungicides and herbicides, fumigants and repellants, mechanism of action and toxicities of insecticides, fungicides and herbicides.

UNIT-I **[12 Hours]**

Synthetic polymers: Methods of polymerization, Mechanism and Stereochemistry, Addition polymerization (Anionic, Cationic and Free radical process), Condensation and Stepwise polymerization, Coordination polymerization, Use of Ziegler-Natta catalyst in polymerisation. Ring opening polymerization. Mechanism of co-polymerization. Properties, Structure and applications of Polythene, Polypropylene, PVC, Polystyrene & Acrylic polymers, Teflon, polyesters, polyamides, Phenol-Formaldehyde resins, Epoxy resins, Polyurethanes, Polycarbonates. Structural features and manufacture of natural rubber, Regenerated cellulose.

UNIT-II **[12 Hours]**

Dyes: Introduction, modern theories of colour and chemical constitution. Classification of dyes, methods of applying dyes to the fabrics. A general study of Azo dyes- Orange–II, rosanthrene O, Naphthol blue black 6B, Mordant brown, Congo red, Methyl orange, Chrysoidin G, Bismark brown. Triphenylmethane dyes - Malachite green, Rosaniline, Crystal violet; Phenolphthalein; Cyanin dyes- Ethyl Red and Cyanin blue. Reactive dyes, Optical brighteners - Tinapal and Blankophor. Pigments: Lake red and Orange R.

UNIT-III **[12 Hours]**

Insecticides: Introduction, classification and Historical importance. Mode of action and synthesis of organochlorines (Diazenon, DDT, Heptachlor, Chlordane), organophosphates (Monocrotophos, parathion, chlorpyrifos) and carbamates (Carbaryl, Carbofuran, Aldicarb). Naturally occurring insecticides-pyrethroids-natural pyrethrins-isolation and structures, synthetic pyrethroids.

Insect Pheromones: Introduction, Classification and use in insect pest control. Synthesis of disparlure, grandisol, Periplanone-A & B and bomykol.

Fungicides: Introduction, Systemic fungicides-types & examples.

Herbicides: Introduction, study of sulfonyl ureas and heterocyclic sulphonamides. Fumigants and repellants. Mechanism of action and toxicities of insecticides, fungicides and herbicides.

References:

1. Polymer Science, V. R. Gowariker, N. V. Vishwanathan & T. Shridhar, Wiley Eastern,(2008).
2. Textbook of Polymer Science, F. W. Billmeyer, Wiley, (1984).
3. A Textbook of Dyes, O. D. Tyagi & M. Yadav, Anmol Publications,(2002).
4. Textbook of Dyes, A. Arora, Sonali Publications, (2009).
5. Synthetic Dyes, Vol. I, Venkataraman, (1999).
6. Synthesis and Chemistry of Agrochemicals, Vol I & II, ACS, Wahington.
7. Chemicals for Crop Protection and Pest Managements, M. B. Green, G.S. Hartley and West, Pergamon.
8. Chemistry of Insecticides and Fungicides, S. Ramulu, Oxford & IBH, (1985).