

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 and Phenolphthalein;

Cyanin dyes- Ethyl Red, Cyanin blue and Quinaldine, Reactive dyes and Optical brighteners-

Tinopal and Blankophor.

Pigments: Fast violet, Lake red and Orange R.

UNIT - III :**[12 Hours]**

Insecticides: Introduction, classification, mode of action and synthesis of Methoxychlor, chlordane, heptachlor, Hexachlorocyclohexane, Parathion, Diazenon, Sevin and Beygon. Naturally occurring insecticides-pyrethroids-natural pyrethrins-isolation and structures, synthetic pyrethroids.

Insect Pheromones: Introduction, use in insect pest control. Synthesis of disparlure, grandisol and bombykol.

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, 3rd Edition, [Fred W. Billmeyer](#) (Wiley) 1984.
3. A Textbook of Synthetic 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, Washington
7. Chemicals for Crop Protection and Pest Managements, M B Green, G.S. Hartley West, Pergamon.
8. Chemistry of Insecticides and Fungicides, Sree Ramulu, Oxford & IBH, 1985.

AC S 555: APPLIED ELECTROCHEMISTRY**COURSE OUTCOME:**

- The course covers important practical applications of electrochemistry. Batteries, fuel cells, sensors and electroplating techniques are dealt with.
- The use of electrochemical techniques in environmental related issues are discussed
- chemical processes such as costing and design of electrochemical processes,
- They can learn important organic and inorganic reactions which can be carried out in industries and modern technological developments in electrochemical industrial processes.

UNIT-I :**[12 Hours]**

Electrochemical Energy System: Electricity storage-Importance, storage density, Fundamentals and classification of batteries, Primary battery (Laclanche-dry cell and Alkaline cell). Secondary battery (acid and alkaline). Reserve batteries. Lithium batteries - (primary and secondary and lithium based conducting polymer battery). Fuel cells – introduction, classification, H₂-O₂ and bio-cells.

5hrs

Bio-electrochemistry- Introduction, Membrane potential - theoretical and modern approach. Electrical conduction in biological organism, Electrochemical communication in biological organisms. **3hrs**

Sensors: Biosensors: Introduction electrochemical bio-sensors- characteristics, use as a transducer, types. **Ion-Sensors**: Ion-selective electrode: Introduction, Types. Analytical and biological applications of sensors. **4hrs**

UNIT-II :

[12 Hours]

Metallurgical Processing: Electroplating-fundamentals, mechanism of electrodeposition of metals, application of electroplating. Brief account of Electroless plating, Conversion coatings, Electrophoretic painting.

Metals and materials processing-theory and applications of Electroforming and Electrochemical etching. Production of metals by electro winning and electrorefining.

Electrochemistry of Environment: Introduction, Global warming. Electrochemistry in - transport system, fixing of CO₂, sewage disposal, treatment of waste, Metal ion removal and metal recovery. Treatment of liquors containing dissolved chromium.

UNIT-III:

[12 Hours]

Electrochemical Engineering: General considerations, costing and technology of electrolytic process, electrolysis parameters, principles of cell design, laboratory data and scale-up, performance and figures of merit. **4hrs** **Industrial Electrochemistry**: Fundamentals, electro- organic synthesis (Kolbe synthesis, oxidation and reduction of hydrocarbons, reduction of nitro-compounds); Electro inorganic synthesis of fluorine and ozone. Synthesis of metal salts via anodic dissolution **4hrs**.

Industrial Application- A Case study:- The chlor-alkali industry: Introduction, General concepts of brine electrolysis, modern technological developments (electrode materials, membrane), chlorine cell technologies (diaphragm cells, membrane cell). **4hr**

References:

1. Modern Electrochemistry, 2nd Ed. Vol.1,2A &2B, Bockris & Reddy (Plenum, NY) 1998
2. Chemical & Electrochemical Energy Systems, R. Narayan & B. Viswanathan (University Press), 1998.
3. Industrial Electrochemistry, D. Peltcher & F. C. Walsh (Chapman & Hall) 1990.
4. Biosensors-theory and Applications, Donald G. Burek, (Technomic), 1993.
5. Principles and Applications of Electrochemistry-Crow (Chapman hall, New York) 2014
6. Fundamentals of Electrochemistry, Fulkner and A. J. Bard, Wiley India, 2006.

AC S 556: REACTION KINETICS & NUCLEAR CHEMISTRY

COURSE OUTCOME:

- The course content consists of two topics, reaction kinetics and radiation chemistry. The first part covers principles of various modern techniques useful for study of reaction rates.
- It covers the applications of kinetics in understanding mechanism of some important organic and inorganic reactions.
- It includes the theoretical aspects of evaluation of energy of activation of reactions. In the second part, the nuclear reactions, radiation measurements,
- They also learn design and functioning of nuclear reactors are taught.