MANGALORE UNIVERSITY

Department of Chemistry

MSc CHEMISTRY

CH E 456: ENVIRONMENTAL, ELECTRO AND POLYMER CHEMISTRY

COURSE OUTCOME:

- It is an elective course offered to students from disciplines other than chemistry.
- It aims at enhancing their general understanding of chemistry. Few important topics such as sources and detection of air pollution, batteries as power sources, devices of solar energy conversion,
- Polymers used in day to day life and for medical and technical applications will be taught.
- Awareness of plastic pollution and technique of plastic waste management

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

Environmental segments, evolution of earth's atmosphere. Air pollution: Air pollutants, prevention and control, Green house gases and acid rain. Carbon monoxide, industrial sources and transportation sources. SO_x- sources, ambient concentration, test methods, control techniques - scrubbing, limestone injection process. Ozone hole and CFC's. Photochemical smog and PAN. NO_x - Sources, ambient concentration, test methods, thermodynamics and NO_x, control techniques. Particulates: Size distribution, particulate collection - settling chambers, centrifugal separators, wet scrubbers, electrostatic precipitators & fabric filters. Catalytic converters for mobile sources. Bhopal gas tragedy.

UNIT-II **[12 hrs]**

Corrosion-Introduction, consequence, types, prevention and measurement. Conventional sources of energy, limitations, Importance of storage, Battery-Electrodes, Cell, battery Brief account of primary, secondary, lithium battery and fuel cells. Semiconductor electrodes and Solar energy system. Introduction to bioelectrochemistry, electrochemical communication in biological organisms. Theory and applications of Electroplating and electroless plating.

Reaction Kinetics-Theory and applications of different types of reactions- Oscillatory, chain reaction, branched chain reaction. Energy of activation and thermodynamic parameters, Collision theory of reaction rates limitations and basics of transition state theory.

UNIT- III **[12 hrs]**

Polymers: Introduction- Basic concepts and classification of polymers, Molecular weight and its distribution, Chemistry of polymerization- Step, chain, Coordination, Copolymerization. Polymerization techniques- bulk, solution, suspension, emulsion, poly-condensation, solid and gas phase polymerization. Chemical and geometrical structure of polymer molecules, Structure property relationship- Physical, Thermal and mechanical properties - 6hrs

Synthesis, properties, structural features and applications of some important commercial polymers (PE, PP, PS, PVC, PMMA, PET, Nylon-6, Nylon-6,6), Engineering polymers (Kevlar, Nomex, ABS, PC, Teflon). Applications of polymers in separations: reverse osmosis, ultra and nano-filtration. Applications in electronics- conducting polymers and electronic shielding, Applications of polymers in medicine. Management of plastics in environment-recycling, incineration and biodegradation.

-6hrs

References:

1. A.K. De : Environmental Chemistry, (Wiley Eastern).
2. S.K.Banerji : Environmental Chemistry, (Prentice Hall India), 1993.
3. Sawyer and McCarty, Chemistry for Environmental Engineering (McGraw Hill) 1978.
4. An Introduction to metallic corrosion and its prevention-Raj Narayan (Oxford-IBH, New Delhi), 1983.
5. Chemical& Electrochemical Energy Systems, R. Narayan & B. Viswanathan (University Press), 1998.
6. Industrial Electrochemistry, D. Peltcher & F. C. Walsh (Chapman & Hall)1990S.D. Faust and O.M. Aly : Chemistry of Water Treatment, (Butterworths),1983
7. F.W. Billmeyer, Text book of Polymer science, 3rd Ednn, A Wiley- Interscience Publication, New York, 2005
8. V.R. Gowariker, Polymer Science, New Age International (P) Ltd., New Delhi, 2012
9. R.W. Dyson, Specialty Polymers, Chapman and Hall, New York, 1987
10. J.R. Fried, Polymer Science and Technology, Prentice Hall of India Pvt. Ltd., New Delhi, 1999
11. P. Ghosh, Polymer Science and Technology, Tata - McGraw Hill, New Delhi, 1995