V - SEMESTER

Course 15 B : Industrial Chemistry- Polymers and water analysis

Credits: 03

I. Learning Outcomes:

Students after successful completion of the course will be able to:

1) Understand the basic concepts of polymers
2) Acquire a critical knowledge on the preparation and applications of organic polymers.
3) Explain the sources of air pollution.
4) Demonstrate the analysis of water quality parameters.
5) Identify the importance of industrial waste management.

II. Syllabus:

Unit-1: Organic Polymers-1 9 hours

Basic definitions, degree of polymerization, classification of polymers-Natural and Synthetic polymers, Organic and Inorganic polymers, Thermo plastic and Thermosetting polymers, Plastics, Elastomers, Fibers and Resins, Linear, Branched and Cross-Linked polymers.

Unit-2: Organic Polymers-2 9 hours

Addition polymers and Condensation polymers, mechanism of polymerization- Free radical, ionic and Zeigler-Natta polymerization. Industrial manufacturing and applications of following polymers, Polystyrene, Poly acrylo nitrile, Poly methacrylate, Polymethyl- methacrylate.

Unit-3: Air Pollution 9 hours

Sources of air pollution, acid rain, photochemical smog, Greenhouse effect, Formation and depletion of ozone, sources and effects of various gaseous pollutants: NO_x, SO_x, SPM, CO, hydrocarbons, controlling methods of air pollution.

Unit-4 Analysis of water 9hours

Determination of total hardness of water, Dissolved oxygen, BOD, COD, total dissolved solids, turbidity, alkalinity, determination of chloride using Mohr's method.

Unit-5 : Industrial Waste Management 9 hours

Waste water treatment - primary, secondary & tertiary treatment. (All treatment methods in detail). Characteristics of solid wastes, methods of solid waste treatment and disposal, microbiology involved in solid waste disposal, methods of solid waste disposal-composting, sanitary and filling - economic, aesthetic and environmental problems.

III. Suggested Co- Curricular Activities

1) Training of students by related industrial experts.
2) Assignments, Seminars, discussions and Quiz(on related topics).
3) Visits to laboratories, firms, research organizations etc.
4) Invited lectures and presentations on related topics by field / industrial experts.

IV. List of Reference books :

1) E.Stocchi: Industrial Chemistry,Vol-I,Ellis Horwood Ltd. UK
2) J.A.Kent : Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
3) P.C.Jain, M.Jain : Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
4) R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
5) B.K.Sharma : Engineering Chemistry, Goel Publishing House, Meerut
6) O.P.Vermani, A.K.Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi.
7) A.K.De, Environmental Chemistry : NewAgeInternational Pvt, Ltd, NewDelhi.
8) C.k.Varshney:Water Pollution and Management,Wiley Eastern Limited, Chennai.
9) S.S. Dara and D.D. Mishra: Text book of Environmental Chemistry and Pollution Control, Revised edition, S.C.Hand & CoLtd.

V -SEMESTER

Course – 15- B Industrial Chemistry- Polymers and water analysis

Credits: 01

V. Learning Outcomes:

On successful completion of this practical course, student shall be able to:

1) Learn the procedures for the determination of BOD and COD.
2) Demonstrate skills in the determination of chloride in the given water sample.
3) Acquire skills in determining the hardness of water.
4) Analyse the soil samples
5) Handle pHmeter.

VI. Laboratory course Syllabus:

1) Determination of Hardness of water by EDTA titration.
2) Determination of Chemical Oxygen Demand(COD)
3) Determination of Biological Oxygen Demand(BOD)
4) Determination of chloride using Mohr's method.
5) Determination of pH, turbidity and total solids in water sample.
6) Determination of Ca^{+2} and Mg^{+2} in soil sample by flame photometry.
7) Determination of pHin soil samples using pHmetry.

VII. Suggested Co-curricular activities

Mandatory:*(Student training by teacher in field related skills:inlab:15,in field:05hours):*

1) For Teacher: Training of students by the teacher in laboratory and field for not lessthan15hours on the field related skills in the determination of hardness of water, estimation of COD and BOD in water sample, determination of chloride ion in water sample.

2) For Student: Student shall visit a related industry /chemistry laboratory in universities/research organizations /private sector facility and observe the measurement of water quality parameters. Write their observations and submit a hand written field work / project work report not exceeding10pages in the given format to the teacher.

3) Max marks for Fieldwork/project work Report:05.

4) Suggested Format for Fieldwork/project work: *Title page, student details, index page, details of place visited, observations ,findings, and acknowledgements.*

5) Unit tests(IE).

VIII. List of Reference books :

1) Text book of Vogel's Quantitative Chemical Analysis, Sixth edition, Pearson.

2) Text book on Experiments and Calculations in Engineering Chemistry, S.S.Dara, S.Chand.

Note-1: For SEMESTER –VII &VIII, for the domain subject Chemistry, Three Core courses and Two Skill Enhanced Courses shall be chosen course A or B from the list of Courses in each SEMESTER. Three pairs of Core Courses are 16A&16B, 17A&17B, 18A&18B for Sem- VII and 21A &21 B, 22 A& 22 B and 23 A& 23 B in Sem-VIII.

Two Pairs of Skill Enhanced Courses are 19A&19B, 20A&20 B for Sem-VII and 24A & 24 B, 25A&25 B from Sem- VIII

One Online Course chosen from Swayam/NPTEL/Any other courses recognized by universities per SEMESTER -VII and VIII.

Note-2: *One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the skills embedded in syllabus citing related real field situations.*