

V - SEMESTER

- Course 14 B:Industrial Chemistry- Fertilisers and Surface coatings

Credits: 03

I. Learning Outcomes:

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

- 1) Identify the importance of different surface coatings.
- 2) Acquire a critical knowledge on manufacture of ceramics and cement.
- 3) Understand various steps in the manufacture of cane sugar.
- 4) Explain the manufacture of pulp and paper.

II. Syllabus:

Unit-1: Fertilizers 9 hours

A brief introduction to industrial chemistry. Different types of fertilizers. Manufacture of the following fertilizers :Urea, Ammonium nitrate, Calcium ammonium nitrate, Ammonium phosphates; Polyphosphate, Superphosphate, Compound and mixed fertilizers.

Unit-2: Silicates 9 hours

Ceramics: Important clays and Feldspar. Ceramics - types, uses and manufacture. High technology ceramics and their applications.

Cements: Classification of cement, ingredients and their role, Manufacture of cement and the setting process, quick setting cements.

Unit-3 : Surface Coatings 9 hours

Objectives of coatings surfaces, preliminary treatment of surface, classification of surface coatings. Paints and pigments - formulation, composition and related properties. Oil paint

,modified oils, Pigments, toners and lake pigments, fillers, thinners, enamels, emulsifying agents. Special paints (Heat retardant, Fire retardant, Eco-friendly paint, Plastic paint), Water and Oil paints.

Unit-4: Sugar Chemistry 9hours

Introduction – Manufacture and recovery of cane sugar from molasses, manufacture of sucrose from beet root, testing and estimation of sucrose.

Unit-5: Paper Industry 9 hours

Pulp and Paper-Introduction, Manufacture of pulp, sulphate or Kraft pulp, soda pulp, sulphite pulp, rag pulp, beating, refining, filling, sizing and colouring of pulp, manufacture of paper.

III. Suggested Co – Curricular Activities:

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

IV. List of Reference books:

- 1) J.A.Kent : Riegel's Hand book of Industrial Chemistry, CBS Publishers, New Delhi.
- 2) P.C.Jain, M.Jain : Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
- 3) R. Gopalan, D. Venkappayya, S. Nagarajan: Engineering Chemistry, Vikas Publications, New Delhi.
- 4) B.K.Sharma: Engineering Chemistry,Goel Publishing House,Meerut
- 5) O. P. Vermani, A. K. Narula: Industrial Chemistry, Galgotia Publications Pvt. Ltd., New Delhi.

V - SEMESTER

Course - 14-B Industrial Chemistry- Fertilizers and Surface coatings

Credits: 01

V. Learning Outcomes:

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

- 1) Determine free acidity in ammonium sulphate fertilizer.
- 2) Learn the procedure for the Estimation of Calcium in Calcium ammonium nitrate fertilizer.
- 3) Demonstrate skills on Estimation of phosphoric acid in superphosphate fertilizer.
- 4) Acquire skills in using colorimeter for the estimation of sucrose.

VI. Laboratory course Syllabus:

- 1) Determination of free acidity in ammonium sulphate fertilizer.
- 2) Estimation of Calcium in Calcium ammonium nitrate fertilizer.
- 3) Estimation of phosphoric acid in superphosphate fertilizer.
- 4) Estimation of sucrose by colorimetry.

VII. Suggested Co-Curricular Activities:

Mandatory: *(Lab / field training of students by teacher : (lab:10+field:05):*

- 1) For Teacher: Training of students by the teacher in laboratory and field for not less than 15 hours on field related skills in determination of free acidity, estimation of calcium and phosphoric acid in a fertilizer, use of colorimeter to estimate sucrose.

- 2) For Student :Student shall visit a related industry /chemistry laboratory in universities/research organizations/private sector facility and observe the surface coatings of surfaces used to prevent the corrosion. Write their observations and submit a hand written fieldwork/project work report not exceeding 10 pages in the given format to the teacher.
- 3) Max marks for Field work/ 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.
- 3) R.Gopalan, D.Venkappayya, S.Nagarajan: Engineering Chemistry, Vikas Publications.
- 4) B.K.Sharma: Engineering Chemistry, Goel Publishing House, Meerut