

## **CH-225 Industrial Chemistry**

**Credit Hours:** 2-1

**Pre-requisite:** Nil

### **Course Outcomes**

1. Students will acquire knowledge about the fundamentals of chemical industry, unit operations commonly used in industries, unit processes, flow sheet diagrams, commercial production of various chemicals, applications and Industrial waste management.

### **Detailed Contents**

2. Fundamentals of Chemical Industry. Basic principles and parameters for industrial plant location; Elementary treatment of general unit operations commonly used in industries such as size reduction; evaporation, filtration, distillation, crystallization and drying; Chemical unit processes like carbonation, sulfitation, defecation, nitration, etc. in chemical process industries.
3. Basic and Heavy Chemical Industries. Raw materials and chemicals; Flow sheet diagrams and commercial production of sulfuric acid, nitric acid, hydrochloric acid, caustic soda and washing soda; Applications of these chemicals in chemical industries. Industrial wastes and management.
4. Cement Industry: Introduction of the cement manufacturing process, including raw material selection, crushing, mixing, and kiln operations. Key unit processes such as calcination, clinker formation, and grinding, along with considerations for plant location and environmental impacts.
5. Fertilizer Industry: Introduction to the production of major fertilizers like urea, ammonium nitrate, and superphosphates. Key chemical processes including ammonia synthesis (Haber-Bosch process), neutralization, and granulation, with focus on raw material handling, reaction conditions, and plant operation parameters.

### **Course Outcomes**

1. At the end of the course, students will be able to understand the concept of fundamentals of chemical industry, unit operations, unit

processes, flow sheet diagrams, commercial production of various chemicals, applications and Industrial waste management.

**Relevant Experiments:**

1. Determination of temporary and permanent hardness of a given water sample by EDTA method; Estimation of total solids in water; Extraction and characterization of essential oils from fragrant plants; Preparation of detergents, cosmetics and vanishing creams; Determination of the lignin content in wastewater by the Kappa number test.

**Recommended Books**

1. G.T. Austin, Shreve's Chemical Process Industries, 5<sup>th</sup> Ed., McGraw Hill Book Company Inc. New York, 1984.
2. E.R. Riegel, Industrial Chemistry, 5<sup>th</sup> Ed., Reinhold Publishing Corporation New York, 1997.
3. J.C. Kuriacase and J. Rajaran, Chemistry in Engineering and Technology, 2<sup>nd</sup> Ed., 1984.
4. Chuis A. Clauses III Guy Matison, Principles of Industrial Chemistry, 1978.
5. P.C. Jain, A Textbook of Applied Chemistry, 1993.
6. B.N. Chakrabarty, Industrial Chemistry, 1991.
7. H.L. White, Introduction to Industrial Chemistry, 1992.