

## UCH507: CHEMICAL PROCESS INDUSTRIES

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### Course Objective:

To study process technologies of various organic and inorganic process industries.

**Introduction:** Production trends, Material and energy balances, Symbols and flow sheets, Waste generation and recycling, Engineering problems, Materials of construction, Environmental and energy conservation measures.

**Pulp and Paper:** Cellulose derivatives: Pulp, paper and boards, Types of raw material for pulping, Various pulping methods, Recovery of chemicals from black liquor, Manufacture of paper, Quality improvement of paper.

**Sugar and Starch:** Raw and refined sugar, Byproducts of sugar industries, Starch and starch derivatives.

**Oils and Fats:** Types of oil, Different fatty acids, Extraction of oil from seeds, Oil purification, Hydrogenation of oil.

**Soaps and Detergents:** Types of soaps, Soap manufacture, recovery and purification.

**Chlor-alkali Industries:** Brine electrolysis, Manufacture of caustic soda and chlorine in mercury cells, Diaphragm cells, Membrane cells, Hydrochloric acid.

**Nitrogen Industries:** Ammonia, Nitric acid, Ammonium sulphate, Ammonium nitrate, Urea, Calcium ammonium nitrate.

**Phosphorus Industries:** Phosphorus, Phosphoric acid, Phosphatic fertilizers.

**Mixed Fertilizers:** SSP, TSP, NPK, KAP, DAP, Nitrophosphate, Bio fertilizers.

**Sulphur Industries:** Sulphur dioxide, Sulphuric acid, Oleum.

**Ceramic Industries:** Portland cement, Lime, Gypsum.

### Course Learning Outcomes (CLO)

Upon completion of this course, the students will be able to:

1. understand the processes involved in manufacturing of various inorganic and organic chemicals.
2. prepare the process flow diagrams.
3. analyze important process parameters and engineering problems during production.

**Text Books:**

1. Dryden, C.E., *Outlines of Chemical Technology* (Edited and Revised by M. Gopal Rao and Sittig. M), East West Press Pvt. Ltd, New Delhi (1997).
2. Austin, G.T., *Shreve's Chemical Process Industries*, McGraw Hill (1984).

**Reference Books:**

1. Faith, W.L., Keyes, D.B. and Clark, R.L., *Industrial Chemicals*, Wiley (1980).
2. Kirk and Othmer, *Encyclopaedia of Chemical Technology*, Wiley (2004).
3. Groggins, P.H., *Unit Processes in Organic Synthesis*, Tata McGraw-Hill (2003).

**Evaluation Scheme:**

S. No.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	50
3	Sessional (May includes seminar/ assignments/ quiz's etc)	20