

## UCH403 CHEMICAL TECHNOLOGY-II

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3	0	0	3.0

Study of the following chemical industries/processes involving process details, production trends, material and energy balances, flow sheets, engineering problems pertaining to materials of construction, regeneration/recycling, environmental and energy conservation measures.

**Petroleum and Petrochemical Industries:** Origin and composition of petroleum, classification of petroleum, Manufacture of petroleum products and their uses and properties. Petroleum refining, physical and chemical conversion products, lubricating oils, petrochemical precursors, methane, olefines, acetylenes and aromatics.

**Coal and Coal Chemicals:** Types of coal, destructive distillation of coal, distillation of coal tar, chemicals from coal.

**Pulp and Paper Industries:** 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 Industries:** 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. Types of detergents, their cleansing action.

**Surface Coating Industries:** Paints, Pigments, Varnishes, Industrial coatings.

**Food Industries:** Food processing, Food additives and preservatives, food processing equipments.

**Fermentation and Enzyme Industries:** Production of industrial alcohol, acetic acid, citric acid and lactic acid. Introduction to enzymes and their applications.

**Polymers:** Monomers, Thermoplastic and Thermosetting materials (such as polyethylene, polypropylene, polyvinyl chloride, polystyrene) and PF resins; Epoxy and polyesters - Natural rubber; Synthetic rubber such as SBR, NBR, CR - Fundamental methods of processing of synthetic Rubbers.

**Synthetic Fibre and Film Industries:** Viscose rayon, cuprammonium and cellulose acetate, nylons, polyesters, acrylics.

**Pharmaceutical Industries:** Introduction to pharmaceutical products - Synthesis and recovery,

**Course Learning Outcomes (CLO)**

The students will be able to:

1. identify various operations involved in the manufacturing of different organic chemicals.
2. know the important process parameters and solve engineering problems during production.
3. identify the limitations and advantages of various manufacturing processes.

**Text Books**

1. Rao, M.G. and, Sittig, M., *Dryden's Outlines of Chemical Technology for the 21<sup>st</sup> century, Affiliated East West (1998) 3<sup>rd</sup> ed.*
2. Austin, G.T., *Shreve's Chemical Process Industries, McGraw Hill (1998) 5<sup>th</sup> ed.*
3. Groggins, P.H., *Unit Processes in Organic Synthesis, Tata McGraw Hill (2003) 5<sup>th</sup> ed.*

**Reference Book**

1. Faith, W.L., Clark, R.L. and Keyes, D.B., *Industrial Chemicals, John Wiley (1980) 4<sup>th</sup> ed.*
2. Garry, James H., Handwerk, G. E. and Kaiser, M.J., *Petroleum Refining Technology and Economics, Taylor & Francis (2007).*

**Evaluation Scheme:**

S. No.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	50
3	Sessional (may include assignments/ quizzes)	20