

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	B. Tech. (Chemical Engineering)
Course Code:	2CH401
Course Title:	Chemical Process Industries
Course Type:	Core
Year of introduction:	2023-2024

L	T	Practical component				C
		LPW	PW	W	S	
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Course Learning Outcomes (CLOs):

At the end of the course, the students will be able to –

1. describe various chemical manufacturing processes (BL3)
2. interpret the major engineering problems encountered during the manufacturing processes (BL2)
3. predict the performance of chemical processes by making use of the principles of material balance (BL3)
4. compile recent developments and modern techniques in process industries (BL2)

Syllabus:

Total Teaching hours: 30

Unit	Syllabus	Teaching hours
Unit I	Introduction of Chemical Process Industries: Concept of unit operations and unit processes	02
Unit II	Fertilizer Industries: Production of synthesis gas, ammonia, and urea	04
Unit III	Inorganic Chemical Industries: Production of sulfur and sulfuric acid, chloro-alkali industry	04
Unit IV	Natural Product Industries Pulp and Paper Industry, Carbohydrate and Fermentation industries, Oil and soap industries	05
Unit V	Flow sheeting of Chemical Processes: Introduction to flow sheeting, Material balance of unit operations like mixing, extraction, distillation, absorption, percentage conversion, Yield and selectivity, concept of limiting and excess reactants, Material balance without chemical reactions, Material balance involving chemical reactions, Generalised approach for solving problems	15

Self-Study:

Self-study contents will be declared at the commencement of the semester. Around 10 % of the questions will be asked from the self-study contents.

Laboratory Works:

Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

Suggested Readings/ References:

1. George T. Austin, Shreve's Chemical Process Industries, Tata Mc-Graw Hill Publication
2. M. Gopala Rao and Marshall Sittig, Dryden's Outlines of Chemical Technology, East West Press.
3. Bhatt, B.I. and Thakore, S.B., Stoichiometry, Tata Mc-Graw Hill.
4. Pandey G. N, Text book of Chemical Technology Vol 1, 2, Vikas Publishing.

Suggested List of Practical (not restricted to the following) only for information

Sr. No.	Practical	Number of Hours
1	To determine the acid value of given oil sample	02
2	To prepare the caustic soda by chemical method	02
3	To determine Sodium Carbonate content in washing soda	02
4	To determine the saponification value of given oil sample	02
5	To study the preparation of soap	02
6	To prepare salicylic acid from methyl salicylate	02
7	To determine the Iodine value of given oil sample	02
8	To determine the flash & fire point of a given sample of petroleum products using Cleveland apparatus	02
9	To determine the flash & fire point of the given petroleum products using Pensky-Martin apparatus	02
10	To determine the aniline point and diesel index of given samples	02
11	Flow sheeting of different unit operations using CHEMCAD	02