CHEMICAL PROCESS TECHNOLOGY

ENCH 252

Lecture : 3 **Year : II**
Tutorial : 1 **Part : II**
Practical : 0

Course Objectives:
The objective of this course is to equip students with knowledge of the methods used in manufacturing various inorganic and organic chemicals in the chemical process industry. It aims to provide an understanding of the unit operations and unit processes involved in chemical production, as well as to address the engineering challenges associated with the manufacture of different chemicals.

1 Chlor-Alkali and Acid Industries (4 hours)

1.1 Chlor-alkali: Manufacturing of soda ash, caustic soda and chlorine
1.2 Acid: Mining of sulfur, production of sulfuric acid, production of nitric acid

2 Industrial Gases and Fertilizer Industries (6 hours)

2.1 Industrial gases: Production of carbon dioxide, hydrogen from steam reforming of hydrocarbon, production of nitrogen and oxygen
2.2 Nitrogen: Manufacturing of synthetic ammonia and urea

3 Inorganic Materials Industries (6 hours)

3.1 Cement: Manufacturing of ordinary Portland cement and Portland pozzolana cement, types of compounds in cement, hardening and setting of cement
3.2 Refractories: Properties of refractories, manufacture of refractories
3.3 Glass: Composition of glass, types of commercial glasses, manufacturing procedure of glass

4 Water Industries (4 hours)

4.1 Water conditioning method: Ion exchange, lime soda process, phosphate conditioning, deaeration, demineralization and desalting
4.2 Waste water treatment: Basic of municipal and industrial waste water treatment

5 Natural Product Processing Industries (6 hours)

5.1 Pulp and paper: Methods of pulping, production of sulphate and sulphite pulp, manufacturing of paper-wet process

5.2 Manufacturing of sugar from sugarcane/sugar-beet

5.3 Production of starch, production of high fructose corn syrup (HFCS)

6 Industrial Microbial Processes and Edible Oil Industries (5 hours)

6.1 Production of ethyl alcohol and methanol

6.2 Production of citric acid

6.3 Extraction and processing of vegetable oils, refining and hydrogenation of oils

7 Surfactant and Paint Industries (5 hours)

7.1 Soap: Continuous process for the production of fatty acids, glycerin and soap

7.2 Detergent: Production of detergents

7.3 Paint: Paints and pigments, varnishes, lacquers and industrials coatings

8 Petroleum and Petrochemical Industries (5 hours)

8.1 Petroleum: Origin, classification, composition of crude oil, impurities in crude oil, distillation of crude oil, refining-method

8.2 Petrochemical: Precursors of petrochemicals, manufacture of ethylene and propylene

9 Polymer Industries (4 hours)

9.1 Polymer: Classification of polymer, manufacturing of polyethylene and polyvinylchloride

9.2 Production of phenol formaldehyde, styrene-butadiene rubber (SBR) and nylon-66

Tutorial (15 hours)

1. Manufacturing of nitric acid
2. Manufacturing of urea fertilizer
3. Manufacturing of refractories
4. Different water conditioning method
5. Manufacturing of sugar by sugar-beet
6. Production of beer
7. Production of detergent
8. Manufacturing of propylene
9. Production of nylon-66

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapters	Hours	Marks distribution*
1 and 2	10	13
3 and 4	10	13
5 and 6	11	15
7 and 8	10	13
9	4	6
Total	**45**	**60**

* There may be minor deviation in marks distribution.

Note: Students are required to submit a report upon completion of industrial visit.

References

1. Austin, G.T. (1985). Shreve's Chemical Process Industries. McGraw-Hill.
2. Rao, G.M., Sittig, M. (2000). Dryden's Outlines of Chemical Technology. East–West Press Pvt Ltd., New Delhi.
3. Moulijn, J.A., Makkee, M., van Diepen, A.E. (2013). Chemical Process Technology, John Wiley.