BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

Hyderabad Campus

SECOND SEMESTER 2019-20

Course Handout (Part II)

Date: 06/01/2020

In addition to part -I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. **: CHE F419**
Course Title **: Chemical Process Technology**
Instructor-in-charge **:** Ramesh Adusumalli

1. **Scope and Objective of the Course:**

The aim of the course is to study the general principles involved in Chemical manufacturing processes and their application to specific chemical industries relevant to Indian economy. Process technology of Vegetable oils, Fertilizers, Pulp/paper, Cement, Coal, Petroleum, Polymer and Fibres are studied from raw material to product. Emphasis is placed on understanding the flow sheets.

2. Learning Outcomes:

- Understand the fundamentals of Unit operations and Unit processes involved in Chemical process technologies
- Apply the knowledge if Separation processes and Reaction Engineering in understating the chemical process
- Understand the Engineering problems in processing of chemical products
- Understand the need for flow sheets in manufacturing a product (like cement, paper)

3. **Text Book:** "Dryden's **Outlines of Chemical Technology** for the 21st Century" Edited by M. Gopala Rao and Marshall Sittig. East West Press, 3rd Ed., 2010.

Reference Books: George T. Austin, Shreve's Chemical Process Industries by, McGraw Hill, 5th Edn., 1984.

4. Course Plan:

Lect. No.	Learning Objectives	Topics to be covered	Ref. Chap./Sec.#(Book)
1.	Overview of the course		
2	To know the present status of chemical industries in India	Chemical Industries – Facts and figures	Ch.IA-B, T1
3 -4	To understand the Unit operations	Lab tour: Drying (Try drier), Filtration (rotary drum vacuum filtration), Sedimentation, Adsorption, Evaporation, Size reduction (fibres, particles), Size enlargement (Granulation)	Ch.IC-D, T1
5-6	To understand the cement manufacturing process	Cement properties, limestone beneficiation, Portland cement manufacturing	ChIIK, T1
7	To understand the sulfuric acid production process	Contact Process using SO2 and air	ChII A, T1; R1
8-9	To understand the Nitrogen based fertilizers production	Urea Production Processes; Ammonium Nitrate and Nitrolime Production Processes	ChII E, T1; R1
10-12	To understand the importance of NPK fertilizer and its production	Production of Phosphoric acid, DAP; Superphosphate	ChII F, T1; R1

13-15	To understand the extraction of edible oils	Mechanical and solvent based extraction processes, Hydrogenation of vegetable oils, continuous process for Soap manufacturing. GC of vegetable oils for identification	ChIII A, B, T1; R1
16-20	To understand the pulp and paper production processes	Cellulose raw materials used for pulp production, Mechanical Pulping; Kraft (sulfate) Process; Chemical recovery, Paper making, Production of lignin chemicals (dimethyl sulfide, dimethyl sulfoxide); Production of recycled paper; MDF boards	ChIII F, T1; R1, notes
21-23	To understand the coal based technologies	Coking of coal, Coal gasification, Hydrogenation of Coal, Ash	ChIII G, T1;
24-26	To understand the crude oil refining processes	Origin and classification of petroleum,; Refining operations (atmospheric and vacuum distillation), Catalytic cracking, Reforming	ChIII H, T1;
27-31	To understand the petrochemical processes	Chemicals from C_1 compounds (Formaldehyde, Choloroform and Carbon tetracholride), Chemicals from C_2 compounds (Ethylene and acetylene production), Chemicals from C_3 compounds	ChIV B-D, T1;
32-37	To understand the processes in polymer technology (thermoplastics and thermosets including Fibres)	Modes of Polymerization, Structure, properties of polymers, Processing of polyolefins (PE), PVC, Phenol-formaldehyde, Epoxy. Production of viscose/lyocell fibres, Nylon, Polyester, , Carbon fibres, Composites	ChV A-B, T1, R1, notes
38-40	To understand the aluminium manufacturing processes	Purification of alumina from Bauxite, electrolytic aluminium smelting cell.	ChVI B, T1;
41	To understand the Paracetamol Tablet manufacturing	API, binder, granulation, Tablet making and Tablet attributes.	Class notes

5. Evaluation Scheme:

Evaluation Component	**Duration**	**Weightage (%)**	**Date &Time**	**Nature of Component**
Mid semester test	90 min	30%	6/3 9.00 - 10.30AM	CB
Surprise Tests[#]	20 min each	15 %		CB[$]
Seminars		15 %		OB[$]
Comprehensive Exam	3 hours	40%	12/05 FN	OB (10%)+CB (30%)

Seminar topics will be allotted for students having 50 % attendance in the class.

6. **Chamber Consultation Hour:** To be announced in the class. **(chamber: D 207)**
7. **Notice:** Notice will be displayed on CMS

Make-up policy: Make-up will be granted after he /she maintains 50% attendance in the class and has genuine reasons not to appear in the regular test. Prior permission from IC is must for any make-up.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
CHE F419
(Chemical Process Technology)