

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
INSTRUCTION DIVISION
FIRST SEMESTER 2014-2015

Course Handout (Part – II)

Date: 03/08/2015

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 G512
Course Title : Petroleum Refining & Petrochemicals
Instructor in Charge : P. C. Sande

Objective & Scope:

The objective of this course is to encapsulate the important concepts in petroleum refining and petrochemicals production and related processes. With this course knowledge one will have ready understanding when entering the industry. Global petroleum industry scenario and related current affairs are integrated with technical concepts; hence a holistic approach to the subject is taken. Since this is a four unit course with two project units, research work is a critical evaluation component.

The scope includes detailed description of all major refinery processes in contemporary refinery, as well as design aspects of the main atmospheric distillation unit. History of the industry, background, tests, products and industry terminology are also included. Flow-sheets of major petrochemical production processes are also taught.

Course Description:

The course is designed to teach detailed fundamentals of petroleum refining and petrochemical production as lecture content, and current application aspects will be learnt through project or research component. The first ten lectures introduce the history and background, fundamentals of origin, composition, classification, evaluation and fractionation of petroleum crude. Design aspects are also introduced. The remaining lectures focus in detail on processes associated with a refinery as well as main flow-sheets of petrochemical production.

Being a higher degree course extensive reading apart from lecture notes is a must. Also the progressive nature of the petroleum industry dictates that students continuously monitor related current affairs to be able to apply the knowledge gained effectively.

Text Books:

- T1. J.H. Gary et al, "Petroleum Refining", CRS press, New York, 5th ed., 2007.
- T2. B.K. Bhaskara Rao, "Modern Petroleum Refining Processes", Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 4th ed., 2002.
- T3. Maiti S., "Introduction to Petrochemicals", Oxford & IBH Publishing Co., Pvt., Ltd., New Delhi, 2nd Ed., 2002.

Reference Book:

- R1. Nelson, W.L., "Petroleum Refinery Engineering", McGraw-Hill Kogakusha, Ltd., Tokyo, 4th ed., (International student edition), 1958.
- R2. Watkins, R.N., "Petroleum Refinery Distillation", Gulf Pub. Company, Houston, 2nd ed., 1979.
- R3. Ram Prasad, "Petroleum Refining Technology", Khanna publications, Delhi, 1st ed., 2013.

Lecture Plan:

Lect. No.	Learning objectives	Topics to be covered	Reference Chap. Sec. # (Book)
1	History, Origin & formation of petroleum	Origin & formation of petroleum, reserves & deposits of the world, history and development of refining	1.1-1.2 (T2) 1 (R1)

2	World and Indian petroleum industry	Indian refineries and their history, oil & gas scene and reserves, possible future developments	1.3 (T2) Class sharing starts
3	Composition of petroleum crude	Hydrocarbon series, isomeric compounds, sulfur compounds.	1.4 (T2) 2 (R1) 3.2 (T1)
4 -6	Petroleum processing data	Crude oil properties, TBP curve, Refinery products, properties and test methods- self-study	3.1 (T1) 4 (R1) 2 (T1) 2.3 (T2)
7-8	Fractionation of petroleum	Desalting of Crudes, Heating of crude, Distillation of petroleum – Atmospheric and Vacuum	3 (T2)
9-10	Major Project Proposal		
11-15	Distillation column and its design	Qualitative aspects of design of crude distillation column	2, 3 R(2)
16-23	Thermal and catalytic processes	Catalytic cracking, Hydro cracking, Hydro treating, Catalytic reforming Isomerization	6, 7, 9, 10 (T1)
24-26	Other processes	Coking, Visbreaking, , Alkylation	5, 11 (T1)
27-37	Petrochemical process	Classification of petrochemicals, First generation petrochemicals production, Select second generation petrochemicals production	1, 3, 4 (T3)
38-40	Major Project presentations		

Evaluation Scheme:

EC No	(Percentage of marks) Evaluation Component	Duration (Minutes)	Marks	Date	Nature of Component
1.	(30%)Test - 1	90	90	10/10 10:00 - 11:30 AM	Closed Book
2.	(30%) Short assignments with class sharing Main Project ⇒ Research proposal ⇒ Updates ⇒ Seminars	Continuous	Total 90 2x15 20 20 20		
3.	(40%) Comprehensive Examination	180	120	12/12 AN	Partially Open Book

Chamber Consultation Hour: To be announced in class.

Notices: Notices (of mid-sem grades) will be displayed on the Chemical Engineering Notice Board.

However ***all other important communications will be made in the class room only*** (not via intrabits), **and it is the student's sole responsibility to be aware of the same.**

Assignments / project / seminars:

- As per new evaluation guideline 30% of marks exclusively cover non- examination type testing as elaborated in evaluation guideline component 2 of the table above.
- Dates for submission/completion of the continuous evaluation components in 2 above (as announced in the class) are to be strictly adhered to, and there will not be any make-up. In exceptional cases as judged by the IC, make-up may be granted, but with 40% reduction in the marks allotted for that component.
- **Attendance and extent of participation of the student in regular class will be taken into consideration in deciding borderline cases during final grading.**

Make-up policy: Make-up for paper based tests may be granted (only with prior permission) when the student *has attended more than 75% of classes conducted until that day* and has genuine reasons for not appearing in the regular test.

Instructor-in-charge
CHE G512