

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**  
**INSTRUCTION DIVISION**  
**FIRST SEMESTER 2012-2013**

**Course Handout (Part – II)**

Date: 02/08/2016

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 F422  
**Course Title** : Petroleum Refinery Engineering  
**Instructor in Charge** : P. C. Sande

**Objective & Scope:**

*The objective of this course is to encapsulate important concepts of the petroleum industry in general with emphasis on petroleum refining and related processes. The course is industry oriented with a research component. The course aims to prepare the student for work in the petroleum sector.*

Major portion of the course content is conceptual with theory and some numericals. Related statistics and related current affairs from online resources are included. Assignment will cover research topics is included from journal papers; so the student must learn to read and comprehend scientific writing in journal papers.

**Course Description:**

The course is rigorous with a wide converge of petroleum industry; important topics such as crude oil properties and characterization, petroleum distillation and related processes (Fluidized Catalytic Cracking, Catalytic Reforming, Hydro-based processes and Thermal processes) are covered in depth.

For the following topics an overview is given: Petroleum world scenario, statistics, history, origin, composition, product properties /tests, heating, pumping and pretreatment.

The course content is drawn from several text books and online material. The research component includes individual presentations and written assignments by the student of suggested research papers and other topic from online resources. **Hence the course requires regularity and extensive reading by the student.**

**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.

**Reference Book:**

- R1. Ram Prasad, "Petroleum Refining Technology", Khanna Publishers, 1<sup>st</sup> ed., 2012.  
R2. Watkins, R.N., "Petroleum Refinery Distillation", Gulf Pub. Company, Houston, 2<sup>nd</sup> ed., 1979.  
R3. Indra Deo Mall, "Petroleum Refining Technology", CBS Publishers, 1<sup>st</sup> ed., 2015.  
R4. Nelson, W.L., "Petroleum Refinery Engineering", McGraw-Hill Kogakusha, Ltd., Tokyo, 4<sup>th</sup> ed., (International student edition), 1958.

**Lecture Plan:**

Lect. No.	Learning objectives	Topics to be covered	Reference Chap. Sec. # (Book)
1-3	History, Origin & formation of petroleum, World and Indian petroleum industry	Origin & formation of petroleum, reserves & deposits of the world, drilling, history and development of refining, World and Indian refineries, future scope	1.1-1.3 (T2) 1.4 (R1) 1.2-1.3 (R3) <b>Self study 2 (R4)</b> Online material (IEA stats.)
4-5	Composition of petroleum crude	Hydrocarbon series, isomeric compounds, sulfur, nitrogen, oxygen compounds, Asphaltenes, Bitumen	1.4 (T2) <b>Self study 2.3 (R1)</b> 3.2 (T1)

6-9	Petroleum processing data	Crude oil properties, TBP curve, Refinery products, properties and test methods (concepts in class)- <b>rest will be self-study</b>	2-2.3 (T2) 3.1 (T1) <b>Self study 4 (R1)</b>
10	<b>Proposal of topics for Research Assignment</b>		
11-13	Graphical characterization of crudes	Detailed problems to characterize crudes with graphical aids	Class Notes only
14-16	<b>Research Assignment Presentations (September)</b>		
17-19	Pre- Fractionation of petroleum	Desalting, Transportation, Heating of crudes	3.1-3.2 (T2) 3 (R1)
20-22	Fractionation of petroleum	Distillation of petroleum – Atmospheric and Vacuum, principles of design :Gaps and Overlaps	3.3 (T2) 4 (T1) And class notes
23-25	<b>Research Assignment Presentations (November)</b>		
26-33	Thermal and catalytic processes	Catalytic cracking, Hydro-processes, Catalytic reforming, Isomerization	6, 7, 8, 9, 10 (T1)
33-37	Other processes	Coking, Visbreaking, , Alkylation	5, 11 (T1)

#### Evaluation Scheme:

Components	Duration	Date and Time	Marks (Weight age)	Remarks
Mid Semester Test	90 min	<TEST_1 >	60 (30%)	CB/OB
Class tests/ guided Assignments/ class participation	10 min/ Take-home		50 (25%)	CB/ Take-home
Comprehensive Examination	3 hours	<TEST_C >	90 (45%)	CB/OB

**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***, it is the student's sole responsibility to be aware of the same.

#### Assignments / project / seminars:

- Dates for submission/completion of the evaluation components 3 (as announced in the class) are to be strictly adhered to, failing which there will be 40% reduction in marks allotted for that component.
- **Extent of participation in regular classes as a whole will be taken into consideration in deciding borderline cases in the final grade.**

**Make-up Policy:** Make-up for Mid-sem will be granted only in case of illness justified by warden of the respective bhavan with accompanying medical certificate. **Only medical certificate will NOT be considered.** Make-up for comprehensive examination must be obtained from ID. **There will be no make-up for class tests.**

**Instructor-in-charge**  
CHE F422