Birla Institute of Technology & Science, Pilani
Hyderabad Campus

Second Semester 2019-2020

Course Handout Part II

Course No. : CHE G617
Course Title: Petroleum Refinery Engineering
Instructor-in-Charge: Srikanta Dinda
Instructors: Srikanta Dinda &KalyanVuchuru

Course Description :

History and development of refining; Indian petroleum industry; Composition of petroleum, laboratory tests, refinery products; Classification, characterization and evaluation of crude oil; Trends of petroleum products; Atmospheric and vacuum distillation; Design of crude distillation column; Catalytic cracking; Hydrotreating and Hydrocracking; Catalytic reforming; Delayed coking and visbreaking; Furnace design; Isomerization, alkylation and polymerization; Lube oil manufacturing; Energy conservation in petroleum refineries; Environmental aspects of refining.

Scope and Objectives:

This course introduces the student to develop / increase their knowledge about the petroleum, refinery and petrochemicals and also provides an insight of various aspects of refinery operation. This course mainly deals with the raw material of refinery, refinery process and raw products of refinery and treatment of raw product to make finished product. Furthermore, the laboratory component of this course will also give an exposure on hands-on experience on crude & product property analysis.

Learning outcomes:
After studying this course, students will be able to

- Have the knowledge how fuel products are obtained from raw crude.
- Lab exposer will help to know the analysis procedure of fuel properties
- Think to develop new catalyst for cracking and polymerization reaction.
- Do flowsheet design of new process to obtain value added products from crude.

Prescribed Text Book

T1. B. K. Bhaskara Rao, Modern Petroleum Refining Processes -5th Ed.
T2. J. H. Gary, & G. E. Handwe, Petroleum Refining Technology and Economics -5th Ed

Reference Book

R2. R Meyers, Handbook of Petrochemicals Production Processes
R3 S. Matar, Chemistry of Petrochemical Processes

Course Description :

Origin, formation and composition of petroleum; Indian and world scenario about crude oil and its processing capacity, demand & supply of petroleum Fractions; refinery products properties and test methods; classification and evaluation of oil stocks, fractionation of petroleum; treatment of important products, thermal and catalytic processes.

Course Plan for lecture:

Lect. No.	Learning Objectives	Topics to be covered	**Ref. Chap. (Book)**
1-3	Introduction	History and Development of refining, Indian petroleum industry	T1, 1(T2), other sources
4-7	Composition and tests	Composition of petroleum, laboratory tests, refinery products	2(T1), 1,4(T2),
8-10	Classification and characterization	Classification, Characterization and evaluation of crude oil,	3 (T1), 3 (T2),
12-16	Distillation column	Atmospheric and vacuum distillation, Design of crude distillation column,	4 (T1), 3(T2)
17-20	Thermal processes	Description about vis-braking, Coking	5(T1), 5(T2)
21-23	Catalytic processes	Description about FCC	6(T1), 5(T2)
24-26	Catalytic processes	Hydrocracking, Hydrotreating	7,9(T1), 5(T2)
27-30	Catalytic processes	Isomerization, Catalytic reforming	10(T1), 5(T2)
30-34	Catalytic processes	Description about alkalization	11(T1), 5(T2)
35-37	Treatment of products	Removal of chemical impurities, Treatment of LPG, Gasoline, Treatment of diesel	T1, 4 (T2)
38-39	Lube oil	Lube oil manufacturing process	14 (T1)
40-42	Environmental aspects	Environmental aspects of refining process	T1, other ref.

Plan for Lab experiments

Expt. No	**Lab name**	**Experiment Name**
1.	Petroleum Engg Lab	Determination of pour point of diesel
2.	Petroleum Engg Lab	Determination of pour point of kerosene
3.	Petroleum Engg Lab	Determination of cloud point of diesel
4.	Petroleum Engg Lab	Determination of cloud point of kerosene
5.	Petroleum Engg Lab	Determination of flash point of diesel
6.	Petroleum Engg Lab	Determination of flash point of kerosene
7.	Petroleum Engg Lab	Determination of Reid vapour pressure of gasoline
8.	Petroleum Engg Lab	Determination of KV of engine oil using Redwood Viscometer
9.	Petroleum Engg Lab	Determination of aniline point of diesel

10.	Petroleum Engg Lab	Determination of aniline point of kerosene
11.	Petroleum Engg Lab	Distillation characteristics of kerosene
12.	Petroleum Engg Lab	Distillation characteristics of diesel
13.	Petroleum Engg Lab	Distillation characteristics of crude oil
14.	Petroleum Engg Lab	Determination of Reid vapour pressure of simulated naphtha
15.	Petroleum Engg Lab	Cracking of hydrocarbon fuels (demo)
16.	Petroleum Engg Lab	Determination of calorific value of coal by bomb calorimeter(demo)

Evaluation Scheme:

Evaluation Component	Duration	**Weightage (%)**	Date & Time	Nature of Component
Mid sem test	1.5 hr	20	06/03, 09 – 10:30 AM	Closed Book
Lab Expt.		25		Open Book
Seminars (min. two)	-	10		Open Book
Quizzes (min. two)		10		Closed Book
Comprehensive Exam	3 hrs	35	12/05 , FN	Closed Book

- **Minimum marks required to secure a valid grade is above 15% of total marks of all components.**
- **Closed Book Test:** No reference material of any kind will be permitted inside the exam hall.
- **Open Book Exam:** Any printed material will be permitted. Loose papers will not be permitted.
- **Chamber Consultation Hour:** To be announced in the class.
- **Notices:** Notices related to the course will be displayed on Chem. Engg Notice Board/CMS
- **Make-up Policy:** Make-up for the test may be granted with prior permission from the Instructor-in-charge.
- **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.

19/11/19
Srikanta dinda
INSTRUCTOR-IN-CHARGE