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**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:**

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| --- | --- | --- | --- |
| **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**

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| --- | --- | --- |
| **Expt. No** | **Lab name** | **Experiment Name** |
|  | Petroleum Engg Lab | Determination of pour point of diesel |
|  | Petroleum Engg Lab | Determination of pour point of kerosene |
|  | Petroleum Engg Lab | Determination of cloud point of diesel |
|  | Petroleum Engg Lab | Determination of cloud point of kerosene |
|  | Petroleum Engg Lab | Determination of flash point of diesel |
|  | Petroleum Engg Lab | Determination of flash point of kerosene |
|  | Petroleum Engg Lab | Determination of Reid vapour pressure of gasoline |
|  | Petroleum Engg Lab | Determination of KV of engine oil using Redwood Viscometer |
|  | Petroleum Engg Lab | Determination of aniline point of diesel |
|  | Petroleum Engg Lab | Determination of aniline point of kerosene |
|  | Petroleum Engg Lab | Distillation characteristics of kerosene |
|  | Petroleum Engg Lab | Distillation characteristics of diesel |
|  | Petroleum Engg Lab | Distillation characteristics of crude oil |
|  | Petroleum Engg Lab | Determination of Reid vapour pressure of simulated naphtha |
|  | Petroleum Engg Lab | Cracking of hydrocarbon fuels (demo) |
|  | Petroleum Engg Lab | Determination of calorific value of coal by bomb calorimeter(demo) |

**Evaluation Scheme:**

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| --- | --- | --- | --- | --- |
| **Evaluation Component** | Duration | **Weightage (%)** | Date & Time | Nature ofComponent |
| 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**