SEMESTER S6

PETROLEUM REFINING TECHNOLOGY

Course Code	OECHT615	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3:0:0:0	ESE Marks	60
Credits	3	Exam Hours	2 Hrs. 30 Min.
Prerequisites (if any)	None	Course Type	Theory

Course Objectives:

1. To apply chemical engineering principles to design and analyze refinery processes.
2. To gain knowledge of the various stages of crude oil refining, including distillation, cracking, and reforming.
3. To provide students with a comprehensive understanding of the petrochemical industry, its processes, and the underlying principles

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SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	**Origin and formation of crude oil:** Oil exploration and drilling. Storage and transportation of crude oil and products. Classification, Composition and Evaluation of oil stock. Status of Petroleum industry in India. Classification of petroleum refinery. Preliminary petroleum processing-Impurities in crude oil, Dehydration and desalting of crude-Electric Desalter-, Process description, factors affecting the electric desalter. Pipe still furnaces and its operations.	9
2	**Distillation of crude- Prefractionator:** Atmospheric topping unit, Vacuum distillation unit. Thermal Conversion process: Process description of Thermal cracking, Visbreaking, Coking. Process description of fluid Catalytic cracking unit, Hydro cracking. Process description of catalytic reforming. Process description of alkylation process- sulphuric acid	9

	alkylation. Treatment of gasoline- Copper Chloride process and Merox sweetening.	
3	**Petrochemical Industries & their feed stocks:** Process of Synthesis gas production by steam reforming of Naphtha, Manufacture of Methanol from Synthesis Gas, Production of liquid fuels from Synthesis gas by Fischer – Tropsch process. **Petrochemical products and their applications:** First, Second and Third generation petrochemical products, Production of Ethylene, Propylene, and Butadiene by Naphtha/Gas cracking,	**9**
4	**Plastomers, Elastomers and Synthetic fibres:** Various methods of polymerization and their mechanisms, Production processes of LDPE, LLDPE and HDPE, Basic difference among the three and their applications, Production of PVC and Polystyrene, Production of Polypropylene, Production of SBR, PBR and Butyl rubber, Production of ABS plastics, Production of Polyamide (Nylon 6 and Nylon 6,6), Polyester and Acrylic fibres, Production of Phenol Formaldehyde resins, Detergents: Classification of detergents, Production of Linear Alkyl Benzene (LAB) from Superior Kerosene and Benzene, Sulphonation of LAB for production of Synthetic Detergents. Additives for synthetic detergents. Hard and soft detergents.	**9**

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Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
• 2 Questions from each module. • Total of 8 Questions, each carrying 3 marks **(8x3 =24marks)**	• Each question carries 9 marks. • Two questions will be given from each module, out of which 1 question should be answered. • Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

	Course Outcome	Bloom's Knowledge Level (KL)
CO1	Summarize the storage, selection and evaluation of crude oil.	**K2**
CO2	Outline the principles of distillation in the atmospheric and vacuum distillation unit and analyze the preliminary refinery operation.	**K2**
CO3	Explain the various petrochemical feed stocks and the production of various petrochemicals.	**K2**
CO4	Summarize the production of aromatics in the petrochemical industries, the major polymerization processes and the various process for the production of synthetic detergents.	**K2**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

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CO-PO Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3						2					
CO2	3						2					
CO3	3						2					
CO4	3						2					

,. Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	A Text on Petrochemicals	B.K.B. Rao	Khanna Pub.	5th Edition 2004
2	Introduction to Petrochemicals	SukumarMaity	Oxford and IBH Publishing Co	2002
3	Modern Petroleum Refinery Process	Baskara Rao B.K	Oxford& IBM	6th Edition 2020
4	Petroleum Refining Technology	Dr.Ram Prasad	Khanna Publishers	1998

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Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Advanced Petrochemicals	Dr. G. N. Sarkar	Khanna Publishers	1998
2	Modern Petroleum Chemistry	Dr.Kochu Baby Manjooran S		
3	Petroleum Refinery Technology and Economics	James H.Garry Glenn E. Handwerk Mark J.Kaiser	CRC Press, Taylor and Francis group	
4	Fundamentals of Petroleum and Petrochemical Engineering	Uttam Ray Chaudhuri	CRC Press	1st Edition 2020
5	Petroleum Refinery Engineering,	Nelson W.L	McGraw Hill	4th Edition

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://archive.nptel.ac.in/courses/103/102/103102022
2	https://archive.nptel.ac.in/content/syllabus_pdf/103102022.pdf

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