

22PCM303T					Petrochemical Processes - II					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	--	--	100

COURSE OBJECTIVES

- To have a clear idea of the Petrochemical Industry, its structure and constitution.
- To understand the requirements of feedstocks for production of olefins and diolefins
- To study the processes to produce light olefins with emphasis on engineering aspects.
- To learn the commercial utilization of diolefins and higher olefins and their commercial production.
- To understand the upgradation of C4 and C5 cuts.
- To study and understand the Polyolefin technologies and their commercial features

Unit I: The Structure and feedstocks of Olefin Industry

8 Hr.

The nature of olefin production complexes. Petroleum feedstocks for production of primary and higher olefins; their origin and availability. Specifications of Naphtha (long and short), VGO, RCO, role of impurities such as sulfur and metal content and its bearing on processing, purity and yield.

Unit II : Olefin production and purification

12 Hr.

Pyrolysis of hydrocarbons. Bond energies, pyrolysis models, thermodynamic aspects, factors affecting pyrolysis processes, operating variables, severity concept, residence time. Naphtha cracking versus gas cracking, cracking of heavy hydrocarbons, product profiles. Hardware aspects; pyrolysis furnaces, constructional features, SRT heaters, quench, quenching devices, transfer line exchangers etc. Separation and purification of olefins from pyrolysis products, recent developments in olefin production. Pyrolysis gasoline and its utilization, energy considerations. Oligomerization of light olefins, olefin metathesis.

Unit III : Diolefins and higher olefins.

9 Hr.

Dimerization of olefins, paraffin dehydrogenation, UOP pacol process, dehydration of alcohol and other processes. Upgradation of C4 cuts, recovery of butadiene from C4 cuts, separation of mono-olefins from C4 cuts, MTBE and t-butyl alcohol synthesis. Upgradation of C5 cuts and recovery of isoprene. Butadiene production by catalytic dehydrogenation.

Unit IV : Polyolefin production

10 Hr.

Microstructural features of polymers and their effect on properties. Polyolefin types, microstructural classification, polymerization catalysis and mechanism, Polyolefin reactors and processes. Basell spherilene, spheripol and spherizone technology, Chevron Phillips process, high pressure processes, Unipol PE gas phase process etc.

Max. 39 Hr.

COURSE OUTCOMES

On completion of the course, student will be able to

- CO1:** Visualize the structure of Olefin complexes
- CO2:** Comprehend and evaluate the effect of feedstocks on olefin production.
- CO3:** Analyse the effect of various parameters on olefin and diolefin production.
- CO4:** Visualize the upgradation of C4 and C5 cuts.
- CO5:** Evaluate the technologies for polyolefin production.
- CO6:** Focus the current developments in olefin and polyolefin technologies.

TEXT/REFERENCE BOOKS

1. Moulijn, J. A., Makkee, M and Van Diepen, A. E. Chemical Process Technology, Second Edition, Wiley, 2013.
2. Chauvel, A and Lefebvre, G. Petrochemical Processes I, Technip, Paris, 1989
3. Meyers, R A. Handbook of Petrochemical Production Processes, McGraw-Hill, 2005.
4. Asua, J, M. Polymer Reaction Engineering, Blackwell Publishing, 2013.

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Part A: 10 Questions each carrying 5 marks

Part B: 5 Questions each carrying 10 marks

Exam Duration: 3 Hr.

50 Marks

50 Marks