Format K1

Maharashtra State Board of Technical Education, Mumbai

TEACHING PLAN (TP) Academic Year: **2025-26 (EVEN)**

Institute Code and Name: 0078- K. K. Wagh Polytechnic, Nashik **Semester**: Fifth
Programme and Code: Chemical Engineering (CH) **Course Index: 607**
Course and Code: PETROCHEMICAL TECHNOLOGY (PCT) 316306
Name of Faculty: Dr S. S. Rikame **CLASS: TYCH**

INDUSTRY EXPECTED OUTCOME

The aim of this course is to help the students to attain the following industry identified outcomes through various teaching learning experiences: Use of specified techniques and operations to enhance the quality of petroleum products and petrochemicals required for the market.

COURSE LEVEL LEARNING OUTCOMES (COS)

- CO607.1 - Identify the components of petroleum.
- CO607.2 - Identify fractions and its properties after fractionation of petroleum.
- CO607.3 - Use the different refinery processes to enhance the properties of refinery fractions.
- CO607.4 - Demonstrate the manufacturing of pure chemicals from C1 to C4 chemicals through flow chart.
- CO607.5 - Use Udex process to separate aromatic hydrocarbons from reformate.

TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category	Learning Scheme					Credits	Paper Duration	Assessment Scheme										Total Marks
				Actual Contact Hrs/Week			SLH	NLH			Theory				Based on LL & TSL Practical				Based on SL		
											FA-TH	SA-TH	Total		FA-PR		SA-PR		SLA		
				CL	TL	LL					Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
316306	PETROCHEMICAL TECHNOLOGY	PCT	DEC	**3**	-	**2**	1	**6**	**3**	03	30	70	100	40	25	10	25#	10	**25**	**10**	**175**

Total IKS Hrs for Sem.: 1 Hrs

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @$ Internal Online Examination

THEORY LEARNING OUTCOME (TLO)

TLO No.	Title of TLO
TLO 1.1	TLO 1.1 Explain history of petroleum reserves in India.
TLO 1.2	TLO 1.2 Describe exploration of petroleum.
TLO 1.3	TLO 1.3 Compare cable tool and Rotary table drilling method.

TLO 1.4	TLO 1.4 State the Physical properties of petroleum.
TLO 1.5	TLO 1.5 Describe Composition of petroleum.
TLO 1.6	TLO 1.6 List Indian petroleum refineries with their location and capacity.
TLO 1.7	TLO 1.7 List Global crude oil producer countries.
TLO 2.1	TLO 2.1 Explain different methods of dehydration and desalting of petroleum.
TLO 2.2	TLO 2.2 Describe the specified type of fractionation of petroleum with flow diagram.
TLO 2.3	TLO 2.3 Select petroleum fractions with their boiling range, carbon number.
TLO 2.4	TLO 2.4 State the test Properties of petroleum fractions with their significance.
TLO 2.5	TLO 2.5 Sketch the specified petroleum test properties apparatus.
TLO 3.1	TLO 3.1 Describe specified thermal cracking process with flow diagram and chemical reactions.
TLO 3.2	TLO 3.2 Describe fluidized catalytic cracking process with flow diagram and chemical reactions.
TLO 3.3	TLO 3.3 Describe catalytic reforming process with flow diagram and chemical reactions.
TLO 3.4	TLO 3.4 Describe isomerization process with flow diagram and chemical reactions.
TLO 3.5	TLO 3.5 Describe polymerization process with flow diagram and chemical reactions.
TLO 3.6	TLO 3.6 Describe hydrocracking process with flow diagram and chemical reactions.
TLO 3.7	TLO 3.7 Describe alkylation process with flow diagram and chemical reactions.
TLO 3.8	TLO 3.8 Describe esterification process with flow diagram and chemical reactions.
TLO 4.1	TLO 4.1 Explain specified petrochemicals derived from C1 with flow diagram and chemical reactions.
TLO 4.2	TLO 4.2 Explain specified petrochemicals derived from C2 with flow diagram and chemical reactions.
TLO 4.3	TLO 4.3 Explain specified petrochemicals derived from C3 with flow diagram and chemical reactions.
TLO 4.4	TLO 4.4 Explain specified petrochemicals derived from C4 with flow diagram and chemical reactions.
TLO 5.1	TLO 5.1 State the Physical properties and industrial applications of specified chemicals.
TLO 5.2	TLO 5.2 Explain Udex process for recovery of BTX from the specified reformates.
TLO 5.3	TLO 5.3 Describe aniline manufacturing process from hydrogenation of nitrobenzene.

SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	2	1	1	1	-	2			
CO2	3	2	3	3	3	2	3			
CO3	3	2	3	2	2	2	3			
CO4	3	3	2	2	3	2	3			
CO5	3	3	3	2	3	2	3			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
*PSOs are to be formulated at institute level

Maharashtra State Board of Technical Education K-1

Teaching Plan (TP)

Academic Year: 2025-26 **Institute Code:** 0078
Program: Chemical Engineering **Course Code:** 316306
Course: Petrochemical Technology (PCT) **Semester: Sixth** (CH-6K)
Name of faculty: Dr. S. S. Rikame

Chap No. (Allotted Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
Unit - I Introduction to Petroleum								
1 (04)	CO-1	TLO 1.1	1.1 Overview of petroleum reserves in India	02	16/12/2025 to 19/12/2025		Blackboard, Books, media, PPT	
		TLO 1.2	1.2 Exploration methods of petroleum: Seismic method, Gravity method, Magnetic method, Electrical method	03	20/12/2025 to 27/12/2025			

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 1.3	1.3 Drilling methods of petroleum: Cable tool method and Rotary table method.	03	30/12/2025 to 03/01/2026			
		TLO 1.4,	1.4 Physical properties of petroleum: Appearance, API (American Petroleum Institute) gravity and viscosity					**1 extra**
		TLO 1.5-7	1.5 Composition of petroleum: Hydrocarbons, Non-hydrocarbons, Metallic constituents 1.6 Indian petroleum refineries with their location and capacity. 1.7 Global crude oil producer countries (Name only).**Practice test 1 and MKCL Quiz 2***	02	06/01/2026 to 09/01/2026			
Unit - II Petroleum Refining								
2(08)	**CO-2**	**TLO 2.1**	2.1 Primary processing of petroleum: Methods of dehydration and desaltification (Gravity settling, Chemical treatment, Centrifugal separation and Electric desalter)	2	10/01/2026 to 13/01/2026		Blackboard, Books, media, PPT	

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 2.2	2.2 Fractionation of petroleum (Atmospheric and Vacuum): Process flow diagram, Process description	2	16/01/2026 to 17/01/2026			
		TLO 2.3	2.3 Petroleum fractions with their boiling range, carbon number and uses.	1	20/01/2026 to 20/01/2026			
		TLO 2.4	2.4 Test properties of each petroleum fractions with definition and significance: API gravity, Viscosity, Flash point, Fire point, Aniline point, Smoke point, Pour point, Cloud point, Octane number, Cetane number, Diesel index, Drop melting point of wax, Calorific value, Carbon residue, Penetration index.	2	23/01/2026 to 24/01/2026			
		TLO 2.5	2.5 Petroleum test properties apparatus (Sketch only): Redwood viscometer, Flash and fire point apparatus (Pensky-Martens apparatus, Abel's apparatus, Cleveland open cup), Cloud point apparatus, Pour point apparatus,	1	26/01/2026 to 26/01/2026			

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
			Drop melting point apparatus, Smoke point apparatus, Aniline point apparatus, Conradson carbon residue apparatus. **MKCL QUIZ 4 and Practice Test 2**					
Unit - III Petroleum Refinery Processes								
3(08)	**CO-3**	**TLO 3.1**	3.1 Thermal cracking: Visbreaking and Delayed coking.	2	30/01/2026 to 31/01/2026		Blackboard, Books, media, PPT	
		TLO 3.2	3.2 Catalytic cracking: Fluidized catalytic cracking (Flow sheet, Process description, Reactions, and Thermodynamic aspects)	2	03/02/2026 to 06/02/2026			
		TLO 3.3	3.3 Catalytic reforming process (Flow sheet, Process description, Reactions, and Thermodynamic aspects)	2	07/02/2026 to 10/02/2026			
		TLO 3.4	3.4 Isomerization process (Flow sheet, Process description, Reactions, and Thermodynamic aspects)	2	13/02/2026 to 14/02/2026			

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 3.5	3.5 Polymerization process (Flow sheet, Process description, Reactions, and Thermodynamic aspects)	1	17/02/2026 to 17/02/2026			
		TLO 3.6	3.6 Hydrocracking (Flow sheet, Process description, Reactions, and Thermodynamic aspects)	1	20/02/2026 to 20/02/2026			
		TLO 3.7-8	3.7 Alkylation: Sulphuric acid process (Flow sheet, Process description, Reactions, and Thermodynamic aspects) 3.8 Esterification process (Flow sheet, Process description, Reactions, and Thermodynamic aspects)	2	21/02/2026 to 24/02/2026			
			MKCL Quiz 6, Practice test 3	--	24/02/2026 to 24/02/2026			
Unit - IV Petrochemicals from C1 to C4 chemicals								
4(10)	**CO-4**	**TLO 4.1**	4.1 Petrochemical from C1 chemicals (Flow sheet, Process description, Reactions, and Thermodynamic aspects) a) Methanol b) Formaldehyde	1	27/02/2026 to 27/02/2026		Blackboard, Books, media, PPT	

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 4.2	4.2 Petrochemical from C2 chemicals (Flow sheet, Process description, Reactions, and Thermodynamic aspects) a) Ethanol from chemical synthesis route (Hydration of ethylene). b) Ethylene oxide.	2	28/02/2026 to 03/03/2026			
		TLO 4.3	4.3 Petrochemical from C3 chemicals (Flow sheet, Process description, Reactions, and Thermodynamic aspects) a) Acetaldehyde b) Cumene (Isopropyl benzene)	1	06/06/2026 to 06/03/2026			
		TLO 4.4	4.4 Petrochemical from C4 chemicals (Flow sheet, Process description, Reactions, and Thermodynamic aspects) a) Butadiene b) Methyl tertiary butyl ether	1	07/03/2026 to 07/03/2026			
			Practice test 4 and MKCL Quiz 8	--	07/03/2026 to 07/03/2026			
Unit - V Aromatics								
5(20)	**CO-5**	**TLO5.1**	5.1 Physical properties and industrial applications of benzene, toluene, xylene, and ethyl benzene	2	10/03/2026 to 13/03/2026		Blackboard, Books, media, PPT	

Chap No. (Allote d Hrs.)	CO Mention only Number	TLO Mention only Number	Unit Name and Learning Content Title/ Details	No. of Lecture	Plan (From-To)	Actual Execution (From-To)	Teaching method/ Media	Remark
		TLO 5.2,	5.2 Separation of aromatics (benzene, toluene, xylene, and ethyl benzene) from reformate by using Udex process (Flow sheet, Process description, Reactions, and Thermodynamic aspects)	2	14/03/2026 to 17/03/2026			**1 extra**
		TLO 5.3	5.3 Aniline manufacturing process from hydrogenation of nitrobenzene.	1	20/03/2026 to 20/03/2026			
		--	**Practice test 5 and MKCL Quiz 10**	--	21/03/2026 to 21/03/2026			**1 extra**

ASSESSMENT METHODOLOGIES/TOOLS

A. Formative assessment (Assessment for Learning) (FA-TH)

- Continuous assessment based on process and product related performance indicators. Each practical will be assessed considering
  - 60% weightage is to process
  - 40% weightage to product

B. Summative Assessment (Assessment of Learning) (SA-TH)

- Continuous Assessment based on Process and Product related performance indicators. Each practical will be assessed considering
  - 60% weightage to Process
  - 40% weightage to Product

SUGGESTED LEARNING MATERIALS / BOOKS

Sr. No.	Author	Title of Book	Publication
1	B. K. Bhaskara Rao	Modern Petrochemical Refining processes	Oxford – IBH Publications, Delhi ISBN:9788120417115
2	B. K. Bhaskara Rao	A Text on Petrochemicals	Khanna Publishers, Delhi ISBN-9788174090444
3	W. L. Nelson	Petroleum Refinery Engineering	McGraw Hill, New York Publications, ISBN: 9780070855366
4	Gary, James H Glenn E Handwork Mark J	Petroleum Refining Technology and Economics	CRC Press, USA Publications, ISBN - 9780849370380

Sr. No.	Author	Title of Book	Publication
	Kai sen		
5	M. Gopal Rao and Sitting, Marshal	M. Gopal Rao and Sitting, Marshal	East-West Press Pvt. Ltd., Delhi Publications, ISBN- 9788185938790
6	Austin G.T.	Shreve's Chemical Process Industries	McGraw Hill India, Pune Publications, ISBN-9781259029455
7	Dr. Ram Prasad	Petroleum Refining Technology	Khanna Publishers, Delhi ISBN-9788174090645
8	Sukumar Maiti	Introduction to Petrochemicals	Oxford - IBH Publications, Delhi ISBN:9788120406636
9	James G. Speight	Handbook of petrochemical processes	CRC Press Publications, ISBN: 10: 1498729703

LEARNING WEBSITES & PORTALS

Sr. No.	Link / Portal	Description
1	https://onlinecourses.nptel.ac.in/noc23_ch64/preview https://nptel.ac.in/courses/103105221 https://nptel.ac.in/courses/114106042 https://www.youtube.com/watch?v=Js4cxZRtk5Q https://archive.nptel.ac.in/courses/103/102/103102022/ https://archive.nptel.ac.in/content/syllabus_pdf/103102022.p df http://digimat.in/nptel/courses/video/103107081/L15.html http://kcl.digimat.in/nptel/courses/video/103103220/L19.html https://www.youtube.com/watch?v=az-q9ga5M0g https://www.youtube.com/watch?v=JAZTQhIoEd8 https://www.youtube.com/watch?v=CZCdDpm3SmE https://www.youtube.com/watch?v=LpWRMYgSatw https://archive.nptel.ac.in/courses/103/107/103107082/ https://onlinecourses.nptel.ac.in/noc23_ch46/preview https://archive.nptel.ac.in/courses/103/103/103103217/ https://archive.nptel.ac.in/courses/103/107/103107082/ https://digimat.in/nptel/courses/video/103107081/L27.html http://acl.digimat.in/nptel/courses/video/103107212/L58.html https://www.youtube.com/watch?v=s1N_VhgbWv4	Video Lectures

Note : Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students

Dr. S. S. Rikame
(Name & signature of staff)

Dr. P. S. Bhandari
(Name & signature of HOD)

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