GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Petrochemical Technology				
Semester	IV		Version	1.0.0.0	
Effective from Academic Year	2026-27		Effective for the batch Admitted in	JULY 2025	
Course code	1PCT4101	Course Name	Petroleum Refining Engineering		

I.TEACHING-LEARNING AND ASSESSMENT SCHEME

Course Type	Course Code	Learning Scheme						Assessment Scheme										
		Actual Contact Hrs./Week			SLH	NLH	Credits	Theory				Practical				Based on SL		Total Marks
		CL	TL	LL				FA-TH	SA-TH	TOTAL		FA-PR	SA-PR	TOTAL		SLA		
								MAX	MAX	MAX	MIN	MAX	MAX	MAX	MIN	MAX	MIN	
DSC	1PCT4101	3	-	2	3	8	4	40	60	100	40	30	20	50	20	20	8	170

Abbreviation :	**CL**- Classroom Learning	**TL** - Tutorial Learning	**LL** - Laboratory Learning
	SLH - Self Learning Hours	**NLH** - Notional Learning Hours	**SLA** - Self Learning Assessment
	FA - Formative Assessment (Term work +Mid Sem Exam +Attendance)		**SA** - Summative Assessment

II. PRE-REQUISITES

Basic knowledge of chemistry, fuels, and fundamentals of chemical engineering.

III. INDUSTRY /EMPLOYER EXPECTED OUTCOMES

The course enables diploma students to understand petroleum refining operations, crude processing techniques, conversion processes, and finishing treatments required in refineries, terminals, and petrochemical industries with emphasis on safety, efficiency, and product quality.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:
CO1: Understand distillation units, crude evaluation, and fractionation processes in refineries.
CO2: Apply treatment techniques for various petroleum products (LPG, LNG, gasoline, kerosene).
CO3: Understand thermal and catalytic conversion processes in refineries.
CO4: Explain finishing processes including sulphur removal and hydro treating.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:

Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's)&CO's	Marks	Hours
Unit 1: Fractionation of Petroleum	**TLO1.1**Explain dehydration **TLO1.2** Describe desalting and crude heating **TLO1.3** Explain atmospheric distillation (ADU) **TLO1.4** Explain vacuum distillation (VDU) **TLO1.5** Describe gasoline blending	**1.1** Dehydration and desalting **1.2** Crude heating and Preheating **1.3** ADU (Atmospheric Distillation Unit) **1.4** VDU (Vacuum Distillation Unit) **1.5** Gasoline blending Operations	**13**	**10**
Unit 2: Treatment Techniques	**TLO2.1** Explain LPG Treatment **TLO2.2** Explain LNG treatment **TLO2.3** Describe gas sweetening **TLO2.4** Understand gasoline treatment	**2.1** LPG treatment techniques **2.2** LNG treatment **2.3** Sweetening of gases **2.4** Treatment of gasoline **2.5** Kerosene treatment **2.6** Lube oil purification Process	**14**	**10**

	TLO2.5 Explain kerosene treatment **TLO2.6** Describe lube oil Purification & wax removal			
Unit 3: Thermal and Catalytic Conversion Processes	**TLO3.1** Understand thermal conversion processes **TLO3.2** Understand visbreaking **TLO3.3** Understand coking processes **TLO3.4** Understand catalytic conversion **TLO3.5** Understand alkylation & isomerization	**3.1** Thermal cracking and reforming Mechanisms **3.2** Conventional and Soaker Visbreaking **3.3** Delayed, Fluid and Flexi coking **3.4** FCC, Catalytic reforming and Hydrocracking **3.5** Sulphuric acid & HF alkylation, Isomerization processes	**15**	**12**
Unit 4: Finishing and Hydro treating Processes	**TLO4.1** Understand sulphur removal processes **TLO4.2** Understand solvent extraction **TLO4.3** Understand amine treatment **TLO4.4** Understand amine treatment **TLO4.5** Understand hydro treating	**4.1** H_2S removal and sulphur Recovery **4.2** Solvent extraction methods **4.3** Solvent extraction methods **4.4** Amine treatment for LPG **4.5** Reaction mechanism and Applications	**18**	**13**

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

SR. NO	PRACTICAL/LABORATORY LEARNING OUTCOME(LLO)	PRACTICAL TITLES	RELEVANT COs
1	**LLO 1.1** To measure distillate by ASTM distillation	To determine the distillation characteristics of a petroleum product	CO1
2	**LLO 2.1** To find API gravity of Petroleum Product	To study about API gravity of Petroleum Product	CO2
3	**LLO 3.1** Determination of Flash Point and Fire Point	To determine the flash point and fire point of a petroleum product	CO3
4	**LLO 4.1** Determination of Aniline Point	To determine the aniline point of a petroleum product	CO3
5	**LLO 5.1** Determination of Smoke Point	To determine the smoke point of kerosene	CO4
6	**LLO 6.1** Determination of Viscosity	To determine the viscosity of a petroleum product and study its flow characteristics.	CO4
7	**LLO 7.1** Determination of Cloud Point and Pour Point	To determine the cloud point and pour point of a petroleum product and assess its low-temperature performance.	CO1
8	**LLO 8.1** Determination of Carbon Residue	To determine the carbon residue of a petroleum product using Conradson or Rams bottom method.	CO1

VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Watch refinery operation documentaries (ADU/VDU/FCC).
- Prepare model of a crude distillation unit.
- Industrial visit report on refinery distillation.

Mini Projects

- Prepare a flow diagram/model of Atmospheric or Vacuum Distillation Unit (ADU/VDU)
- Design a small-scale demonstration model
- Invite industry expert/alumni for a talk
  Topic examples: "Modern Refinery Technologies", "Cracking Units", "Safety in Refinery Operations".

VIII. LIST OF REFERENCE BOOKS

Sr. No.	Title	Author	Publication
1	Modern Petroleum Refining Processes	B.K. Bhaskar Rao	Oxford & IBH
2	Petroleum Refining Technology	W.L. Nelson	McGraw Hill
3	Advanced Petroleum Refining	G.N. Sarkar	Khanna Publishers
4	Petroleum Refining	H.Gary & G.E. Handwerk	CRC Press

IX. LINK OF LEARNING WEB RESOURCE

1	NPTEL – Petroleum Refining Engineering https://nptel.ac.in/courses/103104154
2	NPTEL – Chemical Engineering: Mass Transfer Operations https://nptel.ac.in/courses/103103154
3	Refining Process Tutorials – Indian Oil (IOCL) https://iocl.com/

X. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	**Fractionation of Petroleum**	CO1	9	5	5	3	13
2	**Treatment Techniques**	CO2	10	4	5	5	14
3	**Thermal and Catalytic Conversion Processes**	CO3	12	5	5	5	15
4	**Finishing and Hydro treating Processes**	CO4	14	5	5	8	18
	Grand Total		**45**	**19**	**20**	**21**	**60**

XI. COs AND POs AND PSOs MAPPING

Course outcome (Cos)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	2	1	3	2	1
CO2	3	3	2	2	1	2	1	3	3	1
CO3	2	3	3	2	1	3	1	3	3	2
CO4	2	2	3	2	1	3	2	2	3	3

Legends: - *3- High 2-Moderate/Medium 1-Slight/Low 0-None*