GANPATUNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Petrochemical Technology				
Semester	IV		Version	1.0.0.0	
EffectivefromAcademicYear	2026-27		EffectiveforthebatchAdmittedin	July 2025	
Subject code	1PCT4102	Subject Name	Natural Gas Processing		

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	1PCT2402	3	-	0	3	6	3	40	60	100	40	30	-	-	-	20	08	120

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

Students should have basic knowledge of chemistry, chemical engineering principles, energy resources, petroleum processes, and industrial safety concepts.

III.INDUSTRY /EMPLOYER EXPECTED OUTCOMES

After completing this course, students are expected to understand natural gas production, processing, and utilization, assist in the operation of gas processing and separation units, follow industrial safety practices in gas handling, support storage, transportation, and distribution activities, and comply with environmental and safety regulations.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to:

- **CO1:** Explain the origin, composition, and importance of natural gas along with upstream processes of crude oil and natural gas
- **CO2:** Apply principles of absorption and adsorption in gas processing
- **CO3:** Describe gas processing, separation techniques, and related safety hazards
- **CO4:** Explain storage, transportation, distribution systems, and marketing including CBM

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 Introduction to Natural Gas	**TLO 1.1** Define natural gas and explain its origin **TLO 1.2** Describe composition and properties of natural gas **TLO 1.3** Identify natural gas fields and reserves in India **TLO 1.4** Explain the role of natural gas in the energy sector **TLO 1.5** Explain contribution of NG industries to Indian economy **TLO 1.6** Explain techniques of natural gas utilization **TLO 1.7** Explain upstream sector of petroleum industry **TLO 1.8** Describe exploration stages **TLO 1.9** Describe production methods	1.1 Introduction of natural gas **1.2** Composition and properties of natural gas **1.3** NG fields and reserves in India **1.4** Energy scenario and role of NG **1.5** Major NG producing industries and contribution **1.6** Techniques of natural gas utilization **1.7** Introduction to upstream sector **1.8** Exploration of crude oil and NG **1.9** Production of crude oil and NG	**14**	**13**
Unit-2 Gas Processing Techniques	**TLO 2.1** Define gas absorption and its importance **TLO 2.2** Explain absorption principles **TLO 2.3** Describe packed tower design **TLO 2.4** Apply material balance **TLO 2.5** Explain adsorption principles **TLO 2.6** Identify adsorption equipment **TLO 2.7** Explain conventional separation techniques **TLO 2.8** Describe advanced separation techniques **TLO 2.9** Explain sulphur recovery **TLO 2.10** Describe LPG, LNG & CNG system	**2.1** Gas absorption process **2.2** Principles of gas absorption **2.3** Packed tower design and materials **2.4** Material balance in absorption **2.5** Adsorption principles and equations **2.6** Adsorption equipment and applications **2.7** Conventional separation techniques **2.8** Advanced gas separation methods **2.9** Sulphur recovery process **2.10** LPG, LNG, CNG system and operation	**19**	**13**
Unit-3 Storage and Transportation of Natural Gas	**TLO 3.1** Explain NG hydrates and coal gasification **TLO 3.2** Describe GTL conversion **TLO 3.3** Explain underground storage **TLO 3.4** Identify transportation methods **TLO 3.5** Explain transmission and CGD **TLO 3.6** Explain compressor sizing basics	**3.1** NG hydrates and in-situ coal gasification **3.2** Gas-to-liquid conversion **3.3** Underground storage of NG **3.4** Types of NG transportation **3.5** Transmission and CGD systems **3.6** Compressor sizing principles	**15**	**11**
Unit-4 Marketing, CBM and Safety Hazards	**TLO 4.1** Explain NG marketing scenario **TLO 4.2** Define CBM **TLO 4.3** Explain CBM utilization **TLO 4.4** Identify NG safety hazards **TLO 4.5** Explain preventive measures	**4.1** Current NG marketing scenario **4.2** Introduction to CBM **4.3** Uses of CBM **4.4** Safety hazards of natural gas **4.5** Prevention and control of hazards **4.6** Safety rules and regulations	**12**	**08**

	TLO 4.6 Explain importance of safety regulations			

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

- Prepare a report on **composition, properties, and uses of natural gas** with reference to Indian energy scenario.
- Collect data and present a **case study on a major natural gas producing field or company in India** (ONGC, GAIL, Reliance).
- Draw a **flow chart of upstream processes** involved in crude oil and natural gas production and explain each step.
- Solve **numerical problems on gas absorption or adsorption** based on material balance concepts.
- Prepare a **comparison chart of LPG, LNG, and CNG systems** based on storage, transportation, safety, and applications.
- Prepare a **model or PPT on natural gas transportation and city gas distribution (CGD) system**.

VII. LIST OF REFERENCE BOOKS

SR.NO	TITLE	AUTHOR	PUBLICATION
1	Petroleum Production	Bradly H. B	Society of Petroleum Engineers (SPE), USA
2	Gas Processing	Janes A	Gulf Publishing Company, Houston
3	Petroleum Production (Volume I & II)	D. R. Introduction	McGraw-Hill Book Company

VIII. LINK OF LEARNING WEB RESOURCE

1	https://nptel.ac.in/
2	http://www.vlab.co.in/
3	http://www.howstuffworks.com/
4	http://en.wikipedia.org/wiki/

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Introduction to Natural Gas	CO1	13	06	04	04	14
2	Gas Processing Techniques	CO2	13	07	06	06	19
3	Storage and Transportation of Natural Gas	CO3	11	05	05	05	15
4	Marketing, CBM and Safety Hazards	CO4	08	05	04	03	12
	Grand Total		45	23	19	18	60

X. 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	2	2	1	2	3	2	2	3	2
CO2	2	3	2	2	2	1	1	2	3	2
CO3	3	2	1	2	2	2	2	3	3	3
CO4	3	3	2	3	1	1	1	2	2	2
Legends: -*3- High* *2-Moderate/Medium* *1-Slight/Low* *0-None*										