GANPAT UNIVERSITY

FACULTY OF DIPLOMA ENGINEERING

Programme	Diploma in Petrochemical Technology		
Semester	III	Version	1.0.0.0
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025
Course code	1PCT3102	Course Name	General Chemical Technology

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	1PCT3102	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

Fundamental concepts of basic chemistry studied at secondary level.

III. INDUSTRY /EMPLOYER EXPECTED OUTCOMES

After completing this course, students are expected to apply fundamental knowledge of organic and inorganic chemistry in industrial operations. They should be able to understand and interpret basic chemical process flow diagrams and manufacturing processes.

IV. COURSE LEARNING OUTCOMES

At the end of the course, students will be able to achieve the following course learning outcomes:

CO1: Explain the fundamentals of organic chemistry including isomerism, organo-metallic compounds, Grignard reagent, and reactions and industrial applications of aliphatic and aromatic compounds.

CO2:Apply the concept of aromaticity and electrophilic substitution reactions and identify the Properties and industrial importance of important aromatic compounds.

CO3:Describe major inorganic chemical process industries including manufacturing of sulphuric acid, nitric acid, hydrochloric acid, phosphoric acid, chlor-alkali products, water treatment systems, and Industrial utilities.

CO4:Explain industrial organic and natural product industries including fuel gases, soap and detergent manufacturing, fermentation processes, pharmaceuticals, dyes, agrochemicals, and petrochemical Industries.

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: Fundamentals of Organic Chemistry	**TLO1.1** Introduction to organic chemistry and classification **TLO1.2** Concept of structural, geometrical and optical isomerism **TLO1.3** Organo-metallic compounds and their significance **TLO1.4** Grignard reagent – preparation and reactions **TLO1.5** Aliphatic compounds – aldehydes, ketones, acids, esters, amines	**1.1** Explain fundamentals of organic chemistry **1.2** Differentiate types of isomerism **1.3** Describe organo-metallic compounds **1.4** Explain preparation and use of Grignard reagent in synthesis **1.5** Discuss reactions of aliphatic compounds **1.6** Identify industrial uses of aliphatic organic products	**15**	**11**

	TLO1.6 Properties and industrial applications of aliphatic compounds			
Unit 2: Aromatic Compounds and Aromaticity	**TLO2.1** Difference between aliphatic and aromatic compounds **TLO2.2** Stability of benzene ring and aromaticity concept **TLO2.3** Nomenclature of benzene and its derivatives **TLO2.4** Aromatic substitution reactions (nitration, sulphonation, halogenation, amination) **TLO2.5** Important aromatic compounds and their properties **TLO2.6** Industrial applications of aromatic compounds	**2.1** Distinguish aromatic and aliphatic compounds **2.2** Explain benzene stability and resonance **2.3** Apply nomenclature rules of aromatics **2.4** Describe electrophilic substitution reactions **2.5** Discuss properties of nitrobenzene, aniline, benzoic acid, benzaldehyde **2.6** Identify industrial importance of aromatic chemical	**15**	**11**
Unit 3: Inorganic Chemical Process Industries	**TLO3.1** Introduction to chemical industries and process flow diagrams **TLO3.2** Manufacture of sulphuric, nitric, hydrochloric and phosphoric acid **TLO3.3** Raw materials and properties of inorganic acids **TLO3.4** Chlor-alkali industry – caustic soda, soda ash and chlorine **TLO3.5** Water treatment – DM water and boiler feed water **TLO3.6** Industrial utilities – air and industrial gases	**3.1** Interpret chemical process flow diagram. **3.2** Explain manufacturing processes of major inorganic acids. **3.3** Identify raw materials and properties of acids **3.4** Describe chlor-alkali production processes **3.5** Explain industrial water treatment methods. **3.6** Discuss role of air and gases as industrial utilities	**15**	**11**
Unit 4: Industrial Organic & Natural Product Industries	**TLO4.1** Industrial fuel gases – water gas and producer gas **TLO4.2** Manufacturing of soap and detergent **TLO4.3** Oils, fats, waxes and difference between soap and detergent **TLO4.4** Carbohydrates and fermentation – sugar, starch, ethanol **TLO4.5** Pharmaceutical industry – types of drugs and antibiotics **TLO4.6** Dyes, agro-chemicals and petroleum-based chemical industries	**4.1** Explain production of industrial fuel gases. **4.2** Describe soap and detergent manufacturing **4.3** Differentiate soap and detergent. **4.4** Explain fermentation and ethanol production **4.5** Introduce pharmaceutical industry and drug classification. **4.6** Discuss dyes, fertilizers, pesticides and petrochemical.	**15**	**12**

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

- Watch video lectures or industry documentaries on organic, inorganic and chemical process industries.
- Prepare summary notes on major industrial chemical manufacturing processes.
- Collect safety datasheets (MSDS) of common industrial chemicals and prepare a report.
- Prepare flash cards for important organic reactions and industrial processes

Mini projects

- Mini-project on **Preparation of an organic compound** (Azo dye / Aspirin / Nitrobenzene) with reaction mechanism
- Design a model chart showing:
- Aliphatic vs Aromatic compounds
- Industrial uses of aromatic chemicals
- Study project on Industrial water treatment system in nearby industry or institute laboratory.
- Comparative study on Natural vs Synthetic dyes and their industrial relevance

VII. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

SR. NO	PRACTICAL/LABORATORY LEARNING OUTCOME(LLO)	PRACTICAL TITLES	RELEVANT COs
1	**LLO 1.1** Demonstrate identification and spotting of organic compounds based on functional groups.	To perform organic compound spotting tests.	CO1
2	**LLO 2.1** Prepare an aromatic azo dye using diazotization and coupling reactions.	To prepare azo dye.	CO2
3	**LLO 3.1** Estimate available chlorine content in bleaching powder sample.	To determine available chlorine in bleaching powder.	CO3
4	**LLO 3.2** Determine temporary and permanent hardness of water sample.	To study about boiler mountings and accessories.	CO3
5	**LLO 3.3** Determine chloride content in water sample.	To estimate chloride in water.	CO4
6	**LLO 4.1** Prepare soap by saponification process and test its properties.	To prepare soap.	CO4
7	**LLO 4.2** Prepare synthetic detergent and compare with soap..	To prepare detergent.	CO5
8	**LLO 4.3** Prepare aspirin by esterification reaction.	To prepare aspirin.	CO4
9	**LLO 4.4** Prepare nitrobenzene by nitration of benzene.	To prepare nitrobenzene.	CO4
10	**LLO 4.5** Determine saponification value of oil.	To determine saponification value of oil.	CO4

VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD

1	Organic compound spotting test kits
2	Diazotization and coupling reaction setup for azo dye preparation.
3	Water analysis testing kits (hardness & chloride).
4	Soap and detergent preparation setup.
5	Setup of water turbine.
6	Bleaching powder chlorine estimation apparatus

IX. LIST OF REFERENCE BOOKS

Sr. No.	Title	Author	Publication
1	Organic Chemistry	P.L. Soni,	Sultan Chand & Sons
2	Chemical Technology	C.E. Dryden	East-West Press.
3	Basic Principles of Organic Chemistry	Puri, Sharma & Pathania	Vishal Publishing
4	Inorganic Industrial Processes	R.H. Perry & D.W. Green	McGraw Hill

X.. LINK OF LEARNING WEB RESOURCE	
1	https://nptel.ac.in/courses/103103218

XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE

Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	Fundamentals of Industrial Sustainability	CO1	15	6	7	2	15
2	Resource Efficiency in Chemical and Petrochemical Industries	CO2	15	5	8	2	15
3	Industrial Waste Management and Circular Economy	CO3	15	5	7	3	15
4	Environmental Governance and Green Practices	CO4	15	4	6	5	15
	Grand Total		**60**	**20**	**28**	**12**	**60**

XII. 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	1	1	3	0	2	2	2	1
CO2	2	3	2	2	3	1	2	3	2	1
CO3	2	3	3	2	3	2	2	3	3	1
CO4	2	2	2	3	3	2	3	2	3	2

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