



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Diploma Engineering College
Semester 4 (Diploma)

Subject: Petrochemical Engineering - DETCH14210

Type of course: Minor

Prerequisite: Basic knowledge of Petroleum products and their extraction process.

Rationale: Petrochemical engineering offers a rewarding and challenging career path that contributes to the advancement of modern society. The field's essential role in meeting global demand for products, driving innovation, and fostering economic growth makes it a compelling choice for those interested in engineering and the energy sector.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks					Total Marks
CI	T	P		Theory Marks		Practical Marks		CA	
			ESE	MSE	V	P	ALA		
3	0	2	5	60	30	10	20	30	150

Legends: CI - Class Room Instructions; T - Tutorial; P - Practical; C - Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V - Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Sr. No.	Course content	Hrs	Weightage
1	Introduction to Petrochemical Industry Definition and scope of petrochemical engineering, Historical development of the petrochemical industry, Classification of petrochemicals, Importance of petrochemicals in modern society, Major petrochemical processes and products, Overview of the petrochemical industry in India	10	20%
2	Petroleum Refining Crude oil composition and properties, Refining processes: distillation, cracking, reforming, isomerization, alkylation, hydrotreating, Refinery units and their functions, Petrochemical	11	30%



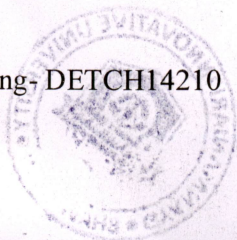
	feedstocks from refineries, Quality control and testing of petroleum products, Environmental concerns in petroleum refining		
3	Petrochemical Processes Production of ethylene, propylene, and butadiene, Production of benzene, toluene, and xylene (BTX), Production of aromatics from naphtha, Production of olefins from paraffinic hydrocarbons, Production of vinyl chloride monomer (VCM), Production of polyethylene, polypropylene, and polystyrene	12	25%
4.	Petrochemical Plant Economics Cost estimation and economic analysis, Project evaluation techniques (NPV, IRR, payback period), Financial management and accounting concepts, Cost control and optimization, Risk assessment and management in the petrochemical industry	12	25%

Continuous Assessment:

Sr. No.	Active Learning Activities	Marks
1.	Practical Application: Students can list out at least 10 petroleum products which are used in day to day life and write a brief report explaining their usage and alternatives. Upload the report on GMIU Web portal.	10
2.	Environmental impact: Students have to prepare a report explaining problems caused by consumption of petroleum products, especially to environment and suggest some solutions. Upload the report on GMIU Web portal.	10
3.	Petrochemical Products: Students need to list out various products of Petrochemical Industries and prepare a report describing their global impacts and upload the report on GMIU web portal.	10
Total		30

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	20%	25%	15%	20%	00



Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Equip themselves with a strong foundation in chemical engineering principles.
CO2	Provide a comprehensive knowledge of the petrochemical industry.
CO3	Develop students' ability to design, operate, and analyze petrochemical plants.
CO4	Understand the environmental and economic implications of the petrochemical industry.

LIST OF PRACTICAL

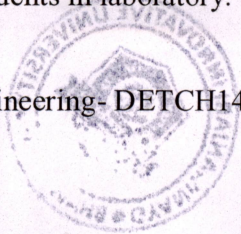
Sr. No.	Practical	Unit	Hours
1	Determination of physical properties of crude oil and refined products (density, viscosity, etc.).	1	2
2	Analysis of crude oil composition using chromatography.	1	2
3	Determination of octane number and cetane number of fuels.	2	2
4	Testing of fuel quality (sulfur content, water content, etc.).	2	2
5	Laboratory-scale preparation of ethylene, propylene, and butadiene.	3	4
6	Synthesis of benzene, toluene, and xylene (BTX).	3	4
7	Polymerization of ethylene, propylene, and styrene.	3	2
8	Analysis of petrochemical products using spectroscopy (IR), UV-Vis, NMR.	4	4
9	Rate petrochemical products using spectroscopy (UV)	4	4
10	Qualitatively analyse petrochemical products using spectroscopy (NMR)	4	4
Total			30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.



Reference Books:

- [1] Petrochemical Process Engineering: A Practical Guide, James G. Speight.
- [2] Petrochemical Technology, A. L. Waddams.
- [3] Petroleum Refinery Engineering, M. Sittig.
- [4] Process Plant Design, Warren L. McCabe, Julian C. Smith, and Peter Harriott.

