



PRESIDENCY UNIVERSITY

BENGALURU

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End - Term Examinations – May / June 2026

Date: 27-05-2026

Time: 01:00pm – 04:00pm

School: SOE	Program: B.Tech (PET)	
Course Code: PET2011	Course Name: Oil and Gas Downstream Operations	
Semester: VI	Max Marks: 100	Weightage: 50%

CO - Levels	C01	C02	C03	C04	C05
Marks	N.A.	N.A.	20	30	50

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2 marks.

10Q x 2M=20M

1.	State the importance of desalting process in petroleum refinery.	2 Marks	L1	C04
2.	Define the Isomerization process with a suitable example.	2 Marks	L1	C04
3.	Describe the importance of pipe still heater in petroleum refinery industry.	2 Marks	L1	C04
4.	State how does a desalter work.	2 Marks	L1	C04
5.	Recognize the correct answer In distillation of the crude oil, it is important not to subject the crude oil to temperatures above A) 350°C to 370°C B) 370°C to 400°C C) 360°C to 370°C D) 400°C to 500°C	2 Marks	L1	C04
6.	Identify the correct answer from the below options:	2 Marks	L1	C05

	Vis-breaking is the process where residues from atmospheric distillation unit (ADU) and vacuum distillation unit (VDU) _____ and produce light hydrocarbons. A) Thermally cracked B) Catalytically cracked C) Thermally and catalytically cracked D) Hydrocracked			
7.	Define the term "Asphaltenes".	2 Marks	L1	C05
8.	Recall the correct answer from the options as given below: Resin is a vacuum residue that is having- A) Higher molecular weight than asphaltenes B) Lower molecular weight than asphaltenes C) Neither Higher molecular weight nor lower than asphaltenes D) None of the above	2 Marks	L1	C05
9.	Imagine you are a petroleum engineer working in the catalytic cracking (CC) section of a refinery. You are using an alumina supported cobalt-molybdenum (Co-Mo) catalyst for the cracking reaction. Typically, a fresh catalyst is expected to have a lifespan of 1 to 2 years. However, after just six months, you have noticed a decline in the production rate from the CC unit. Identify the likely reasons for this decline and discuss potential ways to address the challenges.	2 Marks	L1	C05
10.	State why are desalters important in refinery industry.	2 Marks	L1	C05

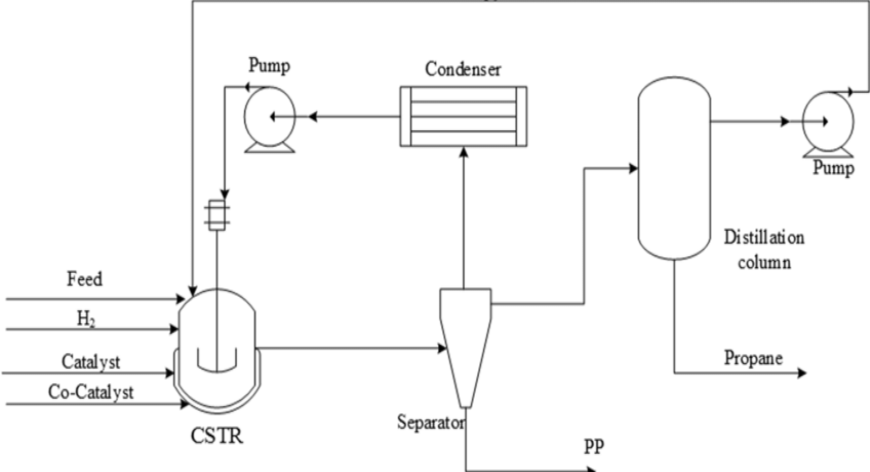
Part B

Answer the Questions.

Total Marks 80M

11.	a.	Apply your understanding of the properties, specifications, and different types of wax to select the most suitable wax for a specific industrial application. In your response, justify your selection by clearly explaining how the chosen wax's characteristics and performance parameters meet the operational requirements of the intended application.	10 + 10 Marks	L3	C03
	b.	Use your knowledge of petcoke specifications, chemical composition, and various types to determine the most appropriate type of petcoke for a given industrial application. Provide a detailed explanation supporting your selection, highlighting how its composition and properties align with the functional and performance needs of the process.		L3	C03
Or					

12.	a.	Apply your understanding of the gas cracking process to identify and determine the appropriate sequence of operating steps, along with suitable process variables such as temperature, pressure, and residence time, in order to maximize product yield under specified industrial operating conditions. Clearly explain how each selected parameter influences the efficiency and outcome of the process.	10 + 10 Marks	L3	C03
	b.	Use your understanding of the production process of Monoethylene Glycol (MEG) from ethylene to determine its key specifications, including purity, composition, and physical properties, for a given industrial scenario. Based on these identified specifications, select the most appropriate industrial application of MEG and justify your choice by considering the specific process requirements, operational constraints, and performance expectations.		L3	C03

13.	a.	Describe in detail the chemical composition and physical properties of Liquefied Petroleum Gas (LPG) and gasoline, including their key constituents, characteristics, and relevant properties.	10 + 10 Marks	L3	C04
	b.	 Examine the process from the above-mentioned diagram. Illustrate the process according to the diagram elaborately. (Describe the process in your own words)		L3	C04

Or

14.	a.	Apply your knowledge of petroleum refining equipment to sketch well-labeled diagrams of both a rectangular pipe still heater and a vertical pipe still heater. Use these diagrams to illustrate and explain their working principles in detail, including fluid flow pattern, heat transfer mechanism, and operational features under practical conditions.	10 + 10 Marks	L3	C04
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	b.	Apply your understanding of industrial chemical processes to construct a suitable diagram of the Vinyl Chloride Monomer (VCM) manufacturing process. Using the diagram, illustrate the step-by-step production of VCM and demonstrate how polymerization is carried out to form PVC, explaining each stage in your own words with appropriate process conditions and reactions.		L3	C04
15.	a.	Analyze and clearly differentiate between a heat exchanger and a pipe still heater by systematically breaking down their design features, modes of heat transfer, and operational principles. Further, examine their respective industrial applications and discuss how the differences in their structure and function influence their efficiency, performance, and suitability in various petroleum processing units.	10 + 10 Marks	L4	C05
	b.	Analyze the Vacuum Distillation Unit (VDU) process by breaking it down into its key operational steps, supported with a well-labeled schematic diagram. Additionally, examine how each stage of the process contributes to improving separation efficiency and the overall effectiveness of the distillation operation in petroleum refining.		L4	C05
Or					
16.	a.	Analyze in detail the internal processes taking place within an Atmospheric Distillation Unit (ADU), including heat transfer, phase separation, and component fractionation. Support your explanation with a neat and labeled sketch, and further examine how various internal components such as trays, reflux system, and reboiler interact to facilitate the efficient separation of crude oil into different fractions.	10 + 10 Marks	L4	C05
	b.	Compare and differentiate the working principles of single-stage and two-stage desalters by explaining their design, operation, and process flow with the help of suitable sketches. Additionally, analyze their operational significance in crude oil processing, particularly in terms of efficiency, salt removal effectiveness, and impact on downstream refining units.		L4	C05
17.	a.	Analyze the simple vis-breaking process and the soaker vis-breaking process used in petroleum refining. Describe their process flow with the help of schematic diagrams, including key units such as heaters, reaction sections, and separation systems. Compare their operating conditions, including temperature, pressure, and residence time. Break down and distinguish their working principles by explaining how thermal cracking occurs	10 + 10 Marks	L4	C05

		in each process. Also, examine the differences in product distribution, such as gas, gasoline, and residual fuel, and discuss how these variations influence their overall performance and industrial applications.			
	b.	Analyze the delayed coking process in an oil refinery by breaking it down into its major stages, such as feed, heating in the furnace, coke drum operation, vapor recovery, and coke removal. Use a suitable diagram to illustrate the overall process flow. Examine how each stage contributes to the formation of products like petroleum coke, gases, naphtha, and gas oils. Further, differentiate the key advantages and limitations of the delayed coking process based on factors such as product yield, operational efficiency, energy consumption, and environmental impact.		L4	C05
Or					
18.	a.	Analyze why diluent is added in the desalting process.	10 + 10 Marks	L4	C05
	b.	Analyze the importance of distillation process in an oil and gas refinery also examine with a suitable diagram how product and by-products are coming out once processed crude oil introduced into the system.		L4	C05