



PRESIDENCY UNIVERSITY

BENGALURU

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Make-up Examinations – December 2025

Date: 26 – 12- 2025

Time: 09:30 am – 12:30 pm

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

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	20	20	30	30	N.A.

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.	Describe the importance of shock or shield section in a pipe still heater.	2 Marks	L1	CO3
2.	Select the correct answer from the following options: In the vacuum distillation column, the liquids to be distilled that have- A) High atmospheric boiling point B) Low atmospheric boiling point C) It stands between High and low atmospheric boiling point D) None of the above	2 Marks	L1	CO3
3.	Recognize the correct answer: Distillation is a process of separating component substances from a liquid mixture by selective _____ and _____. A) Conduction and evaporation B) Evaporation and convection C) Evaporation and condensation D) Condensation and evaporation	2 Marks	L1	CO3

	E) None of the above			
4.	Describe the necessary step to be taken to enhance the bottoms efficiency of the atmospheric distillation unit (ADU).	2 Marks	L1	C03
5.	Identify the correct answer: Light vacuum gas oil that is left over from the VDU is sent to a _____ and then to a _____ to obtain smaller chain hydrocarbons. A) Catalytic cracking unit, Hydrotreater B) Hydrodesulfurization, Catalytic cracking unit C) Hydrotreater, Catalytic cracking unit D) Atmospheric distillation unit, Catalytic cracking unit E) None of the above	2 Marks	L1	C03
6.	List four purposes of vis-breaking process.	2 Marks	L1	C04
7.	Memorize the term “Asphaltenes”.	2 Marks	L1	C04
8.	Identify the correct answer from the options as given below: In the petroleum refinery industry FCC refers to the- A) Fluidized catalytic cracking B) Fluid catalyst cracking C) Fixed catalytic cracking D) Fluid catalytic cracking E) Fixed bed catalytic cracking	2 Marks	L1	C04
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	C04
10.	State the term “Decoking”.	2 Marks	L1	C04

Part B

Answer the Questions.

Total Marks 80M

11.	a.	In crude oil “sulfur compounds are classified according to their corrosive effects” one is the active sulfur compounds and another one is inactive sulfur compounds. Explain in detail the characteristics of active sulfur compounds in crude oil. Similarly, describe the properties and significance of inactive sulfur compounds.	10 + 10 Marks	L2	C01
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	b.	<p>Hydrocracking is a vital process in petroleum refining, aimed at converting heavy feedstocks into more valuable products. There are different configurations of hydrocracking units, namely:</p> <ul style="list-style-type: none"> • Single-stage hydrocracking unit • Single-stage recycle hydrocracking unit • Two-stage hydrocracking unit <p>With the help of suitable schematic flowcharts, discuss each of these configurations in detail.</p>		L2	C01
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Or

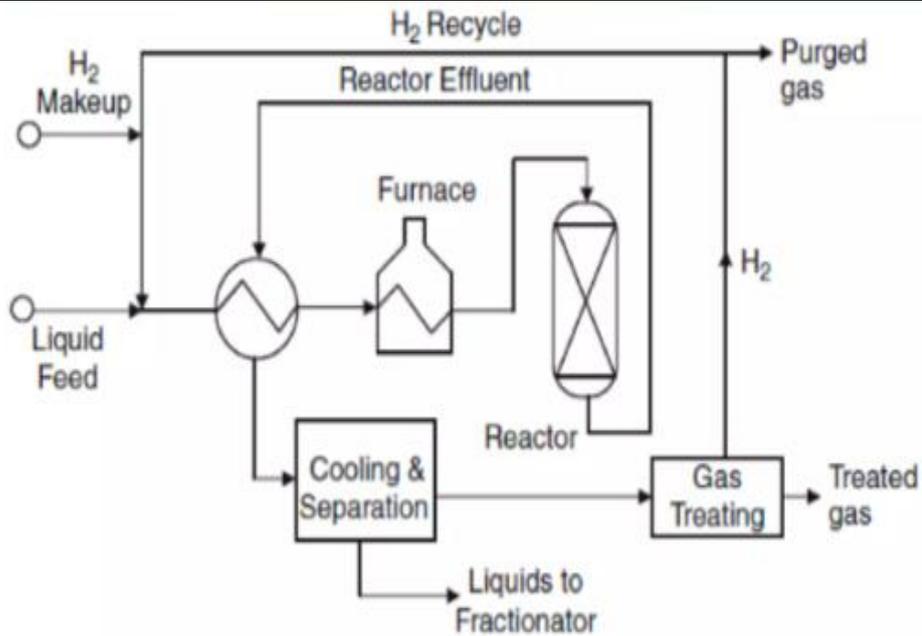
12.	a.	<p>Gas cracking is an important industrial process used to produce lighter hydrocarbons from heavier feedstocks.</p> <p>Explain in detail the various steps involved in the gas cracking process, describing the sequence of operations from feed preparation to product recovery.</p> <p>Discuss the key process variables such as temperature, pressure, residence time, and type of feedstock, and explain how each variable influences the efficiency and outcome of the cracking process.</p>	10 + 10 Marks	L2	C01
	b.	<p>Gas reforming is a fundamental chemical process widely used for the production of synthesis gas (syngas) and other valuable products.</p> <p>Discuss in detail the gas reforming process, clearly explaining the sequence of chemical reactions involved. Also explain its three benefits.</p>		L2	C01

13.	a.	Describe elaborately chemical compositions and physical properties of Diesel.	10 + 10 Marks	L2	C02
	b.	Explain elaborately the specification and applications of poly vinyl chloride (PVC).		L2	C02

Or

14.	a.	Explain industrial specifications and applications of high density poly ethylene (HDPE).	10 + 10 Marks	L2	C02
	b.	With the help of suitable diagram discuss the vinyl chloride monomer (VCM) manufacturing process and polymerization of the VCM.		L2	C02

15.	a.	<p>Heat exchangers and heaters are essential equipment in petroleum refining and chemical industries for effective heat transfer and energy management.</p> <p>With the help of suitable diagrams, explain the working principles of the following equipment:</p> <ul style="list-style-type: none"> • Heat Exchanger • Box-Type Pipe Still Heater • Cylindrical Pipe Still Heater <p>For each type, describe the constructional features and mechanisms of heat transfer.</p>	10 + 10 Marks	L2	C03
	b.	<p>The Vacuum Distillation Unit (VDU) plays a critical role in petroleum refining by separating heavier fractions under reduced pressure.</p> <p>With the help of a clear schematic diagram, describe the process steps involved in the operation of a Vacuum Distillation Unit (VDU). (Describe the process in your own words)</p>			L2
Or					
16.	a.	<p>Describe the interior process that occurs inside the ADU with a net sketch. (describe the process with your own words)</p>	10 + 10 Marks	L2	C03
	b.	<p>With a suitable sketch discuss single stage desalter and two stage desalter process. Also explain the importance of desalters. (Describe the process in your own words)</p>			L2
17.	a.	<p>Vis-breaking is an important thermal cracking process used in petroleum refining to reduce the viscosity of heavy residual oils.</p> <p>With the help of well-labeled schematic diagrams, discuss in detail the following two types of vis-breaking processes:</p> <ul style="list-style-type: none"> • Simple Vis-breaking Process • Soaker Vis-breaking Process 	10 + 10 Marks	L2	C04
	b.	<p>Explain the delayed coking process with a suitable diagram. Also describe key benefits and disadvantages of the delayed coking process.</p>			L2
Or					
18.	a.			L2	C04



10 + 10
Marks

- Identify and summarize the objectives, flow diagram details of process that is shown in the above figure.
- Explain the hydrofining process with a suitable schematic diagram.

b. With a flow diagram describe the hydrocracking process and its three basic principles. (Describe the process in your own words)

L2 C04