

**Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)**



B. Tech (Eighth Semester – Regular/Supplementary) Examinations, April – 2026
22BCHPE48021– Petroleum Refinery Engineering
(Chemical Engineering)

Time: 3 hrs

Maximum: 70 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A**(2 x 5 = 10 Marks)**Q.1. Answer **ALL** questions

- | | CO # | Blooms
Level |
|--|------|-----------------|
| a. Define cetane number and state its significance. | CO1 | K1 |
| b. Why is a high-octane number desirable in gasoline? | CO2 | K1 |
| c. Compare the advantages of propane dewaxing with those of the MEK dewaxing process. | CO3 | K2 |
| d. What are the essential properties required for a solvent to be effective in dewaxing operations? | CO4 | K1 |
| e. Identify the solvent used in the Edeleanu process and explain why it is preferred for this purpose. | CO4 | K3 |

PART – B**(15 x 4 = 60 Marks)**Answer **ALL** the questions

- | | Marks | CO # | Blooms
Level |
|--|-------|------|-----------------|
| 2. a. Explain the composition of crude petroleum in detail, and classify it according to the different types of hydrocarbons present. | 8 | CO1 | K1 |
| b. Compare the properties of paraffinic, olefinic and aromatic hydrocarbons, highlighting differences in their structure and behaviour. | 7 | CO1 | K2 |
| (OR) | | | |
| c. Discuss the current condition of the petroleum sector in India, and analyse the distribution pattern and significance of its petroleum reserves and resources. | 8 | CO1 | K1 |
| d. Describe the major theories explaining the origin and formation of crude petroleum in the Earth's crust, with suitable chemical reactions to support the concepts. | 7 | CO1 | K2 |
| 3.a. Compare single-stage, two-stage, and three-stage distillation units used in petroleum refining, and discuss the advantages of employing multi-stage distillation. | 8 | CO2 | K2 |
| b. Sketch a simplified flow sheet of a two-stage distillation unit and explain the function of each major component in the system. | 7 | CO2 | K1 |
| (OR) | | | |
| c. Design an appropriate pre-treatment process for crude oil containing high concentrations of sulphur, water, and metal impurities. | 8 | CO2 | K4 |
| d. Propose an improved or hybrid technique to enhance the efficiency of existing crude oil pre-treatment methods. | 7 | CO2 | K3 |
| 4.a. Explain the furfural extraction process for improving the quality of lubricating oils, and discuss its industrial significance. | 8 | CO3 | K2 |
| b. Describe the deasphalting process used to remove asphaltic constituents from crude oil fractions, including its working principles and importance in refining operations. | 7 | CO3 | K3 |
| (OR) | | | |
| c. Describe the Copper Chloride process used for sweetening gasoline, including the relevant chemical reactions, and explain the role of copper chloride in this | 8 | CO3 | K1 |

treatment.

- | | | | | |
|------|--|---|-----|----|
| d. | What is Doctor's Solution? Explain the method by which it removes sulfur compounds from petroleum fractions. | 7 | CO3 | K2 |
| 5.a. | What is meant by cracking in petroleum refining? Explain its different types and justify its necessity in modern refineries. | 8 | CO4 | K1 |
| b. | Explain catalytic cracking in detail, including the nature of feedstock, types of catalysts used, key reactions, and major industrial processes. | 7 | CO4 | K3 |
| (OR) | | | | |
| c. | Discuss the chemical reactions involved in thermal cracking processes in petroleum refining in detail. | 8 | CO4 | K2 |
| d. | Describe the alkylation process in which iso-paraffins are converted into higher molecular weight iso-paraffins, and explain its steps and significance. | 7 | CO4 | K3 |

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