GUJARAT TECHNOLOGICAL UNIVERSITY

BE 6 SEMESTER – OLD PAPER – S22 TO S26 – QUESTION BANK

Subject Name & Code: Petroleum Refining and Petro Chemicals - 3160510

Chapter 1: Basics of Petroleum

Repeated Questions:

1. Composition & Classification of Crude Oil:

- **Q.** Discuss composition of crude oil. **(WINTER 2022, 7 Marks; SUMMER 2023, 3 Marks; WINTER 2025, 3 Marks)**
- **Q.** Discuss classification of crude oil in brief. **(SUMMER 2023, 4 Marks; WINTER 2023, 3 Marks; SUMMER 2024, 4 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 4 Marks; SUMMER 2026, 7 Marks)**

2. Indian & Global Scenario (Crude Oil, Refineries & Petrochemicals):

- **Q.** Discuss the recent scenario of production of crude oil and refineries in India. **(SUMMER 2023, 7 Marks; SUMMER 2024, 7 Marks; WINTER 2024, 4 Marks; WINTER 2025, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Explain in brief: Role of crude oil in Global economy. **(WINTER 2022; WINTER 2023, 4 Marks)**

3. Crude Oil Evaluation (ASTM Distillation & Crude Assay):

- **Q.** Explain ASTM distillation with neat sketch. [Diagram required – refer to the original question paper] **(SUMMER 2023, 4 Marks; SUMMER 2024, 3 Marks; WINTER 2024, 3 Marks; SUMMER 2025, 4 Marks; WINTER 2025, 3 Marks)**

Other Important Questions:

1. Origin of Crude Oil:

- **Q.** State and explain evidences in favor of biogenic origin of crude oil. **(SUMMER 2022)**
- **Q.** Explain the biogenic theory for formation of crude oil in detail. **(WINTER 2024, 4 Marks)**

2. Indian & Global Scenario (Crude Oil, Refineries & Petrochemicals):

- **Q.** Discuss about the current scenario of world petrochemical industry. **(WINTER 2023, 7 Marks)**
- **Q.** Enlist major petrochemical units in India. **(WINTER 2023, 3 Marks)**
- **Q.** Write a short note on oil fields and refineries in India. **(SUMMER 2022, 3 Marks)**
- **Q.** Give an account of crude oil refining scenario in global context. **(SUMMER 2025)**

3. Crude Oil Evaluation (ASTM Distillation & Crude Assay):

- **Q.** Explain crude assay for crude oil in detail. **(SUMMER 2026, 7 Marks)**

Chapter 2: Properties of Petroleum Products

Repeated Questions:

1. Gaseous Products:

- **Q.** Enlist and explain various types of gases. **(SUMMER 2022, 3 Marks; WINTER 2023, 3 Marks; SUMMER 2025, 3 Marks; SUMMER 2026, 3 Marks)**

2. Gasoline: Tests, Properties & Additives:

- **Q.** Discuss any three tests for testing of gasoline in detail. **(SUMMER 2023, 7 Marks; WINTER 2024, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** State different types of additives added in gasoline and their functions. **(SUMMER 2022, 4 Marks; SUMMER 2023, 7 Marks; SUMMER 2024, 7 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** Describe any two important properties employed for Gasoline. **(SUMMER 2022, 7 Marks; SUMMER 2024, 3 Marks)**

3. Naphtha:

- **Q.** Discuss various types of naphtha and their important properties & applications. **(WINTER 2023, 7 Marks; SUMMER 2025, 3 Marks)**

4. Kerosene:

- **Q.** Discuss about different tests and properties of kerosene in brief. **(SUMMER 2022, 7 Marks; SUMMER 2024, 7 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 4 Marks)**

5. Diesel Fuels:

- **Q.** What are the different tests recommended for diesel fuels? Explain any two. **(SUMMER 2022, 7 Marks; SUMMER 2023, 4 Marks; SUMMER 2024, 4 Marks)**

6. Fuel Quality Parameters (Definitions & Short Notes):

- **Q.** Define the following: (i) Smoke point (ii) Pour point (iii) Octane number (iv) Cetane number / Softening point **(WINTER 2022; WINTER 2023, 3 Marks; WINTER 2024, 3 Marks; SUMMER 2025, 4 Marks)**
- **Q.** Explain in brief: Cloud and Pour Point. / Discuss cloud point and pour point test. **(SUMMER 2024, 3 Marks; WINTER 2025, 3 Marks)**
- **Q.** Explain in brief: Octane number and its significance. / Explain in brief: Octane Number and knocking. **(SUMMER 2023, 3 Marks; WINTER 2025, 3 Marks; SUMMER 2026, 3 Marks)**

7. Bitumen: Tests & Properties:

- **Q.** Discuss softening point and penetration index with respect to Bitumen. **(SUMMER 2023, 3 Marks; SUMMER 2026, 4 Marks)**

Other Important Questions:

1. Gasoline: Tests, Properties & Additives:

- **Q.** Enlist important properties & tests for gasoline and explain any one in brief. **(WINTER 2022)**

2. Bitumen: Tests & Properties:

- **Q.** Explain Ball and Ring test for bitumen. **(WINTER 2024, 3 Marks)**
- **Q.** Specify two most important tests for bitumen in detail. **(SUMMER 2025, 7 Marks)**

3. Lubricating Oil:

- **Q.** Explain in brief: Conradson carbon residue method for lube oil. **(WINTER 2022)**

4. Fuel Quality Parameters (Definitions & Short Notes):

- **Q.** Discuss briefly: Flash point and Fire point. **(WINTER 2025, 3 Marks)**

- **Q.** Define flash and fire point and list down methods for determination of the same. Also explain any one method in brief. **(SUMMER 2026, 4 Marks)**
- **Q.** Explain in brief: Cetane Number and its significance. **(SUMMER 2024, 3 Marks)**

5. Diesel Fuels:

- **Q.** Discuss briefly: Aniline point and Diesel Index. **(SUMMER 2024, 3 Marks)**

6. General Tests & Properties of Petroleum Products:

- **Q.** Discuss about different test and properties of petroleum oil. **(WINTER 2023, 7 Marks)**

Chapter 3: Processing of Petroleum

Repeated Questions:

1. Crude Oil Pretreatment & Desalting:

- **Q.** Write short note on Electric desalting process. **(SUMMER 2022, 3 Marks; SUMMER 2023, 4 Marks; SUMMER 2024, 4 Marks; WINTER 2024, 4 Marks)**
- **Q.** Explain the need of pretreatment of crude oil in detail and discuss any one method in detail. **(SUMMER 2026, 7 Marks)**

2. Pumping & Heating of Crude Oil:

- **Q.** Explain pumping of waxy crude oil in detail. Also comment on heating of crude oil. **(WINTER 2022; WINTER 2024, 3 Marks; SUMMER 2025, 3 Marks; SUMMER 2026, 4 Marks)**

3. Distillation Units (ADU, VDU & Tower Arrangements):

- **Q.** Discuss in brief Vacuum Distillation Unit (VDU). **(SUMMER 2023, 4 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 4 Marks)**
- **Q.** Discuss in brief Atmospheric Distillation Unit (ADU). **(SUMMER 2022, 4 Marks; WINTER 2023, 4 Marks; SUMMER 2024, 4 Marks)**
- **Q.** Describe different arrangement of distillation towers in petroleum fractioning with the help of neat sketches. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; WINTER 2023, 7 Marks)**

Other Important Questions:

1. Distillation Units (ADU, VDU & Tower Arrangements):

- **Q.** Differentiate: Atmospheric Distillation Unit (ADU) and Vacuum Distillation Unit (VDU) for crude petroleum. **(WINTER 2022)**

2. Pumping & Heating of Crude Oil:

- **Q.** Enlist various pipe still heaters used for heating crude petroleum. Explain any two in brief. **(WINTER 2022)**

Chapter 4: Treatment Techniques

Repeated Questions:

1. Impurities in Crude Oil:

- **Q.** List the physical impurities found in crude oil and the related problems. **(WINTER 2024, 3 Marks; SUMMER 2025, 3 Marks; SUMMER 2026, 4 Marks)**

2. Sweetening Processes:

- **Q.** Discuss in brief about Lead Doctor sweetening process for gasoline. **(SUMMER 2022, 3 Marks; WINTER 2022; SUMMER 2023, 4 Marks; WINTER 2023, 4 Marks; WINTER 2024, 4 Marks; WINTER 2025, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Explain Merox sweetening process for gasoline treatment. **(SUMMER 2022, 7 Marks; WINTER 2023, 7 Marks; SUMMER 2024, 4 Marks; SUMMER 2025, 4 Marks)**

3. LPG:

- **Q.** Discuss manufacturing process of LPG with neat sketch. [Diagram required – refer to the original question paper] **(SUMMER 2022, 4 Marks; SUMMER 2023, 7 Marks; SUMMER 2025, 7 Marks)**
- **Q.** Discuss properties of LPG / LPG and its various composition. **(WINTER 2022; SUMMER 2024, 3 Marks)**

4. Lube Oil Treatment (Extraction, Dewaxing & Deasphalting):

- **Q.** Compare furfural and phenol extraction treatments. **(WINTER 2024, 4 Marks; SUMMER 2026, 3 Marks)**
- **Q.** What is dewaxing? Why it is required? Explain any one method for dewaxing of lubes. **(WINTER 2023, 4 Marks; SUMMER 2025, 4 Marks)**

Other Important Questions:

1. Sweetening Processes:

- **Q.** Define sweetening of gas. Enlist various sweetening techniques for gases. **(WINTER 2022)**

2. Lube Oil Treatment (Extraction, Dewaxing & Deasphalting):

- **Q.** How deasphalting process is carried out for Lubricating oil? Explain in brief. **(SUMMER 2023, 3 Marks)**

Chapter 5: Thermal & Catalytic Cracking

Repeated Questions:

1. Thermal Cracking Processes:

- **Q.** Explain in brief: Necessity and types of Cracking. / Define cracking of crude petroleum. **(WINTER 2022)**
- **Q.** Explain briefly Visbreaking. **(WINTER 2022; SUMMER 2023, 3 Marks; WINTER 2023, 3 Marks; WINTER 2025, 3 Marks)**
- **Q.** Define thermal cracking of crude petroleum and explain Dubbs two coil process of thermal cracking in detail. **(WINTER 2022; SUMMER 2025, 7 Marks)**
- **Q.** Explain briefly delayed coking. **(SUMMER 2022, 7 Marks; SUMMER 2024, 3 Marks; WINTER 2024, 7 Marks)**

2. Catalytic Cracking & Hydrocracking:

- **Q.** Distinguish between thermal and catalytic cracking. **(WINTER 2024, 3 Marks; SUMMER 2026, 3 Marks)**
- **Q.** Discuss fluidized catalytic cracking (FCC) unit of refinery with neat diagram. [Diagram required – refer to the original question paper] **(WINTER 2022; SUMMER 2023, 7 Marks; WINTER 2023, 7 Marks; SUMMER 2024, 7 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks; SUMMER 2026, 7 Marks)**

3. Catalytic Reforming & Platforming:

- **Q.** Explain catalytic reforming in terms of reaction, catalyst, feed stock, operating condition, end products and effect of operating variables. **(SUMMER 2022, 7 Marks; SUMMER 2023; WINTER 2023, 7 Marks; SUMMER 2024, 7 Marks)**
- **Q.** Discuss in detail about Platforming with neat sketch. [Diagram required – refer to the original question paper] **(SUMMER 2022, 4 Marks; SUMMER 2023, 3 Marks; SUMMER 2025, 4 Marks; WINTER 2025, 7 Marks)**
- **Q.** Explain need of reforming unit and explain with neat sketch. Also write on regeneration of catalyst in reformer unit. [Diagram required – refer to the original question paper] **(WINTER 2024, 7 Marks; SUMMER 2026, 7 Marks)**

4. Alkylation, Isomerization & Polymerization:

- **Q.** Distinguish between alkylation, isomerization and polymerization units. / Explain isomerization and polymerization units of refinery. **(WINTER 2024, 7 Marks; SUMMER 2026, 3 Marks)**

Other Important Questions:

1. Catalytic Cracking & Hydrocracking:

- **Q.** Explain in brief: Hydrocracking technique for crude petroleum. **(WINTER 2022)**
- **Q.** Discuss about various catalysts used in catalytic cracking. **(SUMMER 2022, 3 Marks)**
- **Q.** Differentiate between moving bed crackers and fluidized bed crackers. **(SUMMER 2022, 4 Marks)**

2. Alkylation, Isomerization & Polymerization:

- **Q.** Briefly explain catalytic alkylation. **(WINTER 2024, 4 Marks)**

Chapter 6: C1 and C2 Petrochemicals

Repeated Questions:

1. Methanol:

- **Q.** Discuss major engineering problems involved in production of Methanol. **(SUMMER 2022, 3 Marks; SUMMER 2023, 4 Marks; WINTER 2023, 4 Marks; SUMMER 2024, 4 Marks; SUMMER 2025, 4 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Discuss manufacturing process of Methanol with neat sketch. [Diagram required – refer to the original question paper] **(WINTER 2022; SUMMER 2024, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** State various routes of production of methanol. **(WINTER 2023, 3 Marks; WINTER 2024, 3 Marks)**

2. Formaldehyde:

- **Q.** Discuss properties and uses of Formaldehyde. **(WINTER 2023, 4 Marks; SUMMER 2025, 3 Marks; WINTER 2025, 3 Marks)**
- **Q.** Discuss formaldehyde production with neat sketch. [Diagram required – refer to the original question paper] **(WINTER 2024, 7 Marks; SUMMER 2026, 4 Marks)**

3. Chloromethane:

- **Q.** Enlist various properties and uses of Chloromethane. **(WINTER 2022; SUMMER 2025, 3 Marks)**

4. Ethylene:

- **Q.** Discuss manufacturing process of Ethylene with neat sketch. [Diagram required – refer to the original question paper] **(SUMMER 2023, 7 Marks; SUMMER 2024, 7 Marks; WINTER 2025, 7 Marks)**
- **Q.** Discuss major engineering problems associated with the manufacturing process of Ethylene in brief. **(SUMMER 2022, 4 Marks; WINTER 2022)**

5. Vinyl Chloride Monomer & Ethylene Dichloride:

- **Q.** Explain the major engineering problems involved in the manufacturing of Vinyl chloride monomer. **(SUMMER 2022, 3 Marks; SUMMER 2023, 4 Marks; SUMMER 2025, 4 Marks; SUMMER 2026, 4 Marks)**
- **Q.** Discuss with neat flow diagram the manufacturing process of Ethylene dichloride. [Diagram required – refer to the original question paper] **(SUMMER 2024, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks)**

Other Important Questions:

1. Vinyl Chloride Monomer & Ethylene Dichloride:

- **Q.** Discuss properties and applications of Ethylene dichloride. **(SUMMER 2023, 3 Marks)**

2. Ethylene Glycol & Ethylene Oxide:

- **Q.** Explain in detail with a neat flow diagram: Manufacturing process of Ethylene Glycol. [Diagram required – refer to the original question paper] **(WINTER 2022)**
- **Q.** Enlist major engineering problems associated with production of ethylene oxide. **(WINTER 2023, 3 Marks)**

3. Acetic Acid:

- **Q.** Discuss major engineering problems, properties and uses of acetic acid. **(WINTER 2023, 3 Marks)**

Chapter 7: C3, C4, Aromatics and Polymers

Repeated Questions:

1. Polypropylene:

- **Q.** Discuss properties and applications of Polypropylene. **(SUMMER 2024, 3 Marks; WINTER 2025, 3 Marks; SUMMER 2026, 3 Marks)**
- **Q.** Discuss manufacturing process of Polypropylene with neat flow diagram. [Diagram required – refer to the original question paper] **(SUMMER 2022, 7 Marks; WINTER 2022; SUMMER 2024, 7 Marks)**

2. Aromatics (BTX) & Petrochemical Lists:

- **Q.** With the help of a neat flow sheet describe the process of BTX separation. [Diagram required – refer to the original question paper] **(WINTER 2022; WINTER 2024, 4 Marks; SUMMER 2025, 7 Marks; SUMMER 2026, 7 Marks)**

3. Styrene:

- **Q.** Discuss manufacturing process of styrene with neat flow diagram. [Diagram required – refer to the original question paper] **(WINTER 2023, 7 Marks; WINTER 2025, 7 Marks; SUMMER 2026, 7 Marks)**

4. Polyvinyl Chloride (PVC):

- **Q.** Discuss major engineering problems involved in production of PVC. **(SUMMER 2024, 4 Marks; WINTER 2025, 4 Marks)**

5. Polyethylene (LDPE, HDPE & LLDPE):

- **Q.** Discuss manufacturing process of LDPE with neat sketch along with its application. [Diagram required – refer to the original question paper] **(SUMMER 2022; SUMMER 2023, 7 Marks; WINTER 2023, 7 Marks; WINTER 2024, 7 Marks; SUMMER 2025, 7 Marks; WINTER 2025, 7 Marks; SUMMER 2026, 7 Marks)**
- **Q.** Compare LDPE, HDPE and LLDPE / Differentiate between HDPE and LDPE. **(SUMMER 2022; WINTER 2024, 7 Marks; SUMMER 2026, 3 Marks)**
- **Q.** Discuss manufacturing process of HDPE with neat sketch along with its application. [Diagram required – refer to the original question paper] **(SUMMER 2022; SUMMER 2024, 7 Marks)**

Other Important Questions:

1. Butadiene & Synthetic Rubber (SBR):

- **Q.** Explain in detail with a neat flow diagram: Manufacturing process of Butadiene. [Diagram required – refer to the original question paper] **(WINTER 2022)**
- **Q.** Write in brief: Properties and applications of SBR. **(SUMMER 2023, 3 Marks)**
- **Q.** Compare SBR with PBR in detail. **(SUMMER 2026, 3 Marks)**
- **Q.** Discuss various applications of SBR. **(WINTER 2024, 4 Marks)**

2. Aromatics (BTX) & Petrochemical Lists:

- **Q.** List various C1, C2 based and aromatic petrochemicals. **(WINTER 2024, 3 Marks)**

3. Polyvinyl Chloride (PVC):

- **Q.** Write down various properties and uses of Polyvinyl Chloride (PVC). **(WINTER 2023, 4 Marks)**
- **Q.** Enlist applications of PVC in various fields. **(SUMMER 2026, 3 Marks)**

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