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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| **Date:** 09 – 01- 2025 **Time:** 09:30 am – 12:30 pm |

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| **School:** SOE | **Program:** B. Tech in Petroleum Engineering | |
| **Course Code:** PET3013 | **Course Name:** Advanced Refining Engineering (DE-IX) | |
| **Semester**: VII | **Max Marks**: 100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **22** | **22** | **26** | **30** | **-** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1** | Recall the term catalyst deactivation. [mention the reasons behind this elaborately] | **2 Marks** | **L1** | **CO1** |
| **2** | State the role of support while preparing catalyst for any catalytic cracking reaction. | **2 Marks** | **L1** | **CO2** |
| **3** | State the key reaction conditions (temperature, pressure, and catalyst) required for catalytic reforming processes such as Platforming and Power Forming. | **2 Marks** | **L1** | **CO3** |
| **4** | Recall two advantages of Ultra forming process. | **2 Marks** | **L1** | **CO3** |
| **5** | In catalytic reforming process naphtha is the main feedstock. List the compositions of that feedstock. | **2 Marks** | **L1** | **CO3** |
| **6** | Recall Dehydrocyclization and provide one example. | **2 Marks** | **L1** | **CO4** |
| **7** | **“Hydrogen”** is a byproduct in a catalytic reforming process. List three important uses of this by-product. | **2 Marks** | **L1** | **CO4** |
| **8** | Recall the term isomer and isomerization. | **2 Marks** | **L1** | **CO4** |
| **9** | Label the steps for steam cracking of naphtha. | **2 Marks** | **L1** | **CO4** |
| **10** | list two latest development in naphtha cracking that can lead to approximately 10% energy savings. | **2 Marks** | **L1** | **CO4** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** | **a.** | Illustrate the coil vis-breaking process with a suitable diagram also explain its three benefits. | **20 Marks** | **L2** | **CO1** |
|  | **b.** | Explain clearly the reaction steps involved in hydrocracking process and catalysts (like acidic catalyst, hydrogenation catalyst, and bifunctional catalyst) in hydrocracking process.  **[No flowchart is required]** | **L2** | **CO1** |
| **or** | | | | | |
| **12.** | **a.** | Outline the Koppers process by taking the following points:   1. Overview of the Koppers process 2. Process description 3. Applications 4. Advantages and disadvantages of the process. | **20 Marks** | **L2** | **CO1** |
|  | **b.** | Illustrate the **Fluid coking** process with a suitable diagram. | **L2** | **CO1** |
|  |  |  |  |  |  |
| **13.** | **a.** | Explain the catalytic reforming process with a clear flow diagram. Also, state the Houdry catalytic reforming process and Rhein Forming in detail, highlighting its feedstock, catalysts used, reactions steps and operational conditions. Additionally, also construct the reasons for selecting fixed-bed catalytic reactor for the Houdry catalytic reforming process. | **20 Marks** | **L2** | **CO2** |
| **or** | | | | | |
| **14.** | **a.** | Illustrate the objective, process involved, catalyst used, products, application in petroleum industry, environmental impact, by-product formation and its utilization, and importance in modern refining of the Power reforming process. | **20 Marks** | **L2** | **CO2** |

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| **15.** | **a.** | Explain the following points elaborately of a Selecto Forming process   1. Brief of Selecto Reforming 2. Objectives 3. Selective catalyst 4. Feedstock 5. Process Conditions of selecto reforming process 6. By-product formation and its utilization 7. Applications of Selecto forming in Petroleum Refining | **20 Marks** | **L2** | **CO3** |
| **Or** | | | | | |
| **16.** | **a.** | With a suitable schematic diagram elaborately explain the process variables such as reaction temperature, catalyst effect, and acid strength of the “**Sulfuric acid Alkylation**” process. | **20**  **Marks** | **L2** | **CO3** |

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| **17.** | **a.** | Illustrate the effects of Steam on Naphtha cracking. | **20 Marks** | **L2** | **CO4** |
|  | **b.** | Explain the aluminum chloride catalyst-based Isomerization process with a suitable flow diagram. | **L2** | **CO4** |
| **Or** | | | | | |
| **18.** | **a.** | Explain the Platinum catalyst-based Isomerization process following the points as given below: **[Flow diagram is not mandatory]**   1. Reaction Mechanism 2. Catalyst composition 3. Process conditions 4. Industrial applications 5. Advantages of Platinum catalyst along with Challenges and limitations | **20 Marks** | **L2** | **CO4** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***