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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JULY 2024

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| **Semester :VII** | **Date : 10/07/2024** |
| **Course Code : PET 2011** | **Time : 9:30 AM to 12:30 PM** |
| **Course Name : Oil and Gas Downstream Operations** | **Max Marks : 100** |
| **Program : B.Tech** | **Weightage : 50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** | | | |
| 1 | Explain the following statement "Petrochemical complexes involve one or a combination of some operations". | (CO 1) | [Knowledge] |
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| 2 | "Petroleum products are mixtures of hydrocarbons, whereas the raw materials for petrochemicals are pure hydrocarbons separated and converted to desirable products, such as polymers, solvents, and surfactants, usually in several stages" Based on the above statement describe the following stages for production of ethylene from urea. | (CO 1) | [Knowledge] |
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| 3 | "TAN is the key factor for determining a grade of a crude oil" Explain the quoted statement. | (CO 2) | [Knowledge] |
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| 4 | "Fluid catalytic cracking unit is the spinal cord of a refinery" Based on the above statement describe the process description of FCC unit along with a suitable example. | (CO 2) | [Knowledge] |
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| 5 | "Condensate is drawn as the top product or distillate and a part of this, known as the overhead or top reflux, is returned to the column top"- Based on the following statement describe different types of reflux available in the refinery. | (CO 3) | [Knowledge] |
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| 6 | Explain the following statement- "Pretreatment of naphtha required before plat-forming". Also, mention the predominant reactions involved in catalytic reforming. | (CO 4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | Compare the advantages and disadvantages of ethane cracking and naphtha cracking for ethylene manufacture. | (CO 2) | [Comprehension] |
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| 8 | "Ammonia is the main raw material for the production of urea". Explain the following statement. | (CO 2) | [Comprehension] |
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| 9 | Batch reactor is a closed optimised system having sparger, temperature... |  Download Scientific Diagram  Identify the name of the above following apparatus. Also discuss its importance in Petroleum refinery. | (CO 3) | [Comprehension] |
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| 10 | Explain the concept behind the statement ''all molecules spend the same amount of time inside a reactor'' in the context of chemical conversion from Ammonia to Urea. | (CO 3) | [Comprehension] |
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| 11 | With the help of the following flow diagram, discuss the production methodology of LPG. | (CO 4) | [Comprehension] |
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| 12 | "Gasoline is typically a blend of various refinery streams." With the help of the statement discuss the methodology of gasoline production. | (CO 4) | [Comprehension] |
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| 13 | Summarize and explain the key properties and uses of diesel in our daily life, including its chemical composition, energy content, density, and applications, to demonstrate a thorough understanding of its significance in modern society. | (CO 4) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | A petroleum refinery installed an isothermal batch reactor for the production of urea from liquid NH3. At initial condition, the following data was obtained-  The initial concentration of NH3=1kmol/L  conversion rate was 80% after 1 hour.  The order of reaction is zero order (constant for every single situation)  As a petroleum engineer calculate (a) The rate of the reaction for the above reaction; (b) Calculate the required time for 100% conversion. (c) Calculate the required conversion rate after 30 minutes. | (CO 2) | [Application] |
| 15 | For a zero order reaction, A B,80% conversion is obtained in 1 hour. If the initial concentration is 1 kmol/m3  (a) Calculate the rate/rate constant.  (b) Calculate time for obtaining 90% conversion.  (c) Calculate the conversion after 30 min of reaction. | (CO 3) | [Application] |
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| 16 | http://guqbms.inpods.com:57953/api/v1/downloadFile?fileId=40859&tenantid=13  Identify the name of the figure shown below and also discuss its importance in Petroleum refinery. | (CO 4) | [Application] |