


| Name: | |  | |
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| Enrolment No: | | | |
| UPES End Semester Examination, December 2023 | | | |
| Course: Petroleum Refining Technology (Elective) Program: B. Tech (Chemical) Course Code: CHCE 3010 | | Semester: V Time : 03 hrs. Max. Marks: 100 | |
| Instructions: This is a closed book exam. Possession of a mobile or any communication device is strictly prohibited during the exam and will be considered an unfair means. | | | |
| SECTION A (5Q x 4M = 20 Marks) | | | |
| S. No. | Statements of the questions | Marks | CO |
| Q 1 | Name any three important tests for gasoline fuel. Provide at-least one reason for each test. | 4 | CO1 |
| Q 2 | What is LSR naphtha? In which refinery unit is it obtain? | 4 | CO1 |
| Q 3 | What do you understand by flash point of a petroleum product. Write its unit for measuring. What does a high flash point signify (<i>in 4 – 5 lines</i>) | 4 | CO1 |
| Q 4 | Name any four units in a refinery where gas oil is obtained as one of the product. Write any two significance of gas oil <i>w.r.t.</i> petroleum refining process (<i>in 4 – 5 lines</i>) | 4 | CO1 |
| Q 5 | Write any of the four reactions that take place during a hydro-cracking process. | 4 | CO1 |
| SECTION B (4Q x 10M = 40 Marks) | | | |
| Q 6 | (a) Write any two ways (<i>each</i>) by which refineries improve the (a) knocking tendency, and (b) vapor-lock tendency, of gasoline fuel. (b) State the differences between hydrotreating, hydro-cracking, and hydrogenation | 5 + 5 | CO2 |
| Q 7 | Describe in detail about the unit operations and processes of a coking unit. Include a flow chart showing all the streams and unit operations. | 10 | CO1 [2] CO2 [4] CO4 [4] |
| Q 8 | (a) Illustrate the role of alkylation unit in a refinery. (b) Draw a schematic block diagram of a catalytic reforming unit. OR (a) Provide a block diagram of a de-waxing unit. (b) What do you understand by lube oil base stock? | 5 + 5 | CO2 [5] CO3 [5] |

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| Q 9 | <p>Which unit is responsible for the production of lube oil base stock? Describe in details about the processes and operations involved in the unit with a properly labelled flow chart. Your detailed answer should at-least contain the following points:</p> <p>(i) Feed stock and the product (s), (ii) Operating temperature (s) and pressure (s), and pretreatment of feed, if any,</p> <p style="text-align: center;">OR</p> <p>(a) Draw a labelled flow chart of a two-stage crude desalting unit. (b) Draw a labelled flow chart of a severe thermal cracking process.</p> | <p style="text-align: center;">10</p> <p style="text-align: center;">5 + 5</p> | <p style="text-align: center;">CO2[3] CO3[3] CO4[4]</p> |
| SECTION-C (2Q x 20M = 40 Marks) | | | |
| Q 10 | <p>With the help of a properly labelled flow chart, make detailed description of an atmospheric distillation unit (ADU). Your answer must include a minimum of the following information:</p> <p>(i) Unit operations, heating, and heat exchange points, (ii) Operating temperatures and pressure (iii) Number of trays, (iv) Feedstock and products,</p> | <p style="text-align: center;">20</p> | <p style="text-align: center;">CO1[3] CO2[10] CO3[3] CO4[4]</p> |
| Q 11 | <p>(a) Explain in detail about the fluidized catalytic cracking (FCC) unit in a petroleum refinery, with a properly labelled flow chart. Your detailed answer should at-least contain the following points:</p> <p>(i) Description of the whole unit processes and operations in brief, (ii) Temperature and pressure, pretreatment of feed, if any, (iii) Feed stock and the product streams,</p> <p style="text-align: center;">OR</p> <p>Write a detailed description about the two-stage hydrocracking unit in a petroleum refinery, with a properly labelled flow chart. Your detailed answer should at-least contain the following points:</p> <p>(i) Description of the whole unit processes and operations in brief, (ii) Temperature and pressure, pretreatment of feed, if any, (iii) Feed stock and the product streams.</p> | <p style="text-align: center;">20</p> <p style="text-align: center;">20</p> | <p style="text-align: center;">CO1[3] CO2[10] CO3[3] CO4[4]</p> |