

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination November 2018

B. Tech in Chemical Engineering, Semester V/VII

Roll No.....

CHE715: PETROLEUM REFINERY AND PETROCHEMICALS Time: 3 hours **Max. Marks: 80**

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A Objective type multiple choice questions (10 questions @ 1 mark)

10

i. The chief raw material for the commercial production of methanol is:

- | | |
|-------------------|------------------|
| (a) Synthesis Gas | (b) Formaldehyde |
| (c) Acetic acid | (d) Ethanol |

ii. Match the product in group-I to the raw material in group-II

Group-I

P. Ethylene

Q. Methanol

R. Phthalic anhydride

Group-II

1. Natural Gas

2. Synthesis Gas

3. Naphtha

4. Naphthalene

(a) P - 1; Q - 2; R - 3

(b) P - 2; Q - 1; R - 4

(c) P - 3; Q - 1; R - 4

(d) P - 3; Q - 2; R - 4

iii. Formaldehyde is also produced from methanol by oxidation-dehydrogenation process. The catalyst employed in the process is:

(a) Pt-Rh

(b) ZrO₂

(c) Pd-C

(d) Ag - gauze

iv. Coil visbreaking is:

- (a) High temp., High residence time cracking
- (b) High temp., Low residence time cracking
- (c) Low temp., High residence time cracking
- (d) Low temp., Low residence time cracking

v. The proper arrangement of the petroleum fractions in order of their boiling points is

- (a) lubricating oil > petrol > diesel > LPG
- (b) lubricating oil > diesel > petrol > LPG
- (c) petrol > diesel > LPG > lubricating oil

(d) petrol > lubricating oil > diesel > LPG

vi. _____ converts n-paraffins to i-paraffins.

- (a) Alkylation (b) Polymerisation
(c) Isomerisation (d) none of these

vii. Octane number of gasoline is a measure of its

- (a) ignition delay (b) knocking tendency
(c) smoke point (d) ignition temperature

viii. LPG is a mixture of two flammable but nontoxic gases:

- (a) Methane and butane (b) Methane and propane
(c) Methane and Ethane (d) propane and butane

ix. Octane number (unleaded) of gasoline produced by isomerization of butane may be about

- (a) 45 (b) 55 (c) 70 (d) 90

x. Catalytic cracking compared to thermal cracking of residue of vacuum distillation of crude oil

- (a) gives higher yield of petrol
(b) lower octane number of petrol
(c) higher Sulphur content in the product
(d) none of these

Q.2 Short answer type questions (4 questions @ 2.5 marks) 10

- i. Write the name of different petrochemical products we are using in our daily routine life.
ii. Given the list of any five refinery and petrochemical industry in India.
iii. Why thermal cracking is most preferable for vacuum residue than catalytic cracking?
iv. Why Light naphtha is not used for catalytic reforming process.

Q.3A Differentiate between: 05
(a) Flash point and fire point (b) cloud point and pour point

Q.3B Why hydrotreaters are used in industry? Explain the process of hydrotreating with neat diagram. 05

Q.4A Make a flowsheet of butadiene manufacture process. 05

Q.4B Discuss the process of Methane steam reforming. Why this process is important 05

Q.5A What are petrochemicals? How they are classified? Describe the manufacturing process of any compound from 'C1 Group of Petrochemicals'? 01 + 04 = 05

Q.5B Write the different applications of isopropanol. Also describe the process of manufacturing of isopropanol with neat flowsheet. 05

Q.6 Why should we dehydrate gas? Explain the process of solid bed dehydration. 05

OR

- Q.6 What is alkylation? Write down reactions involved in it. Discuss the sulfuric acid alkylation process with a neat sketch. 05
- Q.7 Discuss the status of refinery industries in India. Also listed the factors influencing the price of oil. 7+3 = 10
- Q.8 Explain the concept of cracking with their mechanism. Discuss Fluid catalytic cracking in detail with neat sketch. Write the factors that deactivate the catalyst of fluidized bed catalytic cracking? 15
- OR
- Q.8 Describe the process of Hydrocarbon steam cracking with neat flowsheet? 15