

B.Sc. (Part—I) Semester—II Examination
2S : PETROCHEMICAL SCIENCE

Time : Three Hours]

[Maximum Marks : 80

- Note** :— (1) Question No. 1 is compulsory.
(2) Discuss the reaction mechanism wherever necessary.
(3) Diagrams and chemical equations should be given wherever necessary.
(4) Illustrate your answers with neat sketches wherever necessary.
(5) Use pen of blue/black ink/refill only for writing the answer book.

1. (A) Fill in the blanks :
- (i) In ammonia synthesis source of hydrogen is _____.
 - (ii) _____ generally represent the basic petrochemicals which are the building blocks for various chemical synthesis.
 - (iii) Main constituent of _____ is Methane.
 - (iv) Indian Petrochemicals Corporation Limited (IPCL), was born on _____ to start the first petrochemical complex under the public sector near Baroda. ½×4=2
- (B) Choose the correct alternative :
- (i) Hysorb is used to separate :
 - (a) Ethylene
 - (b) Ethane
 - (c) Methanol
 - (d) Acetylene
 - (ii) Synthesis gas is mixture of :
 - (a) CO and H₂
 - (b) H₂ and N₂
 - (c) CO and CO₂
 - (d) CO₂ and H₂
 - (iii) p-xylene and m-xylene can be separated by :
 - (a) Fractional crystallization
 - (b) Drying
 - (c) Extraction
 - (d) Distillation
 - (iv) The advantage of oxo-synthesis is in getting higher primary alcohols from :
 - (a) Aromatics
 - (b) Olefins
 - (c) Acetylenes
 - (d) Diolefins ½×4=2
- (C) Answer in **one** sentence each :
- (i) Which mechanism is followed in catalytic cracking of hydrocarbons ?
 - (ii) What is the best feedstock for ethylene production ?
 - (iii) Why less reactive catalyst is employed for natural gas reforming process ?
 - (iv) Name the solvent used in Girbotol process. 1×4=4
2. (a) Discuss the importance of petroleum as a source of petrochemicals in detail with suitable examples. 6
- (b) What are the major chemical units of IPCL Baroda ? Discuss these units with their feedstocks and products in brief. 6
- OR**
3. (p) What do you understand by the term "Petrochemicals" ? How these petrochemicals are classified ? 6
- (q) What led to the birth of synthetic organic materials as substitutes for natural essential commodities ? 6

4. (a) All petroleum fractions contain impurities, classify these impurities with suitable examples. 4
- (b) Petrochemical process industry depends mostly on the three sources for their raw materials i.e. natural gas, refinery off gas and liquid petroleum fractions. Explain schematically the basic petrochemicals available from these three sources. 8

OR

5. Discuss the ethanolamine sweetening process in detail with neat sketch of flow diagram and process parameters involved. 12
6. Discuss the azeotropic separation of toluene in detail with neat sketch of flow diagram and process parameters involved. 12

OR

7. Discuss the production of LPG based on absorption technique in detail with neat process flow diagram and process parameters involved. 12
8. (a) Mention the reactions that lead to formation of carbon in steam reforming process. 4
- (b) Discuss in brief, how steam-hydrocarbon ratio affects the yield of steam reforming process. 8

OR

9. (p) Name the various feeds used for steam reforming process. 4
- (q) Discuss the reactivity of hydrocarbons in steam reforming process in detail. 8
10. Synthesis gas is produced by the partial oxidation of hydrocarbons by oxygen. Discuss this process with neat sketch of flow diagram and process parameters involved in detail. 12

OR

11. Discuss the natural gas steam reforming process in detail with neat sketch of flow diagram and process parameters involved. 12
12. (a) Name the various chemicals that are based on carbon monoxide. 2
- (b) How normal aldehyde content of the product can be increased in oxo-process? 4
- (c) What is the typical composition of synthesis gas obtained from different gasification processes? 6

OR

13. (p) Mention the uses of Methanol. 3
- (q) What are the various uses of synthesis gas? 4
- (r) What do you mean by hydroformylation? Explain with suitable example. 5