B.Sc. (Part-I) Semester–II Examination

PETROCHEMICAL SCIENCE

Time : Three Hours] [Maximum Marks : 80

Note :- (i) Question No. **1** is compulsory and carries **8** marks.

(ii) Remaining all **SIX** questions carry **12** marks each.

(iii) Give chemical equations wherever necessary.

(iv) Discuss the reaction mechanism wherever necessary.

(v) Illustrate your answer with the help of neat sketches wherever necessary.

1. (a) Fill in the blanks :

(i) Separation of C_4 components is commonly done by using _____ technique.

(ii) Natural gas essentially consists of _____.

(iii) In ammonia synthesis source of hydrogen is____.

(iv) Steam reforming is an efficacious process for converting hydrocarbons catalytically into a mixture of _____ and carbon monoxide. 2

(b) Choose the correct alternative :

(i) Natural gas containing more than 50 gm/m^3 of condensable hydrocarbons is called as _____.

(a) Dry gas (b) Lean gas (c) Wet gas

(d) Refinery off gas.

(ii) Catalytic reforming is very important process to improve ___.

(a) Oxidation stability (b) Smoke point

(c) Octane number (d) Cetane number

(iii) Main feedstock for the production of VAM is _____.

(a) Propane (b) Butane (c) Iso-butane

(d) Ethylene

(iv) Shift converter is commonly applied in _____.

(a) Steam reforming (b) Steam cracking

(c) Catalytic reforming (d) Catalytic cracking 2

(c) Answer in **ONE** sentence :

(i) In steam reforming process on which factor steam hydrocarbon ratio strictly depends upon ?

(ii) Name the solvent used in Girbotol process.

(iii) What is the role of steam in the steam cracking process ?

10. (a) "The reforming catalyst developed for certain feed may not be useful for other feed", Explain. 4

(b) What is the role of secondary reformer in the steam reforming process ? 4

(c) What are the advantages and disadvantages of partial oxidation of hydrocarbon process ? 4

OR

11. (p) Why hydrogen recycling is recommended when high olefin stocks are used for steam reforming ? 4

(q) Steam-hydrocarbon ratio is considered to be a very important parameter in the steam reforming process. Why ? 4

(r) What is the utility of methanator in the steam reforming process ? 4

12. Discuss the production of propienaldehyde in detail with the neat sketch of flow diagram, process para meters and chemistry involved. 12

OR

13. Discuss the methanol synthesis by the ICI process with the neat sketch of flow diagram, process para meters and chemistry involved. 12

(iv) Which technique is used for separation of toluene ? 4

2. (a) Discuss in brief the role of RCF in agriculture sector. 4

(b) What do you mean by Petrochemicals ? Name the various petrochemical industries with their major products. 8

OR

3. (p) How will you classify the Petrochemical industries in different categories ? 4

(q) Discuss the role of Trans National Corporations (TNC) in providing the biggest boost to the petrochemical industry along with IPCL. 8

4. (a) All petroleum fractions contain impurities. Classify those impurities with suitable examples. 4

(b) According to condensable hydrocarbons present, how petroleum gases are classified ? 4

(c) Presence of sulfur compounds in petroleum fractions is considered as impurity. Why ? 4

OR

5. (p) How petrochemical feed stocks are classified based on their existing form i.e. gas, liquid and solid ? 4

(q) Name the various solid dessicants used for water vapour removal from petroleum gases along with their water removal capacity. 4

(r) Discuss the importance of reformate as a source of various petrochemicals. 4

6. Discuss the separation of C_4 components by extractive distillation 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 flow diagram and process parameters involved. 12

8. (a) Discuss the role of steam in steam reforming process in brief. 4

(b) How steam-hydrocarbon ratio affects the yield in steam reforming process ? Discuss in detail. 8

OR

9. (p) What is the composition of syngas produced by different processes ? 4

(q) What are the various reactions that take place over catalyst in steam reforming of natural gas ? Discuss with suitable examples. 8