AR – 514

Second Semester B. Sc. (Part – I) Examination

PETROCHEMICAL SCIENCE

Paper – 2S

P. Pages : 7

Time : Three Hours] [Max. Marks : 80

Note : (1) Question No.1 is compulsory.
(2) Due credit will be given to neatness.
(3) Diagrams and Chemical equations should be given wherever necessary.
(4) Discuss the reaction, mechanism wherever necessary.
(5) Use pen of Blue/Black ink/refill only for writing the answer book.

1. (A) Fill in the blanks.

(i) Indian Petrochemicals Corporation Limited (IPCL) was born on _____ to start the first petrochemical complex under the public sector near Baroda, Gujarat.

(ii) Lurgi gasification process is related with ——— production.

(iii) Separation of C4 components is commonly done by ——— technique.

(iv) The naphtha reforming reaction is highly ——— and carried out in two stages : primary and secondary reforming. 2

(B) Choose the correct alternative.

(i) Natural gas essentially consists of methane/ethane/propane.

(ii) 70% of steam reforming operations are based on naphtha/gas oil/natural gas.

(iii) Hypersorber is used to separate ——— from cracked gases.

(iv) Steam helps in cracking operations to reduce partial pressure of hydrocarbons/ to increase partial pressure of hydrocarbons / by participating in reactions. 2

(C) Answer in **One** sentence :—

(i) What is the effect of pressure on coking in catalytic cracking ?

(ii) What is the best feedstock for ethylene production ?

(iii) Which solvent is used in Girbotol process ?

(iv) What is the advantage of partial oxidation of hydrocarbon process ? 4

OR

13. (P) What are the uses of methanol ? 2

(Q) Why high pressure is used in oxosynthesis process ? 2

(R) What is the aim of recent developments in methanol production ? 4

(S) Mention the process parameters and chemistry involved in the production of vinyl acetate from carbon monoxide. 4

(R) Steam hydrocarbon ratio is a very important process parameter in the steam reforming process. Why ? 4

10. Discuss the natural gas steam reforming process in detail with neat sketch of flow diagram and process parameters involved. 12

OR

11. Synthesis gas is also 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

12. (A) Name the various chemicals that are based on carbon monoxide. 2

(B) What is the promient use of synthesis gas and major advantage of oxosynthesis ? 2

(C) Mention the process parameters and chemistry involved in the production of propionic acid from carbon monoxide. 4

(D) In oxoprocess, how normal aldehyde content of the product can be increased ? 4

2. (A) What are the major products of Maharashtra Gas Cracking Complex (MGCC) ? 4

(B) Discuss the utility of Hazira-Bijapur-Jagdishpur gas pipeline. 4

(C) National Organic Chemical Industries Ltd. (NOCIL) is regarded as the first integrated petrochemical complex in India. Explain in brief. 4

OR

3. (P) What is the unique feature of Indian Petrochemicals Complex Ltd. Baroda ? 4

(Q) Discuss in brief the Gujarat Aromatic project (GAP) of Indian Petrochemicals Corp. Ltd. Baroda. 4

(R) The growth of petrochemicals and the discoveries made in the polymer field are inter-related. Explain in brief with suitable examples. 4

4. (A) According to condensable hydrocarbon content, how petroleum gases are classified ? 4

(B) All petroleum fractions contain impurities, classify those impurities with suitable examples. 4

(C) Name the various solid dessicants used for water vapor removal from petroleum gases alongwith their water removal capacity. 4

OR

5. (P) What are the various mechanical impurities present in petroleum and petroleum fractions ? Name the sources of these impurities. 4

(Q) Why water vapors present in petroleum gases are treated as impurities ? 4

(R) Petrochemical process industry depends mostly on the basic petrochemicals available from various sources. Name these sources and basic petrochemicals available from these sources. 4

6. Discuss the separation of gaseous hydrocarbons into individual constituents from C4 fraction by low temperature condensation and fractionation in detail with neat sketch of flow diagram and process parameters involved. 12

OR

7. LPG and natural gasoline is produced from the natural gas available from Naharkatiya oil field

using sophisticated turbo expander technology. Discuss this turbo expander technology for natural gas liquefaction in detail with neat sketch of flow diagram and process parameters involved. 12

8. (A) Which process replaced the coal base technologies for the production of synthesis gas ? What is the advantage of this new technology ? 4

(B) What is the reactivity of hydrocarbons in the steam reforming process ? 4

(C) The limitation of heavy feedstocks for reforming in tubular reactors may be more attributed to the desulfurization problems rather than the boiling range. Explain. 4

OR

9. (P) What are the various main and subsidiary reactions that occurs during steam reforming process ? 4

(Q) Though many catalysts are available for steam reforming process, which catalyst established its impregnable position in the industry ? Mention its composition and physical properties. 4