B.Sc. Part—II Semester–IV Examination

4S : PETROCHEMICAL SCIENCE

Time : Three Hours] [Maximum Marks : 80

Note :— (1) Question No. **1** is compulsory.

(2) Diagrams and chemical equations should be given wherever necessary.

(3) Discuss the reaction mechanism wherever necessary.

1. (A) Fill in the blanks :

(i) Isopropyl alcohol dehydrogenation gives _____ . ½

(ii) V.C.M. production from ethane is known as _____ process. ½

(iii) Isopropyl alcohol dehydrogenated to give _____. ½

(iv) Goodyear–SD process for production of isoprene is based on _____ . ½

(B) Choose correct alternative :

(i) Ethylene oxide is generally manufactured by direct oxidation of ethylene in presence of supported metalic _____ catalyst : ½

(a) Silver (b) Platinum

(c) Gold (d) Ferrous.

(ii) Ethylene glycol is obtained by _____ _____ of ethylene oxide : ½

(a) Oxidation (b) Nitration

(c) Hydration (d) Dehydrogenation.

(iii) Ethylene dichloride _____ at 500°C and 3 atm. pressure to give Vinyl chloride monomer : ½

(a) Oxidation (b) Nitration

(c) Dehydrochlorination (d) Dehydrogenation.

(iv) _____ is the monomer of natural rubber. ½

(a) Isoprene (b) Chloroprene

(c) Butadiene (d) All above

(C) Answer in one sentence each :

(i) In Wacker process for production of acetaldehyde, which catalyst is used ? 1

(ii) Give the main user of propylene oxide. 1

(iii) Which raw material is used for production of phenol ? 1

(iv) Which four steps are involved in manufacture of DMT from P-xylene ? 1

2. (A) Poly vinyl chloride is important product in petrochemical industries. Which raw material is used for production of PVC ? Describe advances, economy of process in detail. 8

(B) Describe Vinyl acetate monomer production through acetylene as raw material in detail. 4

OR

3. (P) Describe oxychlorination process for manufacture of V.C.M. with respect to process parameters, chemistry and block diagram. 8

(Q) Compare acetylene and ethylene route for manufacture of V.C.M. with advantages and disadvantages. 4

4. (A) Describe the process in which metallic silver catalyst is used for production of ethylene oxide with the chemistry involved. 6

(B) Discuss ethylene glycol manufacture with respect to the chemistry, process parameters and uses. 6

OR

5. (P) Describe chemistry of chlorohydrin process for production of ethylene oxide. Also give uses of ethylene oxide. 6

(Q) What are the disadvantages of production of ethylene oxide in oxidation and chlorohydrin process. Describe in detail 6

6. (A) Why propylene cannot be easily oxidized to propylene oxide ? Describe chlorohydrin process with respect to chemistry and process parameters. 6

(B) Describe Sohlo process for production of acrylonitrile with process flow diagram. 6

OR

7. (P) Describe isopropyl alcohol manufacture process developed by ICI UK with process parameter chemistry involved. Also give uses of isopropyl alcohol. 6

(Q) Dehydrogenation of isopropyl alcohol gives acetone. Explain with respect to process parameters, chemistry involved and their uses. 6

8. (A) Isoprene is the monomer of natural rubber. Name the various processes for manufacturing of isoprene and also state the uses of isoprene. 6

(B) Name two important routes for the manufacture of chloroprene. Discuss any one of them in detail. 6

OR

9. (P) Describe Goodyear–SD process for production of isoprene with respect to their chemistry and process parameters involved in detail. 6

(Q) Write the chlorination of butadiene for production of chloroprene with the chemistry and process parameters involved. 6

10. (A) Describe production of caprolactum by using benzene as raw material with respect to the chemistry, process parameters involved. Also mention the uses of caprolactum. 6

(B) Describe the production of phenol through cumene route in detail. 6

OR

11. (P) Discuss nitration process for production of aniline with respect to the chemistry and process parameters involved. 6

(Q) Caprolactum is a monomer for production of nylon-6; name the various processes for manufacturing of caprolactum; explain any one process in brief. 6

12. (A) Describe the phthalic anhydride production through naphthalene with respect to the process parameters, chemistry involved. Also mention the uses of phthalic anhydride. 6

(B) Focus recent developments in dimethyl terephthalate process technology. 6

OR

13. (P) Which are the common raw materials for polyester ? Explain terephthalic acid manufactured by using P-xylene with the chemistry involved. 6

(Q) Give the uses of following :

(1) Terephthalic acid. 2

(2) Dimethyl terephthalate. 2

(3) Phthalic anhydride. 2