AT–329

B.Sc. (Part-II) Semester-III Examination

3S : PETROCHEMICAL SCIENCE

Time : Three Hours] [Maximum Marks : 80

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

(2) Remaining **SIX** questions carry **12** marks each.

(3) Draw a diagram and chemical equation wherever necessary.

1. (A) Fill in the blanks : 2

(i) Thermal cracking proceeds via ____ mechanism.

(ii) _____ is obtained in petroleum industry as an ultimate product of prolonged thermal cracking.

(iii) Replacement of hydrogen with charge of carbonium ion is known as _____.

(iv) _____ catalytic cracking process enjoys an impregnable position in catalyst cracking operation.

(B) Choose correct alternative : 2

(i) In India gas oil cracking should be seriously considered for :

(a) Paraffins (b) Napthenes

(c) Olefins (d) Aromatics

(ii) The new oxo process oxo reaction is conducted using highly selective _____ catalyst.

(a) nickel (b) rhodium

(c) cobalt (d) chromium

(iii) Ethyl benzene is generally manufactured by _____ process.

(a) hydrogenation (b) oxidation

(c) alkylation (d) isomerization

(iv) Petroleum coke is the Peerless raw material for :

(a) electrodes (b) clavod

(c) condenser (d) plastics

(C) Answer in one sentence : 4

(i) What is free radical ?

(ii) In selective extraction process which solvent is used to extract butadiene ?

(iii) What are disadvantages of moving bed catalytic cracking process ?

(iv) In oxo process how is cobalt carbonyl formed ?

2. (A) What is thermal cracking ? Which are the thermal cracking operations ? 4

(B) Describe effect of pressure on thermal cracking. 4

(C) Describe radical production, propagation and termination reaction involved in thermal cracking. 4

OR

3. (P) Why thermal cracking is required ? Explain with reaction involved. 8

(Q) Describe properties of cracked material in detail. 4

4. (A) What is coking ? Describe delayed coking with respect to process flow; process description and operating condition in brief. 12

OR

5. (P) Naphtha steam cracking operation is important task for petroleum and petrochemical industries. Discuss them with respect to raw material, reaction, process flow and process description. 12

6. (A) Describe carbonium ion chemistry for catalytic cracking operation in detail. 8

(B) Which type of feed stock is used in catalytic operation ? 4

OR

7. (P) What is the difference between amorphous and zeolite catalyst ? Discuss in brief. 6

(Q) What do you mean catalytic cracking ? Discuss importance of catalytic cracking in petroleum and petrochemical industries. 6

8. (A) Draw and explain propylene product tree in detail. 6

(B) Describe catalytic crackers with their working. 6

OR

9. (P) Fluid catalytic cracking enjoys an impregnable position in catalytic cracking operation, why ? Explain with process flow. 12

10. (A) Name the various routes available for modulation of butadiene. 2

(B) Discuss the manufacturing of butadiene from alcohol with the help of chemistry involved. 4

(C) Explain the selective extraction process for butadiene recovery in brief. 6

OR

11. (P) Compare the performance of conventional and new catalysts used in new oxo process for manufacturing of butanol. 4

(Q) What do you mean by hydro formulation ? Discuss the reaction mechanism involved in the oxo synthesis for the production of higher alcohols from olefins. 8

12. (A) What are the various reactions involved in catalytic reforming ? Mention the chemistry involved. 6

(B) Name and discuss the effect of operating parameters on the reforming process. 6

OR

13. (P) How benzene can be recovered from the BTX-aromatic fraction ? Explain. 6

(Q) Discuss the feedstock selection and preparation for the catalytic reforming process in detail. 6

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