PETROCHEMICAL TECHNOLOGY
(CHEN 3131)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Which of the following is desirable in petrol (Gasoline) but undesirable in the kerosene
(a) Paraffin (b) Aromatics
(c) Mercaptans (d) Naphthenic acid.

(ii) Main constituents of natural gas is
(a) CH_4 (b) C_2H_2
(c) C_2H_4 (d) C_2H_6.

(iii) Ziegler - Nata catalyst is a mixture of
(a) Titanium chloride and aluminium chloride
(b) Palladium and Nickel
(c) Titanium tetrachloride and alkyl aluminium
(d) Aluminium chloride and hydrogen fluoride.

(iv) Thermal pyrolysis of ethylene dichloride produces
(a) vinyl chloride (b) trichloroethylene
(c) methyl chloride (d) ethylene.

(v) Cracking of naphtha is
(a) an exothermic reaction (b) an endothermic reaction
(c) favoured at very low pressure (d) none of these.

(vi) LDPE can be produces from ethylene through
(a) Chlorination (b) Polymerization
(c) Alkylation (d) Pyrolysis.

(vii) Which type of reactor is used during low density polyethylene production?
(a) Stirred tank reactor (b) Tubular reactor
(c) Fluidised bed (d) Packed bed.

(viii) Which of the following statement is not true in case of catalytic reforming?
(a) Dehydrogenation is highly endothermic
(b) Dehydrogenation is exothermic
(c) Dehydrocyclisation reaction is exothermic
(d) Hydrodealkylation reactions are endothermic.

(ix) The raw materials of Nylon 66 are
(a) Adipic acid and Hexamethylene diamine
(b) Caprolactum and Adipic acid
(c) Napthalene and Hexamethylene diamine
(d) Syngas and propylene.

(x) Propylene oxide produced from propylene by
(a) catalytic sulfonation
(b) catalytic oxidation
(c) hypochlorination followed by hydrolysis
(d) hypochlorination followed by H_2O_2 treatment.

Group – B

2. (a) Explain in detail the solvent absorption for natural gas.

(b) Discuss in detail the process conditions of visbreaking operation with the help of a neat flow sheet.

7 + 5 = 12

3. Define and discuss the importance of the followings:
(i) Octane number and Cetane number
(ii) API gravity
(iii) Sweetening and desulphurisation.

(3 × 4) = 12

Group – C

4. (a) What are the main petrochemical intermediates that are obtained by thermal steam cracking of naphtha? Discuss with a neat flow diagram that how different components of naphtha are separated after thermal cracking at the downstream of Naphtha cracker unit.

(b) Discuss with the help of a table or chart that what are the major petrochemicals that are obtained from natural gas. Also mention the process by which those petrochemicals are manufactured.

(2 + 5) + 5 = 12

5. (a) What are the main reactions involved in producing glycerine by Daicel process? Why this process is more popular than the acrolein route of manufacturing glycerine?

   (b) What is the raw material and catalyst used for Butadiene manufacture in industry? Discuss the production and purification process of a continuous manufacturing facility of Butadiene. What are the major applications of Butadiene?

(3 + 1) + (1 + 5 + 2) = 12

Group – D

6. (a) What are the raw materials of phthalic anhydride? Give it uses.

   (b) Write short notes on the followings:
   (i) Dealkylation
   (ii) Hydrocracking
   (iii) Isomerization
   (iv) Dehydrogenation.

2 + (4 × 2.5) = 12

7. (a) Discuss the manufacturing process of phenol from cumene with a help of a neat flow sheet.

   (b) Why fluidized bed is used during phthalic anhydride production from naphthalene?

10 + 2 = 12

Group – E

8. (a) Describe in brief the process of manufacture of Nylon-66 with help of a neat flow sheet.

   (b) Write short on rubber compounding.

8 + 4 = 12

9. (a) Discuss the manufacturing process of phenol-formaldehyde resin with a neat flow sheet.

   (b) Write a short note on comparative studies on plastic, fibre and elastomer.

8 + 4 = 12

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CHE	https://classroom.google.com/c/MTM4NDQxNzU1MjI3/a/Mjc0NDI5MTEzMzg0/details