

**PETROCHEMICAL TECHNOLOGY  
(CHEN 3132)**

**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) The objective of catalytic reforming is  
 (a) increase the octane number (b) decrease the octane number  
 (c) increase the pour point (d) increase the cetane number.
- (ii) The production of aliphatic aldehydes & alcohols by Oxo-synthesis process is performed with the incorporation of synthesis gas and  
 (a) paraffins (b) Olefinic compounds  
 (c) Aromatic hydrocarbons (d) Heterocyclic compounds.
- (iii) KBS is an example of  
 (a) Olefins (b) Hard detergent (c) soft detergent (d) PVC.
- (iv) Ethylene dichloride production is a  
 (a) gas phase reaction  
 (b) solid phase reaction  
 (c) liquid phase reaction  
 (d) gas-liquid phase reaction.
- (v) Phthalic anhydride is produced from  
 (a) Naphthalene (b) Acetylene  
 (c) Benzene (d) Cumene.
- (vi) Dowtherm is used during  
 (a) Ethylene dichloride production  
 (b) Vinyl acetate monomer production  
 (c) Propylene oxide production  
 (d) SBR production.

- (vii) In the preparation of synthesis gas HYDROGEN : CARBON MONOXIDE ratio can be improved by controlling  
 (a) Steam: hydrocarbon ratio  
 (b) Catalyst: hydrocarbon ratio  
 (c) Catalyst: Oxygen ratio  
 (d) Oxygen: hydrocarbon ratio.
- (viii) Raw materials of VCM production are  
 (a) Ethylene dichloride and chlorine  
 (b) Ethylene and chlorine  
 (c) Ethylene, chlorine and water  
 (d) Propylene and benzene.
- (ix) Nylon 6, 6 is made from  
 (a) Acyclic acid & Ammonia  
 (b) Adipic acid & Hexamethylene tetramine  
 (c) Hexmethylene Tetramine and Butanoic acid  
 (d) Adipic acid & ammonia.
- (x) Which catalyst is used during VAM production (vapour phase)?  
 (a) Palladium chloride (b) Alumina  
 (c) Silver (d) Nickel.

**Group - B**

2. (a) What are the impurities present in NG? How NG is purified?  
 (b) What are the petrochemical Feedstock?  
 (c) Define pour point and octane number. **(1 + 4) + 5 + 2 = 12**
3. (a) Describe the essential chemical reactions involved in the steam reforming of methane for the production of syngas.  
 (b) Draw neat process flow diagram for methanol synthesis from syngas.  
 (c) Explain the production distribution in Fischer-Tropsch process for the production of liquid fuels with the help of Anderson-Schulz-Flory distribution. **3 + 3 + 6 = 12**

**Group - C**

4. (a) Discuss the manufacturing process of acrylonitrile with a neat flow sheet.

- (b) What are advantages of fluidized bed compared to packed bed?
- (c) Write down the side reactions involved during acrylonitrile production.

$$8 + 2 + 2 = 12$$

5. (a) Discuss with neat flow sheet the process for the production of propylene oxide.
- (b) Write down the reaction involved in glycerine production (Acrolein route).

$$8 + 4 = 12$$

#### Group - D

6. (a) Explain the manufacturing process of styrene with a neat flow sheet.
- (b) Why vacuum is used in the poly alkyl still unit.
7. (a) Discuss the process with neat flow sheet for the production of phenol (cumene route).
- (b) Why vacuum distillation is required?
- (c) What are the basic advantages of emulsification?

$$10 + 2 = 12$$

$$8 + 2 + 2 = 12$$

#### Group - E

8. (a) How would you classify polymeric materials in respect of their behaviour in different applications?
- (b) Explain briefly the different methods of polymerisation.
- (c) What are the different steps involved in both addition and step-growth polymerisation?
- (d) Mention the differences in polymerisation techniques and methods used for the production of HDPE, LDPE & LLDPE.
9. (a) Describe the process conditions with a neat process flow diagram for manufacturing polypropylene.
- (b) Explain mechanism with chemical equations involved in the production of phenol-formaldehyde resin.
- (c) Explain the methods and processes involved in the production of SBR.

$$2 + 3 + 3 + 4 = 12$$

$$4 + 4 + 4 = 12$$