

**CHEMICAL PROCESS TECHNOLOGY II
(CHEN 3203)**

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) Massecuite represents
 (a) mixture of syrup and crystals
 (c) Massachuset's weather
 (b) London smog
 (d) fructose and glucose.
- (ii) Sterilization is a common practice in
 (a) fermentation industry
 (c) dextrin manufacture
 (b) sugar manufacture
 (d) pulp preparation.
- (iii) Sugar belongs to
 (a) monosaccharide
 (c) polysaccharide
 (b) disaccharide
 (d) starch.
- (iv) Production of alcohol by fermentation of molasses is an
 (a) anaerobic process
 (c) aerobic process
 (b) endothermic process
 (d) exothermic process.
- (v) Phthalic anhydride is produced by oxidation of
 (a) naphthalene
 (c) toluene
 (b) benzene
 (d) aniline.
- (vi) Nylon 6, 6 is so named because
 (a) the average degree of the polymerization of the polymer is 1966
 (b) the number of the carbon atoms between two nitrogen atoms are 6
 (c) the number of nitrogen atoms between two carbon atoms are 6
 (d) the polymer was first synthesized in 1966.
- (vii) SO₂ is bubbled through hot sugarcane juice to
 (a) act as an acidifying agent
 (c) increase the amount of molasses
 (b) increase its concentration
 (d) increase the crystall size.

- (viii) The kinetic studies for the formation of a nitro-derivative of an aromatic compound with mixed acid suggest which of the following mechanism of reaction?
 (a) Nucleophilic addition reaction
 (b) Electrophilic addition reaction
 (c) Free radical reaction
 (d) Electrophilic substitution reaction.
- (ix) What should be the van't-hoff factor for the medium consisting of conc H₂SO₄ & conc. HNO₃?
 (a) 1
 (b) 2
 (c) >1
 (d) 4.
- (x) The catalyst used in the manufacture of phthalic anhydride by oxidation of O-xylene is
 (a) AlCl₃
 (b) V₂O₅
 (c) Ni
 (d) Fe.

Group - B

2. Why oil is hydrogenated? With the help of a neat flow sheet, discuss the hydrogenation process of oil. What are the major engineering problems associated with it? **2 + 6 + 4 = 12**
3. (a) What is a detergent? Discuss the functional aspects of different ingredients in detergents of different classes.
 (b) Write a short note on chemistry of soap formation.
 (c) What are the chemical reactions involved in the manufacturing process of glycerine through allyl chloride route. **4 + 4 + 4 = 12**

Group - C

4. (a) With a neat flow diagram explain the manufacturing process of starch from maize.
 (b) What is inversion of sugar? **10 + 2 = 12**
5. Write short notes on any *three* of the following: **(3 × 4) = 12**
- (i) Pesticides
 (ii) DDT manufacturing process
 (iii) By-products of starch
 (iv) Sugar refining

Group - D

6. (a) Explain the basic steps with the help of a process flow diagram followed in the manufacture of Teflon (PTFE).
- (b) (i) What do you understand by DVS (Dehydrating value of sulphuric acid) in nitration of organic hydrocarbons?
- (ii) Explain the term π (pi) concentration value with reference to sulphonation of aromatic hydrocarbon.

6 + (3 + 3) = 12

7. (a) (i) Every time when the methanol plant is shut down, the reactor is purged with nitrogen, why?
- (ii) With the help of schematic diagram, explain vinyl chloride production process and highlight the major environmental and commercial issues in the plant.
- (b) (i) What are the advantages of fluidized bed reactor over fixed bed reactor in the manufacturing process of phthalic anhydride?
- (ii) Why is demand of butadiene so high and how it is fulfilled by different commercial methods of production?

(2 + 4) + (3 + 3) = 12**Group - E**

8. (a) What is the difference between 6-nylon and 6, 6 nylon?
- (b) Mention the chemical reactions involved in the manufacturing process of 6-nylon.
- (c) Discuss in detail the production process of low density polyethylene with the help of a neat diagram. What are the major engineering problems associated with this process?

1 + 3 + 8 = 12

9. Write short notes on any *three* of the following: **(3 × 4) = 12**
- (i) Emulsion polymerisation
- (ii) Production of HDPE with Ziegler-Natta catalyst
- (iii) SBR production Process
- (iv) Synthetic fibres
- (v) Chemical reactions involved in manufacture of phenol-formaldehyde resin.