

**B.TECH/CHE/6<sup>TH</sup> SEM/CHEN 3203/2017**  
**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) The saturated fatty acid present in oil is  
(a) oleic acid (b) stearic acid (c) linoleic acid (d) linolenic acid.
  - (ii) Unsaturation of fatty acids present in oil can be determined by  
(a) saponification value (b) iodine value  
(c) acid value (d) hydroxyl value.
  - (iii) Dodecylbenzene sulfonate is a surface active agent of the type  
(a) cationic (b) non-ionic (c) anionic (d) amphoteric.
  - (iv) Fumigant insecticides  
(a) kill insects when they eat it (b) emit poisonous vapours  
(c) are absorbed through the plant (d) oxidise the insects tissues.
  - (v) Ethylene oxide is manufactured commercially by the oxidation of ethylene in presence of  $\text{Ag}_2\text{O}$  as catalyst at  
(a) 1 atm & 100°C (b) 50 atm & 1000 °C  
(c) 100 atm & 500°C (d) 5 atm & 275 °C.
  - (vi) When the number average and weight average molecular weights of a polymer sample are identical, the dispersity index is  
(a) >1 (b) <1 (c) equal to 1 (d) equal to 'zero'.
  - (vii) The manufacturing of high purity styrene-butadiene rubber is done by  
(a) emulsion polymerization (b) solution polymerization  
(c) suspension polymerization (d) bulk polymerization.

- (viii) Extractive distillation is performed for the separation of two components because of the low ----- difference of the two components.  
(a) solubility (b) molecular weight (c) volatility (d) miscibility.
- (ix) The Zeigler-Natta catalyst used in the manufacture of polypropylene is basically  
(a) triethyl aluminium combined with titanium tetrachloride  
(b) potassium dichromate in conc. Sulphuric acid  
(c) triethyl aluminium combined with titanium dioxide  
(d) Fe-oxide combined with zeolite.
- (x) High density polyethylene is manufactured in the following reaction conditions  
(a) high pressure & high temperature  
(b) high pressure & low temperature  
(c) low pressure & high temperature  
(d) low pressure & moderate temperature.

**Group – B**

2. (a) Mention the steps for refining of edible vegetable oil.  
(b) State the recovery methods of pure white glycerine from the fat-hydrolysis product in the manufacturing of soaps from vegetable oils & fats?  
(c) Draw a process flow diagram for counter-current solvent extraction process of oil recovery from seeds.

**3 + 5 + 4 = 12**

3. (a) Explain the different steps in kinetics of hydrogenation process for manufacturing of partially or completely saturated oils.  
(b) What are the different types of detergents that functions in various ways in the industrial and domestic applications.  
(c) Explain the functional mechanism of cleansing action of soaps & detergents in aqueous medium on clothes & fabrics.

**4 + 4 + 4 = 12****Group – C**

4. (a) Describe the fermentation process for the conversion of sugar to ethanol.  
(b) Briefly describe with the help of a flow chart the manufacturing process of 100% ethanol from starch slurry.

**5 + 7 = 12**

5. (a) How would you commercially manufacture starch from agricultural resources? Draw process flow diagram.  
(b) Mention some of the natural and synthetic insecticides with their level of toxicity to respective areas of applications in agriculture.

**6 + 6 = 12****Group – D**

6. (a) Why is methanol converter made of copper lined steel reactor and every time when the plant is shut down, the reactor is purged with nitrogen?  
(b) Discuss the major engineering problem associated with manufacturing of ethylene oxide.  
(c) With the help of a neat flow sheet, describe the production of pure butadiene from crude butadiene containing a mixture of butadiene and butene.

**5 + 3 + 4 = 12**

7. (a) Write down the chemical structure of nylon 6, 6 and nylon 6. What are the basic differences in the properties of the two?  
(b) What are the advantages of fluidized bed reactor over fixed bed reactor in manufacturing process of phthalic anhydride?

**6 + 6 = 12****Group – E**

8. (a) Discuss the various process technologies adopted for manufacturing LDPE, HDPE & LLDPE.  
(b) Phenol & formaldehyde are mono-functional monomers but still they form polymer resins. Explain the fact with the help of the chemical reactions involved in the process.

**8 + 4 = 12**

9. (a) Explain the difference between a thermosetting plastic and a thermoplastic.  
(b) Write a short note on Styrene-Butadiene Rubber (SBR).  
(c) Describe the process of manufacturing Polyvinyl chloride by suspension polymerisation technique and mention some its uses.

**2 + 4 + 6 = 12**