CHEMICAL PROCESS TECHNOLOGY
(CHEN 3101)

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) Contact process for the manufacture of sulphuric acid yields
(a) 90% H2SO4 only (b) 80% H2SO4 only
(c) 95% H2SO4 only (d) 98% H2SO4 and higher.

(ii) Which reagent is used for drying ethylene dichloride in the manufacturing process of vinyl chloride?
(a) Calcium Carbonate (b) Sodium sulfate
(c) Silica gel (d) Sulfuric acid.

(iii) How do we remove the presence of acidic impurities in the manufacture of isopropanol?
(a) Wash water (b) Caustic wash
(c) Sulphuric acid (d) Phosphoric acid.

(iv) Which of the following is not an activated nickel catalyst preparation reaction?
(a) $Ni(OH)_2 + H_2 \rightarrow Ni + H_2O$
(b) $Ni(CO)_4 \rightarrow Ni + 4CO$
(c) $2Al \cdot Ni + 6NaOH \rightarrow Ni + 2NaAlO_3 + 3H_2$
(d) $NiCO_3 + H_2 \rightarrow Ni + H_2O + CO_2$.

(v) Why minor quantities of Na_2CO_3 required in electrolysis process?
(a) For Cl_2 drying (b) For high purity brine
(c) For salt purification (d) For high purity depleted brine.

(vi) Which raw material mentioned below is not required in lime soda process?
(a) Quicklime (b) Light soda ash
(c) Alum (d) Oil.

(vii) Which types of water impurity are dissolved salts of Ca and Mg?
(a) Hardness impurity (b) Soluble colour compounds
(c) Insoluble matter impurity (d) Pathogenic.

(viii) Which compound is used to decrease the temperature in the absorber during the manufacture of isopropanol by hydration of propylene?
(a) Refrigerated brine (b) Cold water
(c) Sulphuric acid (d) Nitric acid.

(ix) Which of the following is not an intermediate distillate product in petroleum refining?
(a) Heavy fuel oils (b) Diesel oils
(c) Lubricating oil (d) Gas oil.

(x) Which of the following is a by-product of petroleum refining process?
(a) Fuel oil (b) Diesel oil
(c) Ammonia (d) Lubricating oil.

Group – B

2. (a) Explain the manufacturing process of caustic soda using diaphragm cell with help of neat flow sheet.

(b) Discuss the advantages and disadvantages of mercury cell, diaphragm cell and membrane cell processes.

7 + 5 = 12

3. (a) What is oleum? Describe in detail the contact process for manufacturing the sulfuric acid.

(b) Discuss major engineering problems associated with the production of hydrochloric acid.

(1 + 7) + 4 = 12

Group – C

4. (a) Describe any one process for production of hydrogen with the help of a neat flow sheet.

(b) Explain the manufacturing process of urea with proper flow diagram.

6 + 6 = 12

5. (a) Write down reactions involved in manufacturing of single super phosphate.

(b) Write a short note on crude distillation with neat diagram. What do you mean by cracking?

4 + (6 + 2) = 12

Group – D

6. (a) What is dowtherm? Explain manufacturing process of ethylene oxide with a help of a neat flow diagram.

   (b) Discuss the major engineering problem associated with the production of ethylene oxide.

(2 + 7) + 3 = 12

7. Explain the following conditions of isopropanol production:
   (i) Major and minor reactions
   (ii) Flow diagram
   (iii) Manufacturing process
   (iv) Major engineering problem.

(2 + 5 + 3 + 2) = 12

Group – E

8. (a) Write a short note on Ion exchange method.

   (b) Describe the manufacturing process of soap production with a help of a neat flow sheet.

5 + 7 = 12

9. (a) Discuss the vegetable oil extraction method with the help of a neat flow sheet.

   (b) Differentiate the enzymatic and chemical interesterification method.

8 + 4 = 12

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