CHEMICAL PROCESS TECHNOLOGY
(CHEN 3101)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

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

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Pollution free chlorine is obtained from
(a) Mercury cell process (b) Diaphragm cell process
(c) Membrane cell process (d) All of these.

(ii) The by-product obtained in solvay tower is
(a) Na_2CO_3 (b) NH_4Cl (c) $CaCl_2$ (d) all of these.

(iii) Catalyst used in the sulphuric acid production unit is
(a) Platinum – rhodium (b) Aluminium and zinc oxide
(c) Vanadium pentoxide (d) Lime.

(iv) At a refinery, crude oil is separated into its components by
(a) Catalytic cracking (b) Fractional distillation
(c) Decanting (d) Filtration.

(v) The nitrogenous fertilizer with highest percentage nitrogen is
(a) Urea (b) Ammonium sulphate
(c) Ammonium nitrate (d) Calcium nitrate.

(vi) Which process is used to improve the anti-knock qualities of gasoline?
(a) Cracking (b) Alkylation
(c) Reforming (d) Hydrogenation.

(vii) Dowtherm is used to control the temperature during
(a) Isopropanol production (b) Ethylene oxide production
(c) Vinyl chloride production (d) Butadiene production.

(viii) The catalyst of fluid catalytic cracking reaction is
(a) Zeolite (b) Ziggler Nutta
(c) Ferric oxide (d) Charcoal.

(ix) Example of high refractory is
(a) Fire clay (b) Chromite (c) Zircon (d) Silica.

(x) Which of the following cooling towers possess maximum heat transfer from air to water?
(a) Natural Draft (b) Mechanical Draft
(c) Natural and Mechanical Draft (d) Atmospheric Draft.

Fill in the blanks with the correct word

(xi) To avoid iron contamination during chlorine production evaporator should be lined with _____.

(xii) At lower acid concentration H_2SO_4 and SO_3 form a troublesome _____.

(xiii) Phosphatic fertilizer is graded based on its _____ content.

(xiv) Aniline point test of an oil qualitatively indicates the _____ content of an oil.

(xv) Name of the most commonly used coagulant for waste water treatment is _____.

Group - B

2. (a) Describe the manufacturing process of chlorine production in mercury cell with a neat flow sheet. *[(CO1,CO2)(Analyse/HOCQ)]*
(b) Discuss the advantages and disadvantages of mercury cell process. *[(CO4)(Remember/LOCQ)]*
8 + 4 = 12

3. (a) Briefly discuss the manufacturing process of soda ash production in solvay tower with a help of a neat flow sheet. *[(CO1)(Analyse/HOCQ)]*
(b) Also discuss the major engineering problems associated with this production. *[(CO5)(Understand/LOCQ)]*
8 + 4 = 12

Group - C

4. (a) Discuss the benefit and problem associated with Nitrogen fertilizers. *[(CO2)(Analyse/HOCQ)]*
(b) Write a short note on green ammonia and its applications towards decarbonization. *[(CO2)(Apply/IOCQ)]*
6 + 6 = 12

5. (a) Discuss the use of single super phosphate and role of phosphorous. *[(CO3)(Analyse/HOCQ)]*
(b) State the difference between SSP and DAP. *[(CO4)(Remember/LOCQ)]*
6 + 6 = 12

Group - D

6. (a) Discuss the manufacturing process of vinyl chloride production with the help of a neat flow sheet. *[(CO3)(Analyse/HOCQ)]*
   (b) Explain the major engineering problems associated with vinyl chloride production. *[(CO3)(Remember/LOCQ)]*

8 + 4 = 12

7. (a) Explain the manufacturing steps of butadiene from C4 cut and its application. *[(CO3)(Apply/IOCQ)]*
   (b) Explain the manufacturing process of benzene with net schematic diagram. *[(CO3)(Remember/LOCQ)]*

6 + 6 = 12

Group - E

8. (a) Explain the desire quality of boiler feed-water and cooling tower water. *[(CO4)(Analyse/HOCQ)]*
   (b) Explain the effects of industrial wastewater on streams. *[(CO4)(Remember/LOCQ)]*
   (c) Explain in detail the factors to be considered while stream sampling. *[(CO4)(Apply/IOCQ)]*

4 + 4 + 4 = 12

9. (a) State the advantages of zero discharge liquid management for industrial waste water treatment. *[(CO2)(Apply/IOCQ)]*
   (b) State the various chemical in the Cement Manufacturing process include. *[(CO2)(Apply/IOCQ)]*

4 + 8 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	29.16	29.17	41.67