

**Bachelor of Science (B.Sc.) Semester—III (C.B.S.) Examination**

**INDUSTRIAL CHEMISTRY (ICH—302)**

**Paper—II**

Time : Three Hours]

[Maximum Marks : 50]

**N.B. :—** (1) All questions are compulsory and carry equal marks.

(2) Draw diagrams and write equations wherever necessary.

1. (A) How is m-dinitrobenzene manufactured from nitrobenzene by continuous nitration process ? Explain with well labelled diagram. 5

(B) How will you convert the following :  
 (i) Chlorobenzene to ortho and para nitrobenzene  
 (ii) Acetanilide to para nitro acetanilide ? 5

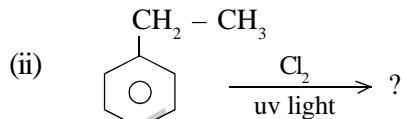
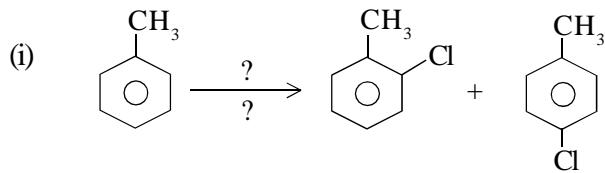
**OR**

(C) Discuss the kinetic of Nitration of Toluene. 2½  
 (D) How will you distinguish Continuous and Batch nitration ? 2½  
 (E) Explain the process of nitration of paraffinic hydrocarbons. 2½  
 (F) Explain mechanism of nitration of Acetanilide. 2½

2. (A) Describe the method of commercial manufacturing of chlorobenzene and dichloromethane. 5  
 (B) What do you mean by halogenation reaction ? What are different types of halogenation reactions ? Explain any one with suitable example. 5

**OR**

(C) How will you synthesized chloral industrially ? 2½  
 (D) Explain the kinetics of halogenation with suitable reaction. 2½  
 (E) Explain the nuclear halogenation of aromatic compound. 2½  
 (F) Complete the following reactions :



2½

3. (A) What is sulphonation ? Give the mechanism of sulphonation of benzene. 5  
 (B) How is Benzoic acid prepared industrially ? 5

**OR**

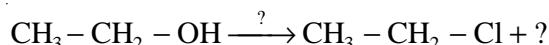
(C) Explain the mechanism of Sulphonation of Naphthalene. 2½  
 (D) What is meant by oxidising agent ? What is role of oxidising agent in chemical reaction ? 2½  
 (E) Distinguish between Batch vs. Continuous Sulphonation. 2½  
 (F) How is Acetaldehyde Synthesized ? 2½  
 4. (A) What is alkylation ? What are different types of alkylating agents ? Explain the thermodynamics of alkylation reaction. 5  
 (B) Explain the process of hydrogenation of oil with the help of flow sheet diagram. 5

**OR**

(C) How is Ethyl benzene synthesized commercially ? 2½  
 (D) Explain role of hydrogenating agent in reaction. 2½  
 (E) How will you synthesized methanol from CO and H ? 2½  
 (F) Draw the flow sheet diagram of continuous process for manufacture of alkyl benzene. 2½

5. Attempt any **ten** of the following :

(i) How will you form the Nitronium ion in the reaction of conc.  $\text{HNO}_3$  and conc.  $\text{H}_2\text{SO}_4$  ?  
 (ii) Write any two properties of nitro paraffins.  
 (iii) Nitration is electrophilic or nucleophilic substitution reaction. Give comment.  
 (iv) Give any two chlorinating agents.  
 (v) Complete the following reaction :



(vi) Write the structural formula of dichloro-fluoromethane.  
 (vii) Define oxidation reaction.  
 (viii) Which sulphonating agent is used for sulphonation of alkyl benzene ?  
 (ix) Give the reaction where ozone is used as oxidising agent.  
 (x) Give any two hydrogenating agents.  
 (xi) How many types of alkylation ?  
 (xii) What is role of catalyst in hydrogenation reactions ?  $1 \times 10 = 10$