

2021
M.Sc.
Third Semester
DSE – 01
CHEMISTRY
Course Code: MCHD 3.11
 (Analytical Chemistry & Catalysis)

Total Mark: 70

Pass Mark: 28

Time: 3 hours

Answer five questions, taking one from each unit.

UNIT-I

1. (a) Discuss the principle involved in polarography. 4
- (b) What is cyclic voltametry? Mention its applications. 3+4=7
- (c) What are membrane sensors? 3
2. (a) What are the various types of ion-selective electrodes? 4
- (b) Explain the principle involved in atomic absorption spectrometry. 4
- (c) Write notes on: 3×2=6
 - (i) Amperometry
 - (ii) Coulometry

UNIT-II

3. (a) Give the four main types of ion exchange resins based on their functional groups. Discuss the application of ion exchange resins in pharmaceuticals. 2+3=5
- (b) What are the different types of exclusion chromatography? Discuss any one of it. 1+3=4
- (c) Discuss the packed columns and capillary columns of gas chromatography. How does it affect on separation? 3+2=5
4. (a) Write short notes on column and thin layer chromatography. 2½×2=5
- (b) Discuss the instrumentation of high performance liquid chromatography (HPLC) with the help of diagram. 5
- (c) Write notes on choice of detectors in gas chromatography. What type of detectors should be used for organic compounds and inorganic and organic sulphur compounds? 2+2=4

UNIT-III

5. a) Explain the following with mechanism. $3 \times 2 = 6$
(i) Oxidative addition
(ii) Insertion reaction
(b) Write notes on activation of small molecules by complexation. 4
(c) Discuss the catalytic reaction of alkene polymerization with mechanism. 4
6. (a) What is a homogeneous catalysis? Give its advantage. $1 + 1 = 2$
(b) Discuss with mechanism the catalytic reaction of the following. $3 \times 3 = 9$
(i) Alkene isomerization
(ii) Alkene hydro formylation
(iii) Ethylene hydrosilytion
(c) Write notes on olefin hydrogenation. 3

UNIT-IV

7. (a) What do you understand by ionizing and non-ionizing solvents? Give examples. $2\frac{1}{2} \times 2 = 5$
(b) How does the acid-base reactions take place in liq. NH_3 ? 4
(c) What is the disadvantage of using liq. HF as a solvent? Give an example of precipitation reaction in liq. HF. $2 + 3 = 5$
8. (a) What are the different types of solvents? Give examples. 4
(b) Mention any two reactions that take place in liq. NH_3 . $3 + 3 = 6$
(c) Explain the auto-ionization reaction of liq. SO_2 . 4

UNIT-V

9. (a) What are silicones? How would you prepare cross-linked silicones? Mention three uses of silicones. $1 + 3 + 3 = 7$
(b) Write short notes on fullerenes. 2
(c) How do you prepare red phosphorus from white phosphorus? Write the reactions involved. 2
(d) Mention the allotropic forms of sulphur. 3
10. (a) What are phosphazenes? Explain the structure of $(\text{NPCl}_2)_3$ $2 + 3 = 5$
(b) How do you prepare B_4H_{10} by Wurt's method? Give the reactions involved. 2
(c) Draw the structure of B_5H_{11} . 3
(d) What are carboranes? Give the preparation of closo-carboranes. $1 + 3 = 4$