(c) Define the following terms :

(i) Conductometric titration

(ii) Transport number. 4

OR

13. (p) Define the term Coefficient of Viscosity and write its unit. What is the effect of temperature on it ? 4

(q) Derive the relation between transport number and ionic conductance. 4

(r) The equivalent conductance of 0.01 N solution of acetic acid was found to be 16.30 Sm^2 $equv^{-1}$ at 25°C. The ionic conductance of H^+ and CH^3COO^- ions at infinite dilution is 349.8 and 40.9 Sm^2 $equv^{-1}$ respectively at the same temperature. Calculate the degree of dissociation. 4

AP–445

B.Sc. Part–II (Semester–III) Examination

3S : CHEMISTRY

Time : Three Hours] [Maximum Marks : 80

N.B. :— (1) Question No. **1** is compulsory.

(2) Solve **one** question from each unit.

(3) Draw diagrams and give equations wherever necessary.

(4) Use of calculator is allowed.

1. (A) Fill in the blanks :

(i) Shape of IF_7 molecule is _____.

(ii) The _____ titration involves the formation of insoluble precipitate when reactants are mixed together.

(iii) The reaction in which two different aldehydes without α-H-atoms are heated with conc. alkali is called _____.

(iv) To determine the viscosity of liquid the apparatus used is____. $4 \times ½ = 2$

(B) Choose the correct alternative :

(i) According to MOT O_2 molecule is :

(a) Paramagnetic

(b) Diamagnetic

(c) Ferromagnetic

(d) None of the above

(ii) In Clemmensen reduction carbonyl group is reduced to :

(a) Alcoholic Group

(b) Methylene Group

(c) Acidic Group

(d) Phenolic Group

(iii) Total number of conformations of ethane are :

(a) 2

(b) 3

(c) 4

(d) 6

UNIT–V

10. (a) Derive Van't Hoff equation $\frac{d(\ln kp)}{dT} = \frac{\Delta H^0}{RT^2}$. 4

(b) Define the following terms :

(i) Gibb's free energy

(ii) Chemical Potential. 4

(c) An aqueous 0.1 dm^3 solution of organic compound containing 0.01 kg of compound would be extracted in five instalments of 0.02 dm^3 each of ether. If the partition coefficient is 5 in favour of ether, calculate the amount extracted. 4

OR

11. (p) Discuss the physical significance of Gibb's free energy. 4

(q) Derive $\mu_i = \mu_i^0 + RT \ \ell n \ P_i$. 4

(r) Explain Phenol-water system. 4

UNIT–VI

12. (a) How would you measure surface tension of a liquid by drop number method ? 4

(b) Discuss the effect of dilution on specific and equivalent conductance of solution. 4

(q) Explain Benzoin condensation with suitable example. 4

(r) What is the action of following on Salicylic acid :

(i) Methanol

(ii) Phenol. 4

UNIT–IV

8. (a) Explain E-Z system of nomenclature with example. 4

(b) Explain the conformations of n-butane with energy level diagram. 4

(c) Explain the following terms :

(i) Optically active compounds

(ii) Plane of symmetry

(iii) Racemisation. 4

OR

9. (p) Explain the Baeyer strain theory and give its limitations. 4

(q) What is conformation ? Explain why chair conformation of cyclohexane is more stable than boat conformation. 4

(r) Explain the R-S system of designating the configuration of optically active compound. 4

(iv) Free energy is ____.

(a) Intensive Property

(b) Additive Property

(c) Colligative Property

(d) Extensive Property $4 \times \frac{1}{2} = 2$

(C) Answer the following in **one** sentence :

(i) What is Standard Solution ? 1

(ii) What is meant by Asymmetric C-atom ? 1

(iii) What are immiscible liquids ? Give example. 1

(iv) Define Surface tension. 1

UNIT–I

2. (a) On the basis of molecular orbital diagram of N_2 molecule, explain.

(i) Bond order of N_2

(ii) Whether N_2 is paramagnetic. 4

(b) What is meant by metallic bonding ? Explain metallic bonding on the basis of free electron theory. 4

(c) On the basis of VSEPR theory, Explain the structure and shape of SF_6 molecule. 4

OR

3. (p) On the basis of molecular orbital diagram of NO molecule, explain.

(i) Bond order

(ii) Molecular orbital configuration of NO

(iii) Whether NO is paramagnetic. 4

(q) Using the band theory of metals, explain the properties of conductors, insulators and semiconductors. 4

(r) Explain the geometric structure of CH_4 molecule on the basis of VSEPR theory. 4

UNIT–II

4. (a) What are different types of titrations ? Give their names. 4

(b) Calculate molarity and normality of a solution containing 4.9 gms of H_2SO_4 in 500 ml water (Mol. Wt. of H_2SO_4 = 98). 4

(c) Explain acid-base titration taking example of HCl and NaOH. 4

OR

5. (p) Explain internal and external indicators in redox titrations. 4

(q) Explain digestion process in gravimetric analysis. What is its need ? 4

(r) Calculate weight of KOH required to prepare 0.2 M, 500 ml solution. (Mol. wt. of KOH = 56). 4

UNIT–III

6. (a) How will you synthesize benzaldehyde from :

(i) Benzene

(ii) Toluene. 4

(b) What happens when :

(i) Isopropylidene dichloride is hydrolysed with NaOH

(ii) Benzaldehyde is heated with 50% NaOH 4

(c) (i) What is the action of NH_3 on oxalic acid ?

(ii) How Lactic acid is converted into Pyruvic acid ? 4

OR

7. (p) What is Cross-Cannizzaro reaction ? Explain with suitable example. 4