AU–57

B.Sc. (Part—I) Semester—II Examination

2S : CHEMISTRY (New)

Time : Three Hours] [Maximum Marks : 80

Note :—(1) All questions are compulsory.

(2) Question No. **1** carries **8** marks. While each of the remaining **SIX** questions carries **12** marks.

(3) Draw diagram and write equations wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :

(i) The shape of IF_3 molecule is _____.

(ii) The tendency of an anion to get polarize by cation is known as _____.

(iii) IUPAC name of Glycol is _____.

(iv) The temperature at which ferromagnetic substance behaves like paramagnetic is called _____. ½×4=2

(B) Chose the correct alternative :

(i) The acid catalysed hydrolysis of methyl acetate is :

(a) First order reaction (b) Second order reaction

(c) Third order reaction (d) Zero order reaction

(ii) Which of the following elements can show –1, +1, +3, +5 and +7 oxidation states ?

(a) Iodine (b) Sodium

(c) Sulphur (d) Magnesium

(iii) Fluorine never show positive oxidation state because :

(a) It is most electronegative element

(b) Its atomic radius is very small

(c) It is less reactive

(d) It is nonmetal

(iv) Epoxide is also called as :

(a) Oxyrane (b) Phenol

(c) Catechol (d) Hydroquinone ½×4=2

(C) Answer in **one** sentence each :

(i) Define Energy of Activation.

(ii) What are Chalcogens ?

(iii) What is the geometry of PCl_5 ?

(iv) What are polar solvents ? 1×4=4

UNIT—I

2. (A) Explain Fajan's Rule with respect to :

(i) Smaller and highly charged cation

(ii) Large and highly charged anion. 2×2=4

(B) What is polarization ? Give the applications of the concept of polarization. 4

(C) Discuss the structure of IF_7 molecule on the basis of hybridization. 4

OR

3. (P) Define acid and base according to Lux-Flood concept. Give its merits and demerits. 4

(Q) What is hybridisation ? Give the conditions of hybridisation. 4

(R) Differentiate between hard and soft acid giving suitable examples. 4

UNIT—II

4. (A) Write the electronic configuration of halogen family elements. 4

(B) Explain the structure of XeF_4 molecule. 4

(C) How are solvents classified on the basis of proton donating and accepting ability. 4

OR

5. (P) Discuss structure and bonding in BrF_5 molecule. 4

(Q) Explain the Oxidation states of Oxygen family elements. 4

(R) What are the requirements of good solvent. 4

UNIT—III

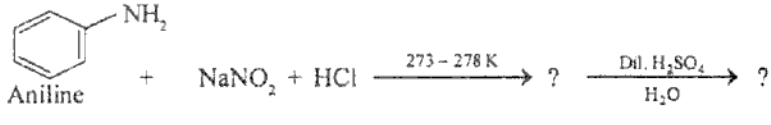
6. (A) How will you prepare ethylene glycol from :
   (i) Ethylene
   (ii) Ethylene oxide. 2+2=4
   (B) What happens when :
   (i) Chlorobenzene is heated with sodium ethoxide at 473 K.
   (ii) Glycerol is treated with PCl_5. 2+2=4
   (C) Compare the reactivity of vinyl and allyl-chloride towards nucleophilic substitution reaction. 4

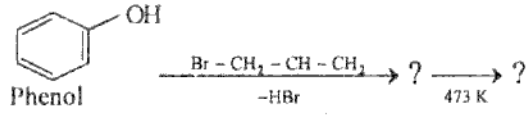
OR

7. (P) How will you prepare :
   (i) Aniline from chlorobenzene.
   (ii) Tri-nitroglycerine from glycerol. 2+2=4
   (Q) How will you convert :
   (i) Glycol to 1,4-dioxane
   (ii) Glycerol to acrolein. 2+2=4
   (R) Explain benzyne intermediate mechanism. 4

UNIT—IV

8. (A) What is epoxide ? Give the synthesis of styrene oxide. 4
   (B) How will you prepare :
   (i) Diethyl ether from ethyl alcohol
   (ii) Ethylene oxide from ethylene. 2+2=4
   (C) Complete the following reactions :

   (i) 

   (ii) 

2+2=4

OR

9. (P) Explain :
   (i) Kolbe's Carboxylation.
   (ii) Reimer-Tiemann reaction. 2+2=4
   (Q) Explain ring opening reactions of epoxide catalyzed by base. 4
   (R) Explain acidic character of phenol. 4

UNIT—V

10. (A) Explain :
   (i) Induced polarization.
   (ii) Orientation polarisation. 2+2=4
   (B) Define and explain ferromagnetism. 4
   (C) Calculate number of unpaired electrons when u_m = 4.9 B.M. 4

OR

11. (P) Define :
   (i) Curie Temperature and Curie Law
   (ii) Polar and Non-polar molecule. 2+2=4
   (Q) Derive relation between magnetic moment and no. of unpaired electrons. 4
   (R) What are paramagnetic substances ? Give their characteristics. 4

UNIT—IV

12. (A) Explain :
   (i) Molecularity
   (ii) Velocity (Rate) constant. 2+2=4
   (B) What is second order reaction ? Show that second order reaction behave as first order reaction when one of the reactant is taken in large excess. 4
   (C) Explain factors affecting rate of reactions. 4

OR

13. (P) Derive Kinetic equation for first order reaction. 4
   (Q) Explain Pseudo-unimolecular reaction with suitable example. 4
   (R) The decomposition of H_2O_2 was studied by titrating it at different intervals of time with potassium permagnate ($KMnO_4$). Calculate the velocity constant from the following data, if reaction is of first order :

t(min)	0	10	22	40
Vol. of $KMnO_4(dm^3)$	25.0	20.0	15.5	9.6

4