VCD 16/10/19 CHEMISTRY P-I S.Y.B.Sc SEM-III MARKS 100 TIME 3 HRS

NOTE: i) All the questions are compulsory.

ii) Figures to the right indicates full marks.

iii) Use of non-programmable calculator/ log table is allowed.

Q.1 A) Multiple choice Questions. **(12M)**

1. Change of free energy with pressure at constant temperature is related to.....

   a) Volume b) Entrpy c) Volume and entropy.

2. If ΔG has negative value, then the reaction is .....

   a) Non-spontaneous b) Spontaneous c) at equilibrium

3. Sum of transport number of cations and anions of an electrolyte is .....

   a) 1 b) zero c)Less than one

4. Eelectrolytic conductance is due to which of the following species?.....

   a) Electrons b) ions c) Protons

5. For tetrahedral geometry the radius ratio rule is .....

   a) 0.155-0.225 b) 0.225 – 0.414 c) 0.414 – 0.732

6. Hybridization of 'Be' in BeF_2 is.....

   a) Sp b) sp^2 c) sp^3

7. Number of resonating structures of CO molecule will be .....

   a) 2 b) 3 c) 4

8. If an electron is removed from an antibonding molecular orbital of the species, the bond order.....

   a) Decreases b) increases c) remains the same

9. Phenols can be prepared by.....

   a) Dow's process b) Naphthalene sulphonic acid c) both

10. Epoxides are named as.....

a) Oxitanes b) Oxiranes c) Oxaphosphetanes

11. An appropriate solvent for Grignard's reagent formation is .....

a) Tetrahydrofuran b) water c) aqueous alcohol

12. Reaction of Epoxide with HX leads to the formation of .....

a) Halohydrin b) alkyl halide c) alcohol

B) State whether the following statements are True or False. **(03M)**

1) For strong electrolytes degree of dissociation is nearly equal to one.

2) In SN^i reaction there is no inversion of configuration.

3) Oxygen molecule is paramagnetic.

C) Match the following. **(05M)**

i) For spontaneous process	a) Octahedral structure
ii) Cell constant	b) Lattice energy
iii) Born Lande's equation	c) $\Delta G < 0$
iv) Sulphur hexa fluoride	d) Detergents
v) Sulphation of alcohols	e) l/a

Q.2 Attempt ANY FOUR of the following questions. **(20M)**

1) Derive relation between Gibb's free energy and Helmholtz free energy .

2) Discuss the factors affecting transport number.

3) Derive Van't Hoff's reaction isochore.

4) 22.6 g of an aqueous solution of ethanol contains 4.6 g of ethanol. If change of chemical potential of ethanol is -10 KJ. Find the change of chemical potential for H_2O.

5) Explain how degree of ionic product of H_2O is determined by conductance method.

6) If the equivalent conductance of Dichloroacetic acid at infinite dilution at 250C is 388.5 Scm2 and the degree of ionization 0.61. Estimate the specific conductivity of 0.1 N dichlor oacetic acid.

Q.3 Attempt ANY FOUR of the following questions. **(20M)**

1) What is covalent bond? Explain conditions for the formation of covalent bond.

2) On the basis of molecular orbital theory explain magnetic property and bond order of oxygen molecule.

3) Give applications of Born-Haber cycles

4) Give postulates of valence bond theory.

5) Give difference between sigma and pi molecular orbitals.

6) Calculate the lattice energy of NaCl crystal from the following data by the use of Born-Haber Cycle. Heat of atomization of Sodium = 108.7 KJmol-1, . Heat of atomization of chlorine = 120.9 $KJmol^{-1}$, Ionisation potential of sodium = 493.7 $KJmol^{-1}$, Electron affinity of chlorine(Cl)= -365.3 $KJmol^{-1}$, Heat of formation of NaCl = -410.9 $KJmol^{-1}$.

Q.4 Attempt ANY FOUR of the following questions. **(20M)**

1) Give factors affecting SN1 and SN2 reactions.

2) With respect to the preparation of alcohols, explain the following reactions.

   a) Sulphatation b) Eyherification

3) What are Grignard's reagent? How are they prepared? What is the function of ether/THF.

4) Explain SN1 reaction with mechanism .

5) Give the ring opening reactions of Epoxides by:

   i) Hydrolysis in acidic conditions

   ii) Reaction with HX

   iii) Reaction with ROH

   iv) Reaction with HCN

   v) Reaction with RMgX

6) Write a note on Williamson's synthesis.

Q.5 Attempt ANY FOUR of the following questions. **(20M)**

1) The standard free energy change for a gaseous reaction is 71.128 KJ. Calculate the equilibrium constant of reaction at 2000K (Given, R = 8.314 Jk-1mol-1).

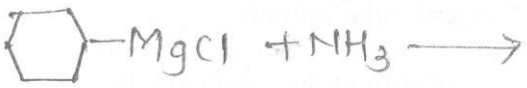
2) Explain the factors affecting electrolyte conduction.

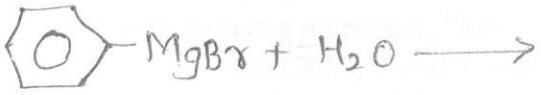
3) Explain any five conditions for resonance.

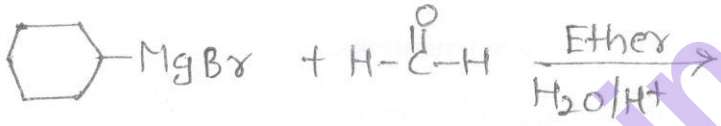
4) Define Hybridization. Explain the hybridization of Be in $BeCl_2$.

5) Complete the following reactions.

i) $C_6H_5MgCl \xrightarrow[H_2O/H^+]{CO_2,\ dry\ ice}$

ii) 

iii) 

iv) 

v) $C_6H_5MgCl + \bigcirc\!\!=O \xrightarrow[H_2O/H^+]{Ether}$

6) Explain the mechanism of alkaline hydrolysis of tert- butyl bromide giving energyprofile diagram.