SCIENCE FACULTY
North Maharashtra University, Jalgaon.
Class:- S.Y.B.Sc. (Semester Pattern)
(wef. June 2008)

Paper I-CH-211, Semester-I

(Physical Chemistry+ Inorganic Chemistry)

Sr. No.	Topic and no. of periods	Weightage of Marks	Number of questions			
			2 Marks	3 Marks	4 Marks	6 Marks
1	**Chemical Thermodynamics:- (14)**	16	24	12	16	10
2	**Electrochemistry:- (12)**	14	21	10	14	08
3	**Molecular Orbital Theory:- (16)**	19	28	14	18	11
4	**Principle of Metallurgy:- (10)**	12	17	09	12	07
	Total	61	90	45	60	36

Paper I-CH-221, Semester-II

(Physical Chemistry+ Inorganic Chemistry)

Sr. No.	Topic and no. of periods	Weightage of Marks	Number of questions			
			2 Marks	3 Marks	4 Marks	6 Marks
1	**Colligative Prpperties :- (14)**	16	24	12	16	10
2	**Chemical Kinetics:- (12)**	15	21	10	14	08
3	**d-block elements :- (14)**	16	24	12	16	10
4	**Acids and Bases :- (06)**	07	11	06	07	04
5	**The Noble Gases :- (06)**	07	10	05	07	04
	Total	61	90	45	60	36

Paper I-CH-212, Semester-I

(Organic Chemistry+ Analytical Chemistry)

Sr. No.	Topic and no. of periods	Weightage of Marks	Number of questions			
			2 Marks	3 Marks	4 Marks	6 Marks
1	**Carbohydrates :- (08)**	09	14	07	09	06
2	**Synthetic Reagents:- (08)**	09	14	07	09	05
3	**Electrophilic Aromatic Substitution:- (06)**	07	10	05	07	04
4	**Agrochemicals :- (04)**	05	07	03	05	03
5	**Introduction to Analytical Chemistry and Data handling:-(08)**	09	14	07	09	06
6	**Stoichiometric calculations :- (08)**	09	14	07	09	05
7	**Volumetric analysis:- (10)**	13	17	09	12	07
	Total	61	90	45	60	36

Paper I-CH-222, Semester-II

(Organic Chemistry+ Analytical Chemistry)

Sr. No.	Topic and no. of periods	Weightage of Marks	Number of questions			
			2 Marks	3 Marks	4 Marks	6 Marks
1	**Stereoisomerism :- (10)**	12	17	09	12	07
2	**Chemistry of Heterocyclic and Polycyclic compounds:- (08)**	09	15	07	09	06
3	**Organic Chemistry in Industry:- (04)**	04	07	03	05	03
4	**Green Chemistry :- (04)**	05	07	03	05	03
5	**Complexometric titration:- (06)**	07	10	05	07	04
6	**Redox titration:- (10)**	12	17	09	11	06
7	**Chromatographic analysis:- (10)**	12	17	09	11	07
	Total	61	90	45	60	36

Structure of Question Paper

Question.1. Solve any 4 question out of 6. Each question of 2 marks.

Question.2. Solve any 2 question out of 3. Each question of 4 marks.

Question.3. a)Solve any 2 question out of 3. Each question of 3 marks.

b) Compulsory question of 2 marks.

Question.4. Solve any 2 question out of 3. Each question of 4 marks.

Question.5. a)Question of 6 marks.

OR

a)Question of 6 marks.

b) Compulsory question of 2 marks.

Structure of Question bank of Chemistry per paper per semester.

Structure of Question	Total Questions	Total Marks
2 Marks	90	180
3 Marks	45	135
4 Marks	60	240
6 Marks	36	216
	231	771

S.Y.B.Sc.-Paper-CH-211
First Term Q.B. (Physical Chemistry)
ELECTROCHEMICAL CELL.

Questions of Two marks each.

1) Define cell. What are different types of cells?
2) Define electrochemical and electrolytic cell. Give one example of each.
3) What do you understand oxidation and reduction?
4) Define electromotive force. Mention its unit.
5) Why voltmeter is not used for the measurement of emf of chemical cell?
6) Mention the various types of potentiometers. State Poggendroff compensation principle.
7) State the conditions for the standard cell.
8) Represent the electrochemical cell with suitable example.
9) State the relation between free energy and emf. Give the significance of the terms involved in it.
10) Define the single electrode potential. How it is determined?
11) What is meant by the term “reference electrode’’? Name any two reference electrodes.
12) Draw the neat and clean labelled diagram of calomel electrode. Write the electrode reaction of it.
13) What is meant by standard emf of the cell? How is it related with equilibrium constant?
14) What are the condition of spontaneity in terms of free energy change and emf?
15) Mention the different types of gas electrodes.

16) Write the electrode reaction of Chlorine gas electrode. Give the expression for electrode potential of it.
17) Write the electrode reaction of Oxygen gas electrode. Give the expression for electrode potential of it.
18) Give the expression for electrode potential of oxidation reduction electrode.
19) What is amalgum electrode/Write the expression for electrode potential of it..
20) Give the advantage of amalgum electrode.
21) Write Nernst equation and explain the term involved in it.
22) State the enthalpy change and emf. Signifiy the term involved in it.
23) Define temperature coefficient of the cell. How it is related with entropy change.

Questions of Three marks each.

1) Draw a neat and clean labelled diagram of Weston std. cell?
2) Draw neat and clean labelled diagram of calomel electrode?
3) Describe the construction of calomel electrode. Write the electrode reaction of it?
4) Obtain the relationship between std cell emf of cell & equilibrium constant of cell reaction?
5) Derive a relation between the equilibrium constant of the cell reaction with standard EMF of the cell?
6) Derive a relation between emf and ΔS of the cell reaction.
7) Derive the relation between emf and ΔS of the cell reaction.
8) Derive the relation for ΔH and ΔG for cell reaction in terms of emf of cell.
9) Obtain the expression for enthalpy change for a cell reaction in terms of emf of cell & its temperature coefficient?
10) Define single electrode potential. How single electrode is potential measured using hydrogen electrode?

11) Describe the construction of hydrogen gas electrode. Give the electrode reaction.

12) Amalgum electrode is more advantageous than metal-metal ion electrode.Comment.

13) Explain with suitable example the metal insoluble salt electrode. Give the electrode reaction.

14) Explain with suitable example the oxidation-reduction electrode. Give the electrode reaction.

15) Write the cell reactions of the following cell.

a) $^{(-)}Ag \mid AgCl_{(s)}\ Cl^- \parallel I^-, AgI_{(s)} \mid {}^{(+)}$

b) $^{(-)}Ni \mid Ni^{2+} \parallel Pb^{2+} \mid Pb^{(+)}$

c) $^{(-)}\ Pt \mid Sn^{2+}\ Sn^{4+} \parallel Fe^{3+}, Fe^{2+} \mid Pt\ ^{(+)}$

16) Derive a cell of the following cell reactions.

1) $\frac{1}{2}\ Br_{2(l)} + Fe^{2+} \rightleftharpoons Br^- + Fe^{3+}$

2) $Cu^{2+}_{(aq)} + H_{2\,(g)} \rightleftharpoons Cu_{(s)} + 2H^+$

3) $Zn_{(s)} + 2CuI_{(s)} \rightleftharpoons Zn^{2+} + 2I^- + 2Cu_{(s)}$

Questions of Four marks each.

1) Describe Poggendroff compensation method for measuring the emf of a cell.
2) Explain the principle of direct reading potentiometer.
3) Explain the construction and working of normal hydrogen electrode. Describe the merits and demerits of the electrode.
4) Write note on standard hydrogen electrode.
5) Describe single electrode potential. How single electrode is potential measured using hydrogen electrode? Illustrate with one example.
6) What is meant by secondary reference electrode? Discuss the construction and working of saturated calomel electrode.
7) Derive Nernst equation for electrode potential.
   Or Derive the expression for emf of a cell by considering the cell reaction

   $aA+bB \rightleftharpoons cC+dD+\text{----}$

8) Deduce the relationship between emf of cell

and i) Enthalpy change,

ii) Entropy change.

9) Calculate the emf of the cell at 298 K

$^{(-)}Zn_{(s)}$ | Zn^{2+} (a=1M) || Cu^{2+} (a=0.1M) | $Cu_{(s)}^{(+)}$

Given : E^{o}_{Zn} (oxi) = 0.763 V. and E^{o}_{Cu} (oxi) = - 0.34 V.

10) E.M.F. of a certain cell at 25^{o} C is 0.3525 V. & temperature coefficient is 1.62 X 10^{-4} V/K. Calculate the change in Gibb's free energy entropy & enthalpy of the cell reaction at 25^{o} C, if two electron are involved in it ,F=96500 Coulombs.

11) Devise a cell in which the cell reaction is

Sn^{2+} (a-1M)+Pb == Sn + Pb^{2+} (a-1M)

Calculate the equilibrium constant of the cell reaction at 25^{o} C. The standard emf of the cell is -0.014 V at 25^{o} C.

12) Write electrode reaction & calculate the emf of the cell

$^{(-)}Zn$ | Zn^{2+} (a=0.1M) || Ag^{+} (a=0.05M) | $Ag^{(+)}$

at 25^{o}C Given :$E^{o}_{Zn\ (oxi)}$= 0.763 V. and $E^{o}_{Ag(oxi)}$ = -0.799 V.

13) Write electrode reaction & calculate the emf of the cell

$^{(-)}Cu$ | Cu^{2+} (a=0.05M) || Ag^{+} (a=0.01M) | $Ag^{(+)}$

The Standard oxidation potentials of Cu & Ag electrodes are0.337 & -0.799 V respectively.

14) The Standard potential of the cell $^{(-)}Cd$ | Cd^{2+} (a=1M) || Cu^{2+} (a=1M) | $Cu^{(+)}$ is 0.74 V. at 25^{o}C.Write the cell reaction and calculate the standard free energy change and equilibrium constant of the cell reaction. F-96500 Coulombs.

15) Determine whether the oxidation reduction reaction Sn +Ni^{2+} == Sn^{2+} +Ni is spontaneous and calculate equilibrium constant at 25^{o} C

[E^{o}_{Sn} (oxi) = 0.14 V. and E^{o}_{Ni} (oxi) = 0.25 V.]

16) Write the cell reaction and calculate its std free energy change and equilibrium constant at 298 k.

$^{(-)}Cd \mid Cd^{2+}$ (1m) $\| Cu^{2+}$ (1m) $\mid Cu^{(+)}$

Given : $E^{o}_{Cd\ (oxi)}$ = 0.403 V and $E^{o}_{Cu\ (oxi)}$ = - 0.337 V.

17) Calculate the electrode potential of Pt I $Co^{2\pm}$, Co^{3+} electrode if the emf of the following cell is 1.4938 V.

$^{-}Hg|Hs_2Cl_2(s),Cl^{-}(0.1N)||Co^{3+},Co^{2+}|Pt^{+}$

The electrode potential (oxi) of calomel electrode is 0.3328 V

18) Construct the cell for the reaction

$$Cd + Pb^{2+}\ (1\ M) \longrightarrow Cd^{2+}\ (1\ M) + Pb$$

Calculate the free energy change of the reaction at 25 ^{0}C.

$E°_{Cd\ (oxi)}$ = 0.403 V , $E°_{Pb\ (oxi)}$ = 0.126 V . F = 96500 coulombs.

Questions of Six marks each.

1) State and explain Poggendroff compensation principle and describe the working of direct reading potentiometer.
2) Define electromotive force. Describe Poggendraff compensation method for measuring EMF of a galvanic cell?
3) What are the qualities of standard cell? Give the construction and working of Weston saturated standard cell.
4) What are the different types of electrodes? Give example of each type. Discuss the construction, working and use of hydrogen / amalgam electrode.
5) Describe the gas electrode and oxidation-reduction electrode with reference to formulation, electrode reaction and the expression of oxidation potential.
6) Discuss with suitable example any two types of electrodes with reference to formulation, electrode reaction and expression of electrode potential.
7) Explain why pure metals in metal-metal ion electrodes are replaced by their amalgams. Describe with example an amalgam electrode?

8) Describe with suitable example the metal insoluble salt electrode & gas electrode with reference to formulation electrode reaction and on expression of electrode potential?
9) Explain with suitable example, the oxidation-reduction electrode & metal-metal ion electrode with reference to formulation, electrode reaction & expression of electrode potential?

CHEMICAL THERMODYNAMICS.

Questions of Two marks each.

1) Define Helmholtz free energy and Gibbs free energy.
2) Give the physical significance of ΔA.
3) Show that $(\partial A/\partial T)_v = -S$
4) Show that $(\partial A/\partial V)_T = -P$
5) Show that $-\Delta G = W_{max} - P\Delta V$.
6) Show that $(\partial G/\partial T)_p = -S$
7) Show that $(\partial G/\partial P)_T = V$
8) Show that $[\partial/\partial T(A/T)]_V = -E/T^2$
9) Show that $[\partial/\partial T(G/T)]_P = -H/T^2$
10) Derive the relation between Helmholtz free energy and Gibbs free energy.
11) Write the Gibbs-Helmholtz equation. Explain the term involved in it.
12) Give the relation between ΔG and equilibrium reaction. Explain the term involved in it.
13) What is the significance of - i) $-\Delta G$,ii) $+\Delta G$ for a chemical reaction.
14) Define fugacity and activity.
15) What do you understand by standard state for solid and liquid.
16) Define standard free energy of formation with suitable example.
17) Give the criteria for equilibrium in terms of ΔA.
18) Give the criteria for equilibrium in terms of ΔG.

19) Give the criteria for equilibrium in terms of ΔS.

20) Write the any two different forms of Clapeyron equation .

21) Define Kp and Kc.

22) Define Lewis fugacity rule.

23) Write the relation between Kp and Kc. Explain the term involved in it.

Questions of Three marks each.

1) Explain the ΔA for reaction.

2) Show that $(\partial A/\partial T)_v = -S$, and $[\partial/\partial T(A/T)]_V = -E/T^2$

3) Explain the ΔA for reaction.

4) Show that a) $dG = V\,dP - SdT$, b) $[\partial/\partial T(G/T)]_P = -H/T^2$

5) Show that a) $\Delta A = -W_{max}$, b) $\Delta G = \Delta A + P\Delta V$

6) Show that $\Delta G^0 = -RT \ln Ka$

7) Explain the physical significance of free energy change.

8) Derive the calculation of free energy change.

9) Give the properties of free energy change.

10) Define the term fugacity, activity &activity coefficient.

11) Explain variation of vapour pressure with temperature.

12) Give the application of Clapeyron equation.

13) Derive the relation between Kp and Kc.

14) Derive the expression for the variation of Kp with temperature.

15) State Calusius Clapeyron equation. How the equation can be utilised to determine enthalpy of vaporisation of a liquid.

16) Two moles of an ideal gas at 300 K and 3.5 atm are compressed isothermally and reversibly to 15.8 atm. calculate the change in the Gibb's free energy for the compression.(R= 8.314 KJ/mole)

17) n-hexane boils at 77.8 ^{o}C under a pressure of 1000 mm Hg. calculate the normal boiling point of n-hexane if its molar heat of vaporisation is 6850.cal/mole.(R= 1.987 $calK^{-1}mole^{-1}$)

18) The boiling point of benzene at 760mm/Hg is 80.1 ^{o}C calculate its boiling point at 110mm Hg. the heat of vaporisation of benzene is 30.76 KJ/mole.(R = 8.314JK^{-1}mole^{-1}.)

19) 1 lit. of an ideal gas at 300K has an initial pressure of 1 atm. is allowed to expand isothermally & reversibly at 1.5 atm. Calculate free energy change..

Questions of Four marks each.

1) Show that $[\partial/\partial T\ (\Delta A)]_V = -\Delta S$, $[\partial/\partial T(\Delta G/T)]_P = -\Delta H/\ T^2$
2) Write the properties of ΔG. Explain how the sign ofΔG is related to the spontaneity of a process.
3) Derive the relation $\Delta G = 2.303\ nRT \log P_2/P_1$
4) Show that contraction is non-spontaneous and expansion is spontaneous process.
5) Explain the term fugacity & activity of a substance. Give the relation between fugacity and activity.
6) Derive Gibbs-Helmholtz equation.
7) Derive Van't Hoff reaction isotherm.
8) Derive Clapeyron equation.
9) What is Kp and Kc? Derive the relation between them.
10) 1 lit. of an ideal gas at 300 K has an initial press of 15 atm. is allowed to expand isothermally & reversibly to a volume of 10 lit. Calculate the free energy change.
11) 10 gm Helium compressed reversibly and a constant temperature of 100 ^{0}C from a pressure of 2 atm. to 10 atm..Calculate the work done and free energy change(R=2 cal/K/mole)
12) The vapour pressure of water at 95^{0}C and 100^{0}C are 634 and 760 mm of Hg respectively. Calculate the latent heat of vaporisation.(R= 1.987 cals.)
13) Calculate the standard free energy change for the reaction.
$4NH_{3(g)} + 5O_{2(g)} = 4NO_{(g)} + 6H_2O$

of the standard free energies of formation of NH_3 , NO , H_2O are -3.9 ,20.7 and -56.7 Kcal.mole^{-1} respectively.

14) The Gibbs free energy for a reaction at 25 and 35 ^{0}C are -28.92 Kcal and -29.52Kcal respectively. Calculate the enthalpy and entropy change at 25^{0}C.

15) The vapour pressure of water at 90^{0}C is 52.6 cm of Hg and latent heat of vaporisation is 542 cal/gm .Calculate the vapour pressure at110^{0}C.

16) The vapour pressure of water at 25^{0}C is 23.76 mm of Hg knowing its normal point. Calculate the heat of vaporisation of water.

Questions of Six marks each.

1) Define Helmholtz free energy. Show that at constant temperature decrease in change in Helmholtz free energy is equal to the maximum work done by system. Deduce the expression for variation of Helmholtz free energy with temperature and volume.
2) Define Gibbs free energy. Show that the decrease in Gibbs free energy is equal to the maximum work other than due to volume change at constant temperature and pressure. Deduce the variation of Gibbs free energy with temperature and pressure.
3) Define Helmholtz free energy & Gibb's free energy. Obtain the expression for their variation with the parameters like temperature Pressure & volume.
4) Define Gibb's free energy. How is it related to Helmholtz free energy? Show that $-\Delta G = W_{max} - P\Delta V$.
5) Define Gibbs and Helmholtz free energy .Discuss the significance of Gibbs free energy change.
6) Derive Gibb's Helmholtz equation. Give its importance.
7) Derive Van't Hoff reaction isotherm in different form.
8) Deduce the condition of equilibrium in terms of ΔA, ΔG, ΔS.
9) Derive the Clapeyron equation .Give its importance

10) Derive Clausius-Clapeyron equation for vapour pressure of liquids and give its applications.

11) Give the relation between ΔG and equilibrium constant. Explain the significance of each term involved in it.

S.Y.B.Sc.
Question Bank
Inorganic Chemistry (CH –211)

Molecular Orbital Theory

2 Marks

1. State any one assumption of valence bond theory.
2. Draw bonding and antibonding molecular orbitals in S-S combination.
3. Draw energy level diagram for the formation of MO's from S- S AO's.
4. Define S-S combination of atomic orbitals.
5. Why O_2 shows paramagnetic behaviour.
6. Write MO configuration of NO^+ ion.
7. Why polarity of CO molecule is less than expected?
8. Define P-P combination of atomic orbitals.
9. Draw MO diagram of Li_2 molecule.
10. Show bond order of NO^+ ion.
11. Show MO energy level diagram for HCl.
12. Draw a diagram to show formation of sigma bonding and antibonding orbitals by combination of 'S' orbitals.
13. Draw figures to show formation of σ2Px , σ*2Px molecular orbitals.
14. Draw figures to show formation of π2Pz, π*2pz molecular orbitals.
15. Define
    a) Atomic orbital b) Molecular orbital
16. Define
    a) Bonding orbital b) Antibonding orbital
17. Define
    a) Sigma bond b) Pi bond
18. Define
    a) Homo nuclear diatomic b) Hetero nuclear diatomic

19. Define Non bonding orbital
20. Define
    a) Paramagnetism b) Diamagnetism
21. Give formulae for the calculation of bond order.
22. Write down general scheme for molecular orbital configuration.
23. Which molecule has following molecular orbital configuration.
    $\sigma 1S^2$, $\sigma^* 1S^2$, $\sigma 2S^2$, $\sigma^* 2S^2$, $\sigma 2Px^2$,
    $\pi 2Py^1$, $\pi^* 2Py^0$, $\sigma^* 2Px^0$
    $\pi 2Pz^1$, $\pi^* 2Pz^0$
24. Which is paramagnetic OR diamagnetic from following molecules a) C_2
    b) O_2
25. Which is paramagnetic OR diamagnetic from following molecules a) B_2
    b) Ne_2
26. Which is paramagnetic OR diamagnetic from following molecules? a) F_2
    b) O_2
27. Sketch the figures for the formation of Sigma and pi M.O. for S-S combination.
28. Sketch the figures for the formation of Sigma and pi M.O. for S-P combination.
29. Sketch the figures for the formation of Sigma and pi M.O. for P-P combination.

3 Marks :

1. Draw MO diagram of He^{+2} and calculate bond order.
2. Why Be_2 and He_2 are unstable?
3. Explain: Oxygen molecule is paramagnetic while Nitrogen molecule is diamagnetic.
4. Give two points of difference between σ and π M.O.
5. State the defining characteristics of σ and π M.O.
6. List three rules of Linear Combination of atomic orbitals.
7. What are bonding, non-bonding and antibonding molecular orbitals?

8. Write a note on limitations of VBT.
9. According to M.O. theory Be_2 does not exist. Explain.
10. Distinguish between bonding and antibonding molecular orbitals.
11. Discuss sigma and pi molecular orbital formation by Linear combination of 'P' orbital.
12. Helium is called mono atomic molecule. Explain.
13. Distinguish between atomic orbitals and molecular orbitals.
14. How do you account for the chemical inertness of N_2?
15. The set of valence shell orbital (2S, 2P) for N are of higher energy than those for C. Explain the reason for your answer.
16. Give the assumption of M.O.T.
17. Explain the formation of bonding and antibonding orbitals in hydrogen molecule.
18. Explain-H_2 is more stable than H_2^+ ion.
19. Explain He_2 does not exist but existence of He_2^+ ion can be proved.
20. How are δ M.O.s are formed.
21. Nitric oxide is paramagnetic. Explain.
22. The bonding in F_2 is weaker than that in O_2. Give reason.

4 Marks

1. Distinguish between sigma (σ) MOs and (π) MOs (4 points)
2. State the rules for linear combination of atomic orbitals
3. Describe the bonding on the basis of MO theory for H_2 molecule
4. Draw MO energy level diagram for Be_2 molecule
   Calculate the bond order and predict the stability of the molecule
5. According to M.O. theory He_2 and Be_2 are non-existing. Give reason.
6. Explain with the help of M.O. Theory neon molecule is mono atomic
7. Explain the difference between molecular orbital theory and valence and theory
8. Explain with the help of diagram σ and π molecular orbital formation by combination of P- atomic orbitals.

9. NO^+ has stronger bond than NO itself. Explain.
10. How is stabilization energy calculated for homo nuclear diatomic molecules? How is it related to stability of molecule? Illustrate your answer with suitable example.
11. Give the important features of V.B.T. What are its limitations?
12. Bond order in H_2 and Li_2 is same but bond energy in Li_2 is less than in H_2. Explain.
13. Discuss the bonding in HCl molecule on the basis of MOT.
14. Point out the similarities and the differences between VBT and MOT
15. Mention the important points of VBT
16. Mention the important points of MOT.
17. Draw MO energy level diagram for C_2 molecule calculate the bond order. Is C_2 molecule paramagnetic or diamagnetic?
18. Discuss the formation of F_2 molecule on the basis of MO theory and predict the bond order.

6 Marks

1. State the difference between MOT and VBT
2. Draw molecular orbital diagram of CO.
   Calculate the bond order and explain the stability.
3. Draw molecular orbital diagram of NO, write MO configuration and calculate the bond order.
4. Write MO configuration and calculate the bond order of O^{2-} ion, O_2^{2-} ion and O^{2+} ion.
5. Draw Molecular orbital energy level diagram of Li_2 and F_2 molecule and comment on their stability and magnetic properties. Calculate stabilization energy in each case.
6. Draw M.O. energy level diagram for NO^+ and NO molecules. Explain which of the two species is more stable.
7. Explain with the help of M.O. theory the paramagnetic nature of oxygen molecule. Why is the VBT not able to explain this?

8. Draw molecular orbital energy level diagram for N_2 molecule and answer the following questions.
   a) How many Sigma and pi bonds are there in N_2 molecule.
   b) Why nitrogen molecule is chemically inert.
9. Discuss with the help of M.O. Theory the formation of NO molecules. Explain its magnetic properties.
10. Explain with the help of diagram the formation of molecular orbitals by the combination of a) s-s orbitals b) p-p orbitals c) s-p orbitals d) p-d orbitals.
11. Draw molecular orbital diagram for following molecule. Calculate bond order and stabilization energy of each molecule and give their electronic configuration.
    a) B_2 b) C_2 c) N_2 d) O_2 e) F_2
12. Write the M.O. configurations of NO, NO^+ and CO Calculate the bond order in each case.

Principle of Metallurgy

2 Marks

1. State the types of ores. Mention the steps involved in the extraction of metal
2. What is flux? State the types of flux
3. Why calcination process is carried out?
4. How are non volatile impurities removed during roasting?
5. State any two the general properties of metals.
6. How do metals occur in nature?
7. What is metallurgy?
8. Define the following terms.
   a) Mineral
   b) Ore

9. Define the following terms.
   a) Concentration ore
   b) Flux
10. Define the following terms.
   a) Slag
   b) Froth
11. Define with one Example Native ore.
12. Define with one Example Sulphide and arsenide ore.
13. Define with one Example Oxide ore.
14. Define with one Example Carbonate ore.
15. Define with one Example Sulphate ore.
16. Define with one Example Silicate ore.
17. Define with one Example Halide ore.

3 Marks

1. Draw a neat labeled diagram of blast furnace.
2. Explain the term roasting and calcinations
3. Explain the term Autoreduction
4. Give in brief account about the Gravity Separation
5. Give in brief account about the Magnetic Separation
6. Give in brief account about the Leading
7. Define flux and discuss acidic and basic flux.
8. Define slag and state the properties of good slag.

4 Marks

1. Explain the process electrometallurgy
2. How is reduction of oxide ore carried out?
3. How is reduction carried out by displacement?
4. Give the choice of flux with suitable example

5. Write a note on froth flotation process
6. Write note on magnetic separation.
7. Discus the following methods of exaction of metal
   Reduction by Carbon
8. Discus the following methods of exaction of metal
   Reduction by heating in air
9. Discus the following methods of exaction of metal
   Reduction by electropositive metal
10. Write a note on electrolytic refining

6 Marks

1. Explain in detail the types of ores.
2. Explain the reduction by heating ore in air and by goldschmidt thermite process.
3. State the common methods of concentration of ores and discuss any one method.
4. What is Concentration of the ore? Describe the various methods of concentration.
5. Define refining of metal. Discuss the various types of refining process.
6. What is smelting? What are the methods for Smelting? Discuss one method.

D Block elements

2 Marks

1. What are transition elements?
2. What are d-block elements?
3. Write the elements of three transition series.
4. List the characterastic properties of d-block elements
5. Give the electronic configurations of third series of elements.
6. What is ionization energy?

7. Why are Zn, Cd, Hg, and La not included in d-block elements?
8. State the factors reducing reactivity of d-block elements
9. Define diamagnetic substance.
10. Define Ferromagnetic substance.
11. State two factors responsible for tendency of cations of transition metals to form complexes.

3 Marks

1. What are antiferromagnetic substances?
2. State electronic contiguration of three series of transition elements.
3. Give three reasons showing reducing property of d-block elements.
4. Explain anomalous configurations of Cr ,Cu and Pt.
5. What are paramagnetic substances? Give examples.

4 Marks

1. How are d-block elements divided in the various series?
2. State the factors which reduce the reactivity of d-block elements.
3. Write four metallic properties of d –block elements.
4. Explain Fe, Co, and Ni are ferromagnetic
5. Explain transition metals do not displace hydrogen from acid solutions.
6. What are paramagnetic substances? Give examples.
7. Write oxidation states and outer electronic contiguration of Sc, T1 , V Cr.
8. Write a note on diamagnetic substance.

6 Marks

1. Explain transition metal compounds are coloured.
2. Explain transition metals exhibit variable Valency
3. Discuss ionization energies of d-block elements.

Semister -1 CH 212 Organic Chemistry

***Carbohydrate ***

Question for 2 marks each.

1) Define the following

a. Carbohydrates
b. Mutarotation
c. Mono saccharides
d. Disaccharides
e. Reducing sugars
f. Nonreducing sugars

2) Give the following reactions

a. Glucose + Br_2 Water
b. Glucose + dil HNO_3
c. Glucose + Na-Hg| H_2O
d. Glucose + HCN
e. Glucose + NH_2 OH
f. Glucose + CH_3 –CO-Cl

3) Draw the following Structure

a. Sucrose b. Lactose c. Maltose

4) Draw the fischer projection formula of following

a. α–D–glucopyranose
b. β–D–glucopyranose
c. α–D–fructopyranose
d. β–D–fructopyranose

5) Draw the haworth projection formula of following

a. α–D–glucopyranose
b. β–D–glucopyranose
c. α–D–fructopyranose
d. β–D–fructopyranose

6) Choose the correct option from the following.

A) The reaction –

Glucose $\xrightarrow{H_2O}$ $2C_2H_5OH + 2CO_2$+ energy

Provides an example of

a. Dehydration
b. Esterification
c. Fermentation
d. Saponification

B) Cane sugar is a

a. Monosaccharide

b. Disaccharide
c. polysaccharide
d. reducing sugar

C) The disaccharide present in milk is --------–

a. Sucrose
b. Lactose
c. Maltose
d. Cellotriose

D) Which of the following carbohydrates is an essential constituent of plant cells

a. Cellulose
b. Maltose
c. Starch
d. Sucrose

E) The change in optical rotation with time of freshly prepared solution of sugar is called

a. Specific rotation
b. Inversion
c. Rotatory motion
d. Mutarotation

F) Glucose on Oxidation with Br_2water results

a. Gluconic acid
b. Saccharic acid
c. tartaric acid
d. none of these

G) Glucose on oxidation with HNO_3 results

a. Gluconic acid
b. Saccharic acid
c. tartaric acid
d. none of these

H) Reduction of D-glucose with Na/C_2H_5OH yields

a. D-Mannitol
b. D-Fructose
c. D-Sorbitol
d. L-Sorbitol

I) Which of following compounds is found abundantly in nature

a. Glucose
b. Fructose
c. Starch
d. Cellulose

J) The sweetest sugar is
a. Glucose
b. Fructose
c. Lactose
d. Sucrose

Question for 4 marks each.

1) Explain – Glucose has pyranose ring.

2) Explain – Osazone formation

3) Discuss the fischer projection formula of glucose

4) Explain – Glucose shows mutarotation

5) Explain – Osazone of D–Glucose

6) Explain – Oligosaccharides with suitable example

7) Explain the term mutarotation

8) What is the action of excess of phenyl hydrazine on glucose

9) Which objection were raised about open chain structures of glucose

10) Which objection were raised about open chain structures of Fructos

Question for 4 marks each.

1) Give the evidence leading to the ring structure of D-glucose
2) Discuss the bayer open chain structure of D-glucose
3) Write notes on
   a. Mutatrotation
   b. killani fischer synthesis
   c. Reducing properties of monosaccharieds
4) Explain the terms reducing and non-reducing Sugars

5) Give the following reactions of D-glucose
   a. Oxidation with Br_2-water
   b. Oxidation with dil-HNO_3
   c. Reduction with Na/C_2H_5OH
   d. Acetylation
   e. Addition of HCN
   f. Phenyl hydrazine
   g. NH_2OH
6) Discuss the structure of sucrose, Maltose, Lactose
7) Give the Classification of Carbohydrate
8) Discuss the bayer open chain structure of Fructose

Questions for 6 marks each.

1) What are carbohydrates? Discuss Classification of carbohydrates with suitable examples.
2) What are disaccharides? Give the structures of
   a. Sucrose
   b. Lactose
   c. Maltose
3) Discuss the ring structure of D-Glucose
4) Give the evidences leading to the open chain structure of glucose
5) Explain how killiani synthesis is useful in lengthening a carbon chain in aldol sugar with suitable example.

Synthetic Reagents

Question for 2 marks each.

1) Explain active methylene group with suitable example.
2) Four alternative answers are given for each question of which only one is correct. Indicate the correct answer.
3) The reactivity of A.A.E. is due to the presence of ....
    a. Ketonic & ester group
    b. an ester group
    c. a ketonic group
    d. a reactive methyle group

1) A.A.E. $\xrightarrow[\text{II) } CH_3I \\ \text{III) dil aq KOH} \\ \text{IV) -CO2}]{\text{I) EtONa}}$ A

    In above reaction A is .....
    a. 2-Butanone
    b. aceto acetic acid
    c. monomethyl aceto acetic ester
    d. mono methyl aceto acetic acid

2) Synthetic reagents are powerful tools used for.....
    a. new carbon-carbon formation
    b. to built up carbon skeletone
    c. both a & b
    d. None of these

3) Matonic ester is prepared by dissolving ..... in ethanol and warming the mixture on a water bath by addition of conc. HCl.
    a. Potassium acetate
    b. cyanoacetate
    c. potassium cyano acetate
    d. Ethylacetate

4) $CH_2(COOEt)_2$ i) $\xrightarrow[\text{ii) n-propyl bromide} \\ \text{iii) } H_3O^+ \\ \text{iv) } -CO_2]{C_2H_5ONa}$ A

above reaction series A is--------
    a. Adipic acid
    b. crotonic acid
    c. valeric acid
    d. n-valeric acid

5)When Na-diethylmalonate treated with benzoyl cholide gives a product which on subsequent hydrolysis & decaboxylation results...

a. Benzoyl acetic ester
b. Benzoyl acetic acid
c. Acetoacetic ester
d. acetoacetic acid

6 Identify A&B in the following reactions

a. $CH_2(COOEt)_2 + CH_3CHO \xrightarrow{2^o \text{ amine}} A \xrightarrow[ii)\ \triangle, -CO_2]{i)\ \text{Hydrolysis}} B$

b. Malonic ester + phCHO $\xrightarrow{2^o \text{ amine}}$ A $\xrightarrow[ii)\ \triangle, -CO_2]{i)\ \text{Hydrolysis}}$ B

c. Diethyl Malonate + Acetyl chloride $\longrightarrow$ A $\xrightarrow[ii)\ \text{Decarboxylation}]{i)\ \text{Hydrolysis}}$ B

d. $CH_2(COOEt)_2$ + Ethylene Dibromide $\xrightarrow{i)\ C_2H_5ONa}$ A $\xrightarrow[ii)\ \text{Decarboxylation}]{i)\ \text{Hydrolysis}}$ B

7)Give synthesis of malonic ester

8)Give synthesis of Acetoacetic ester

9 How will bring folling conversions

a. Malonic ester to adipic acid
b. Malonic ester to succinic acid
c. Malonic ester to cinnamic acid
d. Malonic ester to crotonic acid
e. Malonic ester to -amino acid
f. Malonic ester to n-valeric acid
g. Acetoacetic ester to isobutric acid
h. Acetoacetic ester to butanoic acid
i. Acetoacetic ester to succinic acid
j. Acetoacetic ester to 2-pentanone
k. Acetoacetic ester to 2-4 pentane dione
l. Acetoacetic ester to adipic acid
m. Acetoacetic ester to crotonic acid

n. Acetoacetic ester to cinnamic acid

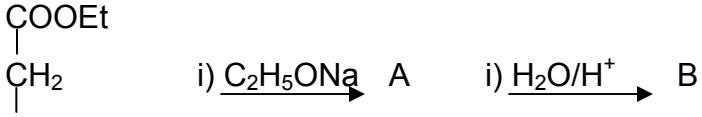
Question for 4 marks each.

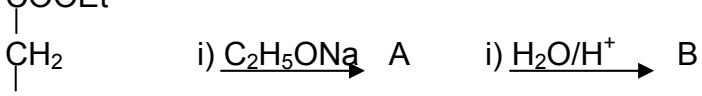
1) What makes Malonic ester a very important synthetic reagent?

2) What makes ethyl aceto acetate a very important synthetic reagent?

Question for 4 marks each.

1) Complete the following reaction & Predict the products A & B

a. 

b. 

c. Diethyl malonate + Benzoyl chloride $\xrightarrow{C_2H_5ONa}$ A $\xrightarrow[ii)\ \triangle]{i)\ H_3O^+}$ B

d. Malonic ester + phCHO $\xrightarrow{2^o\ amine}$ A $\xrightarrow[ii)\ \triangle]{i)\ Hydrolysis}$ B

e. Aceto acetic ester $\xrightarrow[ii)\ C_2H_5I]{i)\ C_2H_5ONa}$ A $\xrightarrow{dil.\ aq.\ acid.}$ B

2) Convert the following

a. Malonic ester into crotonic acid

b. Malonic ester into cinnamic acid

c. Malonic ester into glutaric acid

d. Malonic ester into succinic acid

e. Malonic ester into adipic acid

f. Malonic ester into n-valeric acid

g. A.A.E. into Butonic acid

h. A.A.E. into 2-butanone

i. A.A.E. into acetone

j. A.A.E. into ethyl methyl acetic acid

Questions for 6 marks each.

1) How is aceto acetic ester prepared? Starting from AAE how will you obtain-----?

a. Methyl acetic acid
b. Succinic acid
c. Adipic acid
d. 2-Butanone
e. Acetonyl acetone

2) How is Malonic ester prepared? Starting from malonic ester how will you obtain--?

a. n-valeric acid
b. Adipic acid
c. Succinic acid
d. Aceto acetic acid
e. Benzoyl acetic acid
f. Cinnamic acid

3) Starting from malonic ester, how will you prepare

a. n-pentanoic acid
b. Crotonic acid
c. isobutyric acid
d. Succinic acid
e. Adipic acid
f. Cinnamic acid
g. Propanoic acid

4) Starting from A.A.E. how will you prepare

a. Succinic acid
b. 2-butanone
c. Acetonyl acetone
d. Propanoic acid
e. Adipic acid
f. 2, 4 pentane dione

*Electrophilic Aromatic Substitution *

Question for 2 marks each.

1) Predict the product in the following reaction

a.  + $NO^+_2\,BF_4$ ⟶ ?

b.  + conc. H_2SO_4 ⟶ ?

c.  + $(CH_3CO)_2\,O$ $\xrightarrow{AlCl_3}$?

d.  + $CH_3\,COOH$ $\xrightarrow{H_2SO_4}$?

e.  + C_6H_5COOH $\xrightarrow{H_2SO_4}$?

f.  + CH_3-CH=CH_2 $\xrightarrow{H^+}$?

g.  + CH_3Cl $\xrightarrow{AlCl_3}$?

h.  + C_6H_5COCl $\xrightarrow{AlCl_3}$?

i.  + C_2H_5OH $\xrightarrow{H^+/BF_3}$?

j.  + I-Cl $\xrightarrow{AlCl_3}$?

k.  -OH + HNO_3 ⟶ ?

l.  + Br-Cl $\xrightarrow{AlBr_3}$?

2) Give the use of following reagents in organic reaction. Give the name of reaction and an example of each

a. conc. HNO_3/H_2SO_4
b. $CH_3COCl/AlCl_3$
c. conc. H_2SO_4
d. $Br_2/FeBr_3$
e. $CH_3Cl/AlCl_3$

3) Convert the following.

a. Benzene into nitrobenzene.

b. Benzene into benzene sulphonic acid.

c. Benzene into bromobenzene.

d. Benzene into toluene.

e. Benzene into acetophenone.

f. Benzene into cumene.

g. Benzene into benzophenone.

h. Benzene into ethyl benzene.

i. Benzene into tert.butyl benzene.

j. Phenol into p-nitrophenol.

4) Choose the correct option of the following.

a. An example of electrophile is------.

(1) H_2O (2) CN^- (3) SO_3 (4) OH^-

b. Nitration of banzene is carried out using -------.

(1) Nitrating mixture (2) Nitric acid

(3) Sulphuric acid (4) Nitrobenzene

c. In Friedel craft's acylation --------- group is introduced in the aromatic nucleus.

(1) Alkyl (2) Phenyl (3) Acyl (4) Benzyl

d. The mechanism of Aromatic electrophilic substitution involves formation of --.

(1) σ-Complex (2) Cyclic transition state

(3) Carbanion (4) Carbene

e. kinetic isotope effect is observed for ------.

(1) Chlorination (2) Nitration

(3) Sulphonation (4) None of these

f. The electrophile involved in chlorination is -------.

(1) Cl^- (2) Cl^+ (3) Cl_2 (4) $AlCl_3$

g. In halogenation by interhalogen compounds, the attacking electrophile is -----.

(1) Electronegative halogen (2) Electropositive halogen

(3) Electron withdrawing halogen (4) None of these

h. The carbon atom of benzene are -------.

(1) SP^3 hybridized (2) SP hybridized

(3) SP^2 hybridized (4) SP^3, SP^2, SP hybridized

i. Most characteristic reaction of benzene are --------.

(1) Addition (2) Elimination (3) Substitution (4) Rearrangement

j. The electrophile involved in the sulphonation is--------.

(1) HSO_4^- (2) SO_4^- (3) SO_3 (4) H_3^+O

<u>Question for 4 marks each.</u>

1. What is halogenation? Give its mechanism.

2. What is sulphonation? Give its mechanism.

3. Explain the formation of π-complex & σ-complex in electrophlic aromatic substitution.

4. Why nitration is slow in the absence of sulphuric acid.

5. How sulphonation differs from halogenation & nitration?

6. Give important features of Friedel craft's acylation.

7. Sulphonation of benzene shows kinetic isotope effect. Explain.

8. Give in brief limitations of Friedel craft's alkylation.
9. Benzene easily attracts an electrophile but not a nucleophile. Explain.

10. Benzene undergoes substitution reaction rather than addition reaction. Explain.

11. Halogenation is usally carried out in the presence of Lewis acid. Explain.

12. Alkylation is generally achieved through acylation. Explain.

13. What is Friedel crafts acylation? Explain with one example.

14. What is Friedel crafts alkylation? Explain with one example.

15. Explain halogenation of benzene using hypohalous acid.

16. Explain nitration of phenol using nitric acid.

17. What is bromination? Give the formation of bromobenzene using suitable reagent.

18. Give the evidences to prove the presence of NO^{+}_{2} ion in the nitrating mixture.

19. Give formation of Ethylbenzene using Friedel crafts alkylation.

20. An organic compand A with M.F.C_6H_6 on treatment with acetyl chloride in presence of lewies acid $AlCl_3$ produces a ketone B which on clemmenson reduction yields C What are the structure of A,B,C?

Question for 4 marks each.

1) Explain, the Wheland intermediate is stable.

2) Distinguish between F.C.Alkylation & Acylation.

3) Give the drawbacks of F.C.alkylation.

4) Give the advantages of F.C.acylation.

5) Predicts the product giving mechanism.

a.  $\xrightarrow{AlCl_3}$?

b.  + CH_3-CH=CH_2 $\xrightarrow[BF_3]{H^+}$?

c.  + C_6H_5COCl $\xrightarrow{AlCl_3}$? $\xrightarrow{Sn/HCl}$?

d.  + C_2H_5OH $\xrightarrow{H^+/BF_3}$?

e.  + I-Cl $\xrightarrow{AlCl_3}$?

f.  -OH + HNO_3 $\longrightarrow$?

g.  + $(CH_3CO)_2$ O $\xrightarrow{AlCl_3}$?

h.  $\xrightarrow[conc.\ H_2SO_4]{conc.\ HNO_3}$?

i)  + CH_3-CH_2-Cl $\longrightarrow$ $AlCl_3$?

j)  + Br_2 $\xrightarrow{FeBr_3}$?

Questions for 6 marks each.

1) What is nitration? Explain the mechanism of nitration of benzene.

2) What is halogenation? Discuss the mechanism.

3) Discuss the mechanism of F.C.alkylation reaction. What are the limitations of F.C.alkylation.

4) What is F.C.acylation? Discuss the mechanism. Give the important feature of F.C.acylation.

5) What is sulphonation? Discuss the mechanism of sulphonation of benzene. How it differ from nitration?

6) Discuss the F.C.acylation of benzene using acid anhydrides & acids.

7) Explain the bromination of benzene using $Br_2/FeBr_3$ & chlorination of benzene using hypochlorous acid in presence of strong acid.

8) Explain the F.C.alkylation by taking example of formation of ethyl benzene with mechanism.

9) Explain the chlorination, bromination & iodination reaction.

Agrochemicals

Question for 2 marks each.

1) Define agrochemicals.

2) What happen when –indicate by reaction.

a. Chlorobenzene is treated with chloral in presence of conc. H_2SO_4.

b. Benzene is treated with chlorine in presence of sunlight.

c. Sodium para nitro phenoxide is condensed with 0,0-diethyl-chlorothiophophate.

d. Indole is condesed with monochloro acetic acid.

e. Naphthalene is treated with chloroacetic acid.

3) Give the synthesis of

a. Lindane

b. D.D.T.

c. 2, 4 D

d. Indole acetic acid.

e. α-naphthyl acetic acid.

4) Give the uses of the following----

a. Lindane

b. DDT

c. Indole acetic acid

d. Parathion

e. α-naphthyl acetic acid

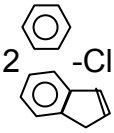
f. 2, 4 D.

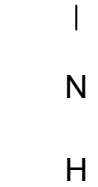
5) Predict the product in the following

a. Naphthalene + Chloroacetic acid ⟶ ?

b. Cyclohexene + $5Cl_2$ ⟶ ?

c.  + $6Cl_2$ ⟶ ?

d. 2  -Cl + Cl_3C-CHO ⟶ (conc. H_2SO_4) ?

e.  + Cl-CH_2-COOH ⟶ (KOH) ?

Question for 4 marks each.

1) How will you carry out the following conversion?

a. Acetaldehyde into D.D.T.

b. Phenol into 2,4 D

c. α -chloro methyl naphthalene into α-naphthyl acetic acid.

d. Indole into IAA.

e. Benzene into Lindane.

f. Naphthalene into α-naphthyl acetic acid.

Question for 4 marks each.

1) Give the synthesis & uses of following agrochemicals.

a. Lindane.

b. Parathion.

c. DDT.

d.2, 4D

e. IAA.

f. α -naphthyl acetic acid

2) What are agrochemicals? Give the synthesis of following

a. Lindane.

b. Parathion.

c. DDT.

d.2,4D

e. IAA.

f. α-naphthyl acetic acid

Questions for 6 marks each.

1) What are agrochemicals? Give the synthesis and uses of
    a. Lindane
    b. D.D.T.
    c. Parathion

2) Define agrochemicals? Give the synthesis and uses of
    a. IAA
    b. 2, 4, D
    c. α-Napthyl acetic acid

S.Y.B.Sc.-Paper-CH-212
First Term Q.B. (Analytical Chemistry)
Data Handling

Questions of Two Marks each.

1) Define the term sampling.
2) Define universe Or population with example.
3) Define sampling unit with example.
4) Define Gross sampling with example.
5) Define analysis sample with example.
6) Define Accuracy.
7) Define Precision.
8) Give the different type of errors.
9) Give types of determinate errors in the analysis.
10) Explain indeterminate error in analysis.
11) Define absolute error.
12) Define relative error.
13) Define Significant figures.

Questions of Three marks each.

1) Explain Random sampling in brief.
2) Distinguish between accuracy and precision.
3) Explain systematic or non random sampling in brief.
4) Give different ways for minimising determinate error in analysis.
5) State the rules for rounding off.
6) What are significant figures? Find the number of significant figures in the following.

   a) 0.0897 b) 4.00×10^5 c) 6.023

7) Give the result of the following after suitable rounding off.

a)0.022 X 0.402 b)16.73 X 6.7 c) 4.345 – (135+0.0444)

8) Find the number of significant figures in the following?

a) 8.8674 b) 0.0405 c) 9.108×10^{-31}

9) Give the result of the following after suitable rounding off.

a) 3.3124 – (175 +0.0345) b)0.581 + 324.65

c) 4.58 + 7.09 +0.006 -0.245

Questions of Four marks each.

1) Describe the method of grinding and crushing.
   OR Write short note on crushing and grinding.
2) Explain sampling in Solids.
3) Explain sampling in Liquids.
4) Explain sampling in Gases.
5) Explain the ways of expressing accuracy.
6) Explain the terms accuracy & precision with suitable example.
7) Justify the statement that " a high degree of precision does not imply the accuracy of analysis".
8) Define and explain Absolute error and Relative error.
9) Define indeterminate errors. What are its sources?
10) Explain the instrumental errors and operational errors.
11) Explain methodic errors and personal errors.

Questions of Six marks each.

1) What precautions are to be taken while sampling process?
2) Explain the sampling in any two of the following.
   a) Solids b) Liquids c) Gases
3) Write a note on Hazard's in sampling.
4) Explain different types of determinate errors in the analysis.

5) What do you mean by error in the analysis? Explain the types of error in the analysis.
6) What are significant figures? Explain the rules for significance of zero.
   OR What are significant figures? Give criteria to determine significance of zero.

Acid & Base Titration

Questions of Two marks each.

1) Define the term acid base Indicator. Give example
2) Define the term End point.
3) Define the term Equivalence point in titration.
4) Define neutralisation point.
5) Explain the transition range of indicator in acid base titration.
6) Draw the titration curve for Strong acid Vs Strong base titration.
7) Draw the titration curve for Strong acid Vs Weak base titration.
8) Draw the titration curve for Weak acid Vs Strong base titration.
9) Define the precipitation titration.
10) Define the Argentimetric titration.
11) Draw the titration curve for precipitation titration.
12) Write Henderson-Hasselbatch equation for acid base indicator.
13) Which indicator used in Strong acid Vs Strong base titration.
14) Which indicator used in Strong acid Vs Weak base titration.
15) Which indicator used in Weak acid Vs Strong base titration.
16) Give the equation for pH calculation at equivalence point in titration of Weak acid Vs Strong base.
17) Give the equation for pH calculation at equivalence point in titration of Strong acid Vs Weak base.

Questions of Three marks each.

1) Explain the transition range of indicator in acid base titration.
2) Explain the choice of indicator in strong acid and strong base titration.
3) Explain the choice of indicator in weak acid and strong base titration.
4) Explain the choice of indicator in strong acid and weak base titration.
5) Explain mechanism of indicator used in Mohr's method.
6) Explain mechanism of indicator in Volhard's method.
7) Give preparation of 0.1 N Standard solution of Silver nitrate.
8) Give limitation of Mohr's method.
9) Explain –precipitation of Ag_2CrO_4 takes place only after the precipitation of AgCl.
10) Calculate the pH at equivalence point for titration of NH_4OH and HCl. (Given Ka=1.75 X 10^{-5})
11) Calculate the initial pH in the titration of 0.1 N Acetic acid Vs NaOH solutions. (Given Ka=1.75 X 10^{-5})
12) Calculate the initial pH in the titration of 0.1 N NH_4OH Vs HCl solutions. (Given Ka=1.75 X 10^{-5})

Questions of Four marks each.

1) Derive Henderson-Hasselbatch equation for acid-base indicators.
2) Explain in brief the nature of titration curve of strong acid with strong base.
3) Explain in brief the nature of titration curve of weak acid with strong base.
4) Explain in brief the nature of titration curve of strong acid with weak base.
5) Draw the titration curve of strong acid with strong base. Discuss choice of suitable indicator for this titration.
6) Describe Mohr's method for standardisation of Ag NO_3 solution.
7) Describe the Fajan's method for the estimation of Chloride.

8) Show by calculation that the theoretical concentration of potassium chromate indicator in Mohr's method is 0.014 M when the concentration of sodium chloride and silver nitrate is 0.1 M each.

Solubility product of AgCl=1.2 $x10^{-10}$

Solubility product of Ag_2Cro_4=1.7 $x10^{-12}$

9) Describe the different methods of minimising the titration error in Volhard's method?
10) Give the theory of adsorption indicators.
11) What are the conditions for good result of adsorption indicators?
12) The reaction between the thiocyanate solution and AgCl precipitate is prevented in Volhard's method.-Explain.

Questions of Six marks each.

1) Derive the Henderson-Hasselbatch equation for indicator and explain transition range of an indicator.
2) Explain the nature of titration curve of strong acid with strong base? Which indicator can be used for this titration? Why?
3) Explain the nature of titration curve of strong acid with weak base, which indicators can be used for this titration? Justify?
4) Explain the nature of titration curve of a weak acid with strong base. Name the indicator which can be used and justify its selection.
5) Describe preparation and standardisation of 0.1M $AgNO_3$ solution by Mhor's method.
6) Explain the titration curve for precipitation titration.
7) Explain principle involved in Fajan's method? Discuss the estimation of chloride by Fajan's method.

Stoichiometric Calculation

Questions of Two marks each.

1) Define the term Atomic weight. Give example.
2) Define the term Equivalent weight. Give example.

3) Define the term Molecular weight. Give example.
4) Define the term Formula weight. Give example.
5) Define the term Dalton. Give its example.
6) Define the term Mole. Give example.
7) Define the term Normality. Give example.
8) Define the term Molarity. Give example.
9) Define the term Molality. Give example.
10) Define the term Formality. Give example.
11) Define the term Primary standard substance.
12) Define the term Standard solution.
13) Give any two examples of primary standard substance.
14) Give any two example of secondary standard.

Questions of Three marks each.

1) How the equivalent weight is calculated in different acids. Give example.
2) How the equivalent weight is calculated in different Bases. Give example.
3) How the equivalent weight is calculated in different Oxidising and reducing agents. Give example.
4) Give the requirement of primary standard substance.
5) Explain the calibration of pipette.
6) Explain the calibration of volumetric flask.
7) Explain the calibration of Burette.
8) How many gram atoms are present in 160 gram of sulphur?
9) How many moles of $CaCO_3$ present in 250 gram of $CaCO_3$.
10) How will you prepare the 250 ml of 0.1 N NaOH solutions? (Molecular weight of NaOH=40 gram).
11) How will you prepare the 100 ml of 0.1 N $AgNO_3$ solutions. (Molecular weight of $AgNO_3$ =169.07 gram).
12) How will you prepare the 250 ml of 0.1 M H_2SO_4 solution. (Molecular weight of H_2SO_4 =98 gram).

Questions of Four marks each.

1) Discuss the requirement of primary standard substance. Give example.
2) What do you mean by primary standard substance and secondary standard substance. Give one example of each.
3) What are the requirement of volumetric titration (analysis).
4) Define volumetric analysis. What are the different types of volumetric analysis?
5) How many grams of KOH is require red to prepare 0.25 N 500 ml solution of it.
   (Molecular weight of KOH-56 gram).
6) How many grams of Oxalic acid is present in 0.5 N 250 ml solution of it.
   (Equivalent weight of Oxalic acid -63 gram).
7) How many grams of Na_2CO_3 is present in 0.2 N 100 ml solution of it.
   (Molecular weight of Na_2CO_3 =106 gram).
8) How many gram of $KMnO_4$ present in 0.1 N 250 ml solution of it.
   (Equivalent weight of $KMnO_4$=31.6 gram).
9) How will you prepare 0.025 N 500 ml solution of HCl from 0.1 N HCl solutions?
10) How will you prepare 0.05 N 500 ml solution of NaOH from 0.5 N NaOH solutions?
11) What will be the normality of 500 ml H_2SO_4 solution prepared from 0.2 N 250 ml solutions?
12) How many ml of 12 N HCl solutions is required for preparation of 250 ml N/10 HCl solution?
13) How many ml of 0.25 M solution of H_2SO_4 will react with 10 ml of 0.25M solution of NaOH?
14) How many gram of $FeSO_4$ are present in one litre of 2 N, 0.4 N.
(Equivalent weight of $FeSO_4$= 151.896 gram).
15) How many gram of $K_2Cr_2O_7$ are present in 500 ml of 0.5 N.
(Equivalent weight of $K_2Cr_2O_7$= 49.032 gram).

16) Calculate the quantity corresponds to 0.5 mole/litre of $NaHCO_3$ substance.

17) What is the normality of solution containing 15 gram of Na_2CO_3 in 200 ml solution.

18) Calculate the molality of a solution which contain 25 gram of KCl per 1000gram of solvent.

Questions of Six marks each.

1) Discuss molarity and normality to express the concentration of solution.
2) What do you mean by primary standard substance and secondary standard? Explain the requirement of primary standard substance.
3) Discuss the calibration of volumetric flask and Pipette.
4) Discuss the calibration of volumetric flask and Burette.
5) Discuss the calibration of Burette and Pipette.
6) What are the different types of volumetric analysis? Explain in brief.
7) What is titrimetric analysis? Give the requirement of titrimetric analysis.

S.Y.B.Sc.-Paper-CH-221
Second Term Q.B. (Physical Chemistry)
Colligative properties.

Questions of Two marks.

1. Define the term Colligative properties of solution.
2. How many Colligative properties are their. Give their names.
3. Define the term solute and solvent.
4. Define the term true solution.
5. Define the term Normality.
6. Define the term Molarity and Molality.
7. Define the term Mole fraction of solute in solution.
8. Define the term lowering of vapour pressure.
9. Define the term relative lowering of vapour pressure.
10. Give the statement of Raoult's law of partial pressure.
11. Give the applicability of Raoult's law of partial pressure.
12. What do you mean by elevation of boiling point.
13. Draw vapour pressure-temperature diagram for solvent and solution. Comment on it.
14. Why vapour pressure curve of solution lies below that of solvent curve?
15. Give the factors on which elevation of boiling point depends.
16. Define the term molal elevation constant / Ebullioscopic constant.
17. What do you mean by depression of freezing point.
18. Define the term molal depression constant / Cryoscopic constant.
19. Give the relation between depression of freezing point and molecular weight of non-volatile solute.Signify the term involved in it.
20. What do you mean by semi-permeable membrane?
21. Define the term Osmosis.
22. Define the term Osmotic pressure.
23. Define the term Van't Hoff factor.

Questions of Three marks.

1. What is relative lowering of vapour pressure? Explain why vapour pressure of solvent decreases by dissolving non-volatile solut in it.
2. Explain how relative lowering of vapour pressure is used to determine molecular weight of the non volatile solute.
3. Show that relative lowering of vapour pressure of a solvent is equal to the mole fraction of non-volatile solute.
4. Why boiling point of solvent is elevated on addition of non-volatile solute. Give the relation between elevation in boiling point and concentration of solute.
5. What is elevation in boiling point? Write the relation between elevation in boiling point and molality of solution.
6. Define ebullioscopic constant.How it is related to molar heat of vapourisation.
7. Define molal elevation constant. Explain how it is useful to determine latent heat of vapourisation.
8. Derive the relation between elevation in boiling point and molecular weight of non-volatile solute.
9. Why freezing point is depressed on addition of non-volatile solute. Give the relation between depression of freezing point and concentration of solute.
10. What is cryoscopic constant? How it is use to determine latent heat of fusion.
11. Derive the relation between freezing point depression and molecular weight of solute.
12. How osmotic pressure is used to determine molecular weight?
13. When 18 gm of glucose dissolved in 100 gm of pure distilled water the boiling point raises by 0.52 K. Calculate the molal elevation constant for water.(Molecular weight of glucose is 180).
14. Calculate the Osmotic pressure of 0.01 M cane sugar solution at 300 K. R=0.0821 L.atm $deg^{-1}mol^{-1}$

15. A 0.5 molal solution of a non-volatile solute in nitrobenzene causes a lowering of freezing point of nitrobenzene by 5 degrees. Calculate the molal depression point constant of nitrobenzene?
16. If 0.1 molal aqueous solution of a substance is boiled at 373.025 K then calculate the molal elevation constant of water.
17. On addition of can sugar to water the freezing point of water depressed by 0.365 K. What is the molality of sugar solution.(K_f=1.825 Km^{-1})
18. What is the elevation in boiling point of one molal solution of glucose? (K_b=0.52 $K.Kgmole^{-1}$)
19. At 300 K the solution of urea has it molality 0.1.Calculate the osmotic pressure of urea solution (R=0.082 $L.atm.K^{-1}mole^{-1}$)

Questions of Four marks.

1. Explain qualitatively why boiling point is elevated while in freezing point is depressed by dissolving non-volatile solute in solvent.
2. State Raoult's law. Show that relative lowering of vapour pressure is a Colligative property.
3. Explain the term molal elevation constant. How molecular weight of a substance in solution is determined by method of elevation of boiling point.
4. Explain the term Colligative properties. Discuss in brief the dependence of elevation of boiling point on the concentration.
5. Describe the Landberger's method for determination of molecular weight of non-volatile solute.
6. Describe the Beckmann's method for determination of molecular weight of non-volatile solute.
7. Describe Berkely and Hartley's method for the determination of osmotic pressure.
8. Write a note on Van't-Hoff factor.
9. Write Van't-Hoff equation for osmotic pressure of dilute solution. Explain the term involved in it. How it can be used to calculate the molecular weight of a solute.

10. Derive the Van't Hoff Equation for Osmotic Pressure.
11. OR Using relation between osmotic pressure and vapour pressure deduced Van't Hoff equation for osmotic pressure.
12. Write a note on abnormal molecular weight.
13. Define the term abnormal molecular weight. What are the reasons for abnormal molecular weight.
14. Explain why molecular weight of non-electrolyte obtained from Colligative property is same as that of formula weight; but in case of electrolyte it is not same as that of formula weight.
15. Vapour pressure of ether at 20^oC is 442 mm and that of solution of 6.0 gm of benzoic acid in 50 gm ether is 410mm at same temperature. Calculate the molecular weight of benzoic acid in ether. Molecular weight of ether is 74.
16. Find the molecular weight of the solute when 1.03 gm of it present in 75 gm phenol freezes at 312.25 K. Latent heat of fusion of phenol = $26.5gm^{-1}$.Freezing point of phenol= 313 K.
17. Find molecular weight of boric acid if 0.4% boric acid is isotonic with 2.3% sucrose solution. (Molecular weight of sucrose=342).
18. Calculate the boiling point of 3% solution of glucose in water. K_b for 100 gm water=5.2^0C.
19. Latent heat of fusion of phenol is 26.5 cal gm^{-1} and melting point is 40^0C.A solution of 0.170 gm of an organic substance in 12.5 gm phenol freezes at 39.25^0C .Calculate the molecular weight of the organic substance.
20. Compute the Cryoscopic constant of benzene which freezes at 5.5^0C.The molar enthalpy of fusion of benzene is 2.347 $Kcalmole^{-1}$. (Molecular weight of benzene= 78).
21. What will be the osmotic pressure of 3.5% sucrose solution at 20^0C? (Molecular weight of sucrose=342).
22. 13.6 gm of cane sugar (molecular weight 342) dissolved in 20 gm of water caused a depression of freezing point of water by 3.7^oC.

23. A solution containing 5gm of urea per 100gm of water. Vapour pressure of pure water is 27.756 mm. Calculate vapour pressure of this solution at same temperature.
24. A solution of 1.35gm of substance in 71.4gm of water boils at 100.162^{o}C. Calculate the molecular weight of substance. Latent heat of vaporisation is 543 cal/gm
25. At 27^{0}C osmotic pressure of solution is 2.525 atmosphere. Calculate concentration of solution.

Questions of Six marks.

1. State and explain Raoult's law. What is relative lowering of vapour pressure.
2. Explain how relative lowering of vapour pressure is used in determining the molecular weight of solute.
3. What is vapour pressure lowering and relative vapour pressure lowering? Show that relative lowering of vapour pressure depends on mole fraction of solute in solution.
4. Show that for given solvent depression of freezing point is proportional to molality of solution when non-volatile solute is added in solvent.
   Or Derive thermodynamically $\Delta T_f = K_f \times m$.
5. What is elevation in boiling point? Show it is a Colligative property.
   Or What is elevation in boiling point? Show that for a given solvent elevation in boiling point depends on molality of solution.
6. Prove thermodynamically elevation in boiling point is a Colligative property.
   Or Derive thermodynamically $\Delta T_b = K_b \times m$.
7. Derive the equation for the elevation in boiling point.Hence define ebullioscopic constant.
8. Define Osmosis and osmotic pressure. Derive the relation between osmotic pressure and vapour pressure.

9. Discuss the phenomenon of Osmosis and Osmotic pressure. Explain Berkely and Hartley's method for determination of osmotic pressure. Give its advantages.
10. State the principle of Berkeley and Hartley method. Describe Berkely and Hartley's method for determination of osmotic pressure. Give its advantages.
11. Explain the different Colligative properties. Discuss in brief the dependence of elevation of boiling point on the concentration.
12. What is abnormal molecular weight? Define and explain Van't-Hoff factor.

Chemical Kinetics.

Questions of Two marks.

1. Explain the meaning of the terms rate constant and order of reaction.
2. Explain the terms rate laws. What are the applications of rate law.
3. Define Reaction rate.
4. Define Molecularity of a reaction. Give a suitable example.
5. Define order of reaction. Give example.
6. Define Homogeneous reaction.
7. Define Heterogeneous reaction.
8. Define the term half-life period of the reaction.
9. What do you mean by freezing of a reaction.
10. What is first order reaction? Give one example of it.
11. What is first order reaction? Give the unit of first order reaction.
12. Write the velocity constant equation of first order reaction. Signify the term involved in it.
13. Write the velocity constant equation of first order reaction. Give its unit.
14. Give the exponential equation of a first order reaction. Signify each term.
15. Show that the half-life period of the first order reaction is independent of the initial concentration of the reactant.
16. Draw the graph of log a/(a-x) Vs t for first order reaction.

17. Draw the graph of log 1/(a-x) Vs t for first order reaction.
18. What is a pseudo molecular reaction?
19. Give the name of different factors on which reaction rate depends.

Questions of Three marks.

1. What are elementary reactions? Explain the term Molecularity of an elementary reaction?
2. Describe the method to determine the rate of a reaction.
3. How will you obtain the rate constant from the graph of long (a-x) against t. for first order reaction?
4. Define Pseudomolecular reaction. Explain aconversion of n-Chloroacetanilide intop-Chloroacetanilide by HCl is bimolecular but order is one.
5. Describe the kinetic investigation of inversion of cane sugar polarimetrically.
6. Describe isolation method for determination of order of reaction.
7. Explain the graphical testing of first order reaction.
8. Explain how integrated rate law could be used to investigate graphically the first order reaction.

Questions of Four marks.

1. Explain the terms rate laws and rate constants. What are the application of rate law ?
2. Discuss with suitable example order and Molecularity of the reaction.
3. Distinguish between order and Molecularity of a reaction.
4. What are elementary reactions ? Explain the term Molecularity of an elementary reaction?
5. Explain with suitable examples, order of a reaction with respect to each species and over all order of the reaction.
6. Describe the method to determine the rate law of a reaction.
7. Define the rate of reaction.Derive first order integrated rate law for first order reaction.

8. Derive an expression for the rate constant of a first order reaction.Give its unit.
9. The reaction A $\rightarrow$ product is first order reaction w.r.to A Derive an expression for rate constant. Give the unit of rate constant.
10. Show that half life period of first order reaction is independent on initial concentration of reactant.
11. Describe the kinetics investigation of the acid hydrolysis of methyl acetate
12. Derive the expression for velocity constant for thermal decomposition of Azo isopropane.
13. Inversion of cane sugar is bimolecular reaction but follows the expression of first order-prove it.
14. Explain the differential method to determine the order of a reaction.
15. Discuss the half life method for the determination of order of a reaction.
16. Acid hydrolysis of methyl acetate can be monitored by titrating the reaction mixture with std. NaOH solution The following data were produced

Time in min.	0	20	30	50	infinity
ml of alkali used	25	26.3	26.9	28.1	44.6

show that the reaction is of first order reactions.

17. Actinium decays 40 % in 5 hr. Find the half life period of actinium element ?The following data was obtained on hydrolysis of methyl acetate in hydrochloric acid solution

Time (Sec.)	0	4500	7140	infinity
ml of alkali used	24.36	29.32	31.72	47.15

show that the reaction is first ordered.

18. The decomposition of H_2O_2 was studied by titrating it at different interval of time with $KMnO_4$;thefollowing data are obtained.

Time (Sec.)	0	600	7660
ml of alkali used	22.8	13.8	8.2

Show that the reaction is first ordered.

19.The time for half decomposition of N_2O was 257 sec.when initial pressure was 288mm and 210sec when initial pressure was 357mm.Find order of this reaction.

20. For a chemical reaction A→D the rate of reaction is increased by factor 8 when the concentration of the reactant is doubled.What is the order of the reaction.

21.Show that time required for 75% of first order reaction is double that the time required for 50% reaction.

22.6.5 ml of solution of H_2O_2 was mixed with 15 ml water and 10 ml KI solution. The volume of oxygen evolved at different time intervals are given in table.

Time in min.	3	6	9	12	00
Ml of formed	12.5	24	33.8	41.5	88.0

Show that reaction is of First order.

23.The decomposition of acetaldehyde was studied in the gas phase at 791 K.The results of two measurements are

Initial conc^n	9.72×10^{-3}	4.56×10^{-3}
Half life/s	328	572

What is the order of reaction.

Questions of Six marks.

1. Explain the meaning of the terms rate constant ,order of reaction, molecularity of reaction.
2. Discuss the factor affecting the rate of reaction.
3. Define rate of reaction.The reaction A → products is first order w.r. to A write its differential rate law and deduce integrated rate law from it .
4. Write down the equation for the velocity constant of a first order reaction and explain clearly the terms involved in it . Using the equation, find the unit of the velocity constant. Show that for such a reaction half life has a constant value.

5. What is pseudomolecular reaction? Discuss one reason for pseudo behaviour.
6. Discuss the Kinetic investigation of thermal decomposition of azoisopropane to hexane and nitrogen. Derive the expression for its rate constant.
7. Discuss any two methods for determination of order of reaction.

S.Y.B.Sc. CH-221(Inorganic Chemistry)

‘d’ block element

2 MARKS

1) What is mean by d blocks element?
2) What is mean by Transition element?
3) State the position of d block in periodic table.
4) Write down the general electronic configuration of d block element.
5) Write down the outer electronic configuration 1^{st} series.
6) Write down the outer electronic configuration 2^{nd} series.
7) Write down the outer electronic configuration 3^{rd} series.
8) What do you mean by screening effect?
9) Define & explain metallic character in d block element
10) Define & explain densities in d block element
11) Define & explain melting point & boiling point in d block element
12) Define & explain reactivity in d block element
13) Define & explain catalytic properties in d block element
14) Define & explain oxidation state in d block element
15) Define & explain standard electrode potential in d block element
16) Define & explain reducing property in d block element
17) Define & explain colour property in d block element
18) Define & explain magnetic property in d block element
19) Define & explain tendency to form complexes in d block element
20) Define & explain atomic & ionic radii in d block element
21) Define & explain ionization energy in d block element
22) Calculate the magnetic moment of Cu^{2+} in $CuSO_4$ (At No. of Cu = 29)
23) Calculate the magnetic moment of Fe^{2+} in $FeSO_4$ (At No. of Fe = 26)
24) Why the 2^{nd} & 3^{rd} I.E. are too high than 1^{st} I.E. in d block element?

3 MARKS

1. Explain Most of transition metals are paramagnetic.
2. Explain All transition metals exhibit variable valency
3. Explain Iron, Cobalt & Nickel are ferromagnetic
4. Explain variable oxidation state in d block element
5. Explain magnetic property of d block element
6. Explain Why standard electrode potent ional of transition element is higher than standard hydrogen electrode
7. Why Zn, Cd, Hg are excluded from transition element
8. what is mean by d-d transition
9. State & explain Para magnetism
10. State & explain Diamagnetism
11. State & explain Ferromagnetism
12. State & explain anti-ferromagnetism

4 MARKS

1. Why Zn, Cd, Hg are excluded from transition element
2. The element Cu Ag& Au are not called as transition element but there ions Cu^{2+} Ag^{2+} & Au^{3+} are consider as transition ions Why?
3. the element Cr & Cu show electronic configuration $4S^1$ $3d^5$ &$4S^1$ $3d^{10}$insted of $4S^2$ $3d^4$ & $4S^2$ $3d^9$ respectively Explain
4. Why do the energies (Ionization energy) in given series increases very slowly on moving along the period
5. “The electrode potential of transition metals are generally higher than that of hydrogen, still these metals do not displace from acid solution” How would you explain their normality?
6. Zr & Hf are chemical twins. Explain
7. Most of the transition metals are colored. Explain

8. Write the note on following properties of d block.
   a) Metallic character b) densities
9. write the note on following properties of d block
   a) M.P. &B.P b)reactivity
10. write the note on following properties of d block
   a) Catalytic properties b) reducing properties
11. write the note on following properties of d block
   a) atomic &ionic radii b) I.E.
12. write the note on following properties of d block
   a) Colour b) Oxidation state
13. Explain the paramagnetic nature of d block element
14. Which d block element show Ferromagnetism & Why .Explain
15. How the atomic & ionic radii affected by screening effect

6 MARKS

1. What are d block elements? Give their electronic configuration. How they are sub divided in the various series?
2. What is mean by d block elements? How they are differ from s & p block element. Discuss the general characteristics.
3. “Compounds of s & p block element are generally colorless (i.e. white) but those of transition metals are generally colored” How would you explain their behavior.
4. Give the electronic configuration of d block element.
5. Explain in brief the following properties of d block element
   a) Metallic character b) densities
   c) M.P. &B.P
6. Explain in brief the following properties of d block element
   a) Reactivity
   b) Catalytic properties c) reducing properties

7. Explain in brief the following properties of d block element
   a) Atomic & ionic radii b) I.E.
   c) Tendency to form complex
8. Explain in brief the following properties of d block element
   a) Metallic character
   b) Atomic &ionic radii c) I.E.
9. S & P block element are called as re-presentative element while d block elements are called as transition elements. Explain
10. Most of the transition metals are paramagnetic while Fe, Co, Ni are ferromagnetic. explain

NOBLE GASES

2 MARKS

1. State why the noble gases are placed in VIII group or zero group.
2. Noble gases have no tendency either to loose, gain or share electrons with atoms of other element why?
3. State where the helium & traces of neon are found
4. Give the name ,symbol & outer shell configuration of radioactive inert gas
5. In isolation of inert gas mixture, CO_2, water vapour & oxygen are removed by using which chemicals?
6. Mention two uses of neon gas.
7. Name two common compound formed by noble gases
8. What are clathrates?
9. How XeF_2 can be stored for indefinite period
10. Mention one fluorinating reaction of XeF_2
11. Give two properties of XeF_4
12. Give chemical reaction to prepare XeF_6 by heating mixture of Xenon & Fluorine

3 MARKS

1. What are noble gases? Write their atomic number & electronic configuration.
2. Give three important industrial uses of noble gases.
3. Explain one way of isolation of inert gases from atmosphere.
4. How XeF_4 is prepared from mixture of Fluorine & Xenon.
5. Comment- Clathrates are normally non-stoichiometric compounds
6. List four important uses of Neon.

4 MARKS

1. Discuss about position of inert gases in periodic table.
2. Explain facts showing that inert gases are monatomic in character.
3. State the uses of Clathrate compounds.
4. Write a note on stability of Clathrate
5. Draw the structures of XeF_2 & XeF_4. And give one property of each.
6. Mention four uses of Krypton.

6 MARKS

1. Give a brief account on occurrence of noble gases.
2. Give a brief account of different methods of isolation of inert gases from atmosphere.
3. Give one method for preparation of XeF_6 & write one property of it.
4. Write note on compounds of inert gases.

ACIDS & BASES

2 MARKS

1. Define acid according to Arrhenius theory
2. Give the definition of Base according to Arrhenius theory
3. Why the free proton H^+ can not exist in water?
4. State two limitation of Arrhenius theory

5. Give the definition of acid & base assumed by Bronsted-Lowry.
6. How conjugate acid-base pair is formed?
7. Define self ionization of solvent.
8. State one merit of theory of solvent system.
9. Identify base & acid in following reaction using Lux-Flood concept.

$$CaO + SiO_2 \Longrightarrow CaSiO_3$$

10. Define Lewis base & state the nature of bond formed by it.
11. Define hard acid & hard base.
12. Name three metal ion of hard acid type.

3 MARKS

1. What are merits & de-merits of solvent system.
2. Explain the difference between Lewis & Lowry-Bronsted theory
3. Explain with example Lux-Flood concept of acid & bases.
4. Define soft base & give two stable complexes formed by soft bases with ligand
5. State the demerits of Lewis concept.
6. Explain conjugate acid base pair with suitable example.

4 MARKS

1. Define Cady-Elsey concept of acid & bases and gave one example of each.
2. Explain the drawbacks of solvent system theory.
3. Give one example of neutralization reaction in any solvent.
4. Give three characteristics features of soft acids.
5. Discuss the auto dissociation of water & forms hydrated proton.
6. Describe Arrhenius theory & state where it can be applied.
7. What are protonic, aprotic & amphiprotic solvent.

6MARKS

1. What are hard & soft acid & bases? Explain giving metal ion of hard acid type & soft acid type.
2. Describe in brief Arrhenius theory of acids & bases giving suitable examples showing neutralization
3. Describe the Bronsted-Lowry concept of acids & bases & explain two Bronsted acid base reactions in the solvent.
4. Describe in details the Lux-Flood concept of acids & bases. Explain with example.

S.Y.B.sc. **Sem---II CH-222**

Stereo-isomerism

Question for 2 marks.

1) Choose the correct choice of following.

A) Optical activity is shown by a molecule which--------

1) contains atleast 3 asymmetric centres
2) is asymmetric or dissymetric as a whole.
3) has a plane of symmetry.
4) has a centre of symmetry.

B) The correct order of stability is----------

1) chair form > boat form > twist boat form.
2) boat form > twist boat form > chair form.
3) chair form > twist boat form > boat form.
4) twist boat form > boat form > chair form.

C) An asymmetric carbon atom has------

1) one different atom or group.
2) two different atom or group.
3) three different atom or group.
4) four different atom or group.

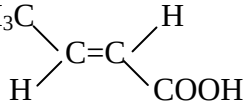
D) The most unstable conformation of cyclohexane is-------

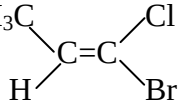
1) Chair 2) Half chair 3) Twist chair 4) Boat.

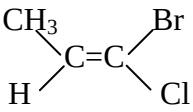
E) In the complete rotation of butane from 0^o to 360^o the gauche conformation appears-------

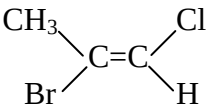
1) Once 2) Twice 3) Thrice 4) Four times.

F) Which of following is Z isomer?

1) 

2) 

3) 

4) 

G) In structural representation of molecule the prefixes Z & E stands for-------

1) Zigler—Erythro
2) Zusammen—Estrogen
3) Zeigler—Erhard
4) Zusammen—Entgegen.

H) Racemic mixture is eqimolar concentration ------

1) Enantiomers
2) Diastereomers
3) Enantiomer & meso compound
4) None of these

I) The priority sequence for the hydrogen isotopes is--------

1) H > D> T
2) T> D > H
3) H > T> D
4) D > T >H.

J) In the R-S notation, the prefixes R&S stands for -----

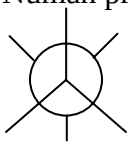
1) Rectus-simiantus
2) Rectus—sinister
3) Rotamer—simiantus
4) Rotamer—sinister.

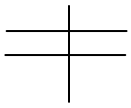
K) ---------is the most stable conformation of n-butane.

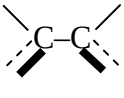
1) Gauche
2) Fully eclipsed
3) Anti or staggered
4) Partially eclipsed.

L) Amongest the following, the Numan projection is--------

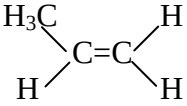
1) 

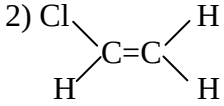
2) 

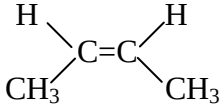
3) 

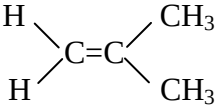
4) 

M) Which of the following shows G.I.-----

1) 

2) 

3) 

4) 

N) The atoms or groups which are behind the plane of the paper are shown by -------

1) Thick line
2) Normal lines
3) Dotted lines
4) Zig-zag lines

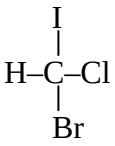
O) The prefixes used in the nomenclature of stereoisomer of oximes are------

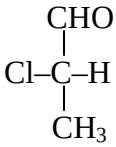
1) Cis-trans
2) Z-E
3) Syn-anti
4) Eclipsed-Staggered.

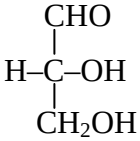
2) Define or Explain the following terms

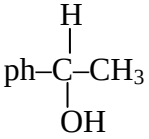
a. Plane Polarised light and optical activity
b. Specific rotation and it's equation
c. Plane of Symmetry
d. Centre of Symmetry
e. Enantiomers and diastereomers
f. Conformation and configuration
g. Geometrical isomers
h. Racemic Modification
i. Dihedral angle
j. Dextro and leavo rotatory

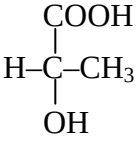
3) Assign R or S Configuration for the following

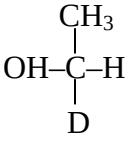
1) 

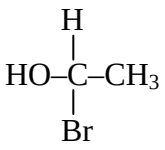
2) 

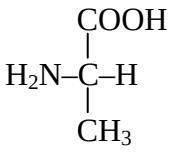
3) 

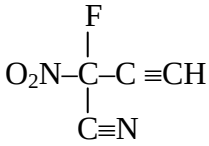
4) 

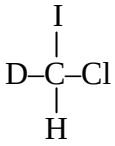
5) 

6) 

7) 

8) 

9) 

10) 

4) Give the structural formula of the following.

a. Z-3-chloro-4-methyl-3-hexene

b. E-1-deuterio-2-chloro-propene

c. Z-2-bromo-2-butene

d. E-4-methyl-2-hexene

e. E-2-pentene

f. Z-2-phenyl-2-butene

g. E-3-hexene

h. Z-2-methyl-3-hexene

i. E-2-chloro-3-heptene

j. E-2-chloro-2-butene

Question for 3marks.

1) Give the reasons.

a. Conformation of ethane can not be isolated.

b. Anti-conformation of n-butane is most stable conformation than any other conformation.

c. Rotation about C=C (double bond) is hindered.

d. Ethylene and isobutylene do not show geometrical isomerism.

e. Tran's isomers are more stable than cis isomers.

f. Chair Conformation is the most stable Conformation of cyclohexane.

g. Twist boat Conformation is more stable than boat Conformation.

h. The equatorial methyl cyclohexane is more stable than axial methyl cyclohexane by 1.8 Kcal/mole.

i. Staggered Conformation is most preferred than its eclipsed Conformation.

j. Racemic mixture is optically inactive.

k. The axial t-butyl cyclohexane does not exist.

2) Draw E & Z isomers of the following & assign the Configuration name E or Z to them.

a. 2-pentene

b. 2-phenyl-2-butene

c. 3-hexene

d. 2-methyl-3-hexene

e. 2-chloro-3-heptene

f. 2-chloro-2-butene

g. 1-chloro-1-bromo-1-propene

h. 1-chloro-2-bromo-1-propene

i. 3-chloro-2-pentene

j. 4-ethyl-5-n propyl-4-nonene

3) Answer the following.

a. Explain in brief E-Z nomenclature system.

b. Explain in brief Geometrical isomerism in oximes.

c. What are symmetry element? Explain any one with suitable example.

d. Draw chair & boat Conformation of cyclohexane & comment on their stability.

e. What is G.I.? Give necessary & sufficient condition for G.I.

f. Which of the following compound exhibit G.I. & why?

CH_3-CH=C $(CH_3)_2$ & CH_3-CH=CH-CH_3

g. Discuss the saw horse & Newman projection formulas for representation of Conformations with suitable example.

h. Draw the Conformation of n-propane.

Question for 4 marks.

1) Answer the following.

a. Draw the chair & boat Conformation of cyclohexane showing axial & equatorial hydrogen atoms.

b. What is Conformational isomerism? Explain with the example of ethane.

c. Explain in brief, how optical rotation is measured?

d. Explain the terms enantiomers & diastereomers with example.

e. Explain in brief about the Elements of symmetry with example.

f. Explain tetrahedral carbon.

g. Write a note on specific rotation.

h. Explain the chiral centre & chirality.

i. Causes of optical activity.

j. Draw Newman projection formulas for chair & boat Conformation.

k. Explain in brief Angle strain & non-bonded interactions.

l. What do you maen by flipping of a ring? Explain with suitable example of methyl cyclohexane.

m. Explain in brief G.I. of oximes with suitable examples.

n. Draw the structures of Equatorial & axial methyl cyclohexane & comment on their stabilities.

o. Explain, why the conformers of n-butane can not be isolated at room temp.

p. What is G.I.? Explain cis & trans isomerism with suitable example.

2) Arrange the following groups in decreasing order of priority & justify.

a. $–NH_2$, $-C\equiv N$, $-NH-CH_3$, $-NO_2$

b. $–CH_2OH$, $-CH_2SH$, $-CH_2Cl$, $-CH_2F$

c. –CHO, $-CH_3$, $-CH_2-C\equiv N$, $-CH_2-NH_2$

d. –F, -Cl, -Br, -I

e. –I, -Cl, $-SO_3H$, -H

Question for 6 marks.

1) Explain the method to measure the optical activity of an organic compound.

2) Define the term "specific rotation". Give the equation for specific rotation. Explain the meaning of terms involved in it. What will be the effect on observed rotation, if the length of the polarimeter tube is doubled.

3) Define, (a) plane polarized light (b) Chiral centre (c) Enantiomers. Explain working of polarimeter.

4) What is optical activity? What are the causes for a molecule to be optically active? Illustrate with suitable example.

5) State & Explain "sequence rules" given by cahn, Ingold & Prelog.

6) What is meant by "Absolute configuration"? Give the sequence rules for priority determination.

7) Discuss the method or steps involved in determining R/S configuration by using Fischer projection formula with suitable example. (Don't discuss the sequence rule.)

8) Draw the conformations of n-butane. Calculate the potentional energy of each. Comment on their stabilities.

9) Discuss the conformation of methyl cyclohexane & Comment on their stabilities.

10) Discuss the conformational isomers in n-butane using energy profile diagram.

11) Discuss the conformational isomers in ethane using energy profile diagram.

12) Draw the various conformations of cyclohexane. Comment on their stabilities using energy profile diagram.

13) Draw the chair & boat conformation of cyclohexane. Draw their Newman projection formula. Comment on their stabilities.

14) In case of G.I, Explain cis-trans & E-Z nomenclature system with suitable examples.

15) Explain in brief.

a) Optical isomerism.

b) Conformational isomerism.

c) Geometrical isomerism.

Chemistry of Heterocyclic & Polycyclic Compounds

Question for 2 marks.

1) Define the following

a. Heterocyclic compound

b. Polycyclic compound

2) Draw the resonance structure for the following.

a. Naphthalene

b. Benzene.

3) Predict the product.

a. Furan $\xrightarrow{H_2/\ Ni}$?

b. Thiophene $\xrightarrow{CH_3COCl/\ AlCl_3}$?

c. Thiophene $\xrightarrow{CHCl_3/KOH}$?

d. Thiophene $\xrightarrow{H_2/Ni}$?

e. Pyrrole $\xrightarrow{CHCl_3/KOH}$?

f. Pyrrole $\xrightarrow{H_2/Ni}$?

g. Pyridine $\xrightarrow{H_2SO_4/350^0C}$?

h. Napthalene $\xrightarrow[25^0C]{CrO_3/AcOH}$?

i. Napthalene $\xrightarrow[460\text{-}480^0C]{O_2/V_2O_5}$?

j. Napthalene $\xrightarrow[160^0C]{\text{Conc. } H_2SO_4}$?

k. Napthalene $\xrightarrow{Cl_2}$?

l. Napthalene $\xrightarrow[50\text{-}60^0C]{HNO_3/H_2SO_4}$?

m. Napthalene $\xrightarrow[80^0C]{H_2SO_4}$?

n. Napthalene $\xrightarrow{H_2/Pt}$?

o. Napthalene $\xrightarrow[AlCl_3/CCl_4]{CH_3COCl}$?

p. Pyridine $\xrightarrow[25^0C,3\ atm.]{H_2/Pt}$?

q. Pyridine $\xrightarrow[300^0c]{HNO_3/H_2sO_4}$?

r. Furan $\xrightarrow{SO_3/pyridine}$?

s. Pyridine $\xrightarrow[300^0c]{Br_2}$?

t. Pyrrole $\xrightarrow{H_2SO_4}$?

u. Pyrrole $\xrightarrow{CH_3COCl/AlCl_3}$?

v. Thiophene $\xrightarrow{H_2SO_4}$?

w. furan $\xrightarrow{CHCl_3/KOH}$?

4) Choose the correct choice of following.

a. The C_1—C_2 bond length in Napthalene is------

1)1.365 A^0 2)1.412A^0 3)1.464A^0 4)1.394A^0

b. The C_2—C_3 bond length in Napthalene is------

1)1.390A^0 2)1.404A^0 3)1.363A^0 4)1.425A^0

c. Napthalene on Sulphonation by conc. H_2SO_4 at 80^0c give –

1) α—napthalene Sulphonic acid 2) β—napthalene Sulphonic acid

3) γ—napthalene Sulphonic acid 4) δ—napthalene Sulphonic acid

d. Napthalene on Sulphonation by conc. H_2SO_4 at 160^0c gives –

1) α—napthalene Sulphonic acid 2) β—napthalene Sulphonic acid

3) γ—napthalene Sulphonic acid 4) δ—napthalene Sulphonic acid

e. Napthalene on reaction with CH_3COCl & $AlCl_3$ in presence of solvent carbon tetrachloride give-----

1) 2-aceto napthalene 2) 1-aceto napthalene

3) 3-aceto napthalene 4) 4-aceto napthalene

f. Napthalene on reaction with CH_3COCl & $AlCl_3$ in presence of solvent Nitrobenzene give-----

1) 2-aceto napthalene 2) 1-aceto napthalene

3) 3-aceto napthalene 4) 4-aceto napthalene

g. Furfural on steam distillation give------

1) Thiophene 2) Furan 3) Pyrrole 4) Pyridine

h. Thiphene undergoes electrophilic substitution reaction at position number----

1) 2 2) 3 3) 4 4) 5

i. Pyridine undergoes electrophilic substitution reaction at position number----

1) 2 2) 3 3) 4 4) 1

Question for 3 marks.

1) Discuss the structure of Napthalene.

2) Napthalene is aromatic in nature, explain.

3) Electrophilic substitution reaction in Pyridine takes place at position no 3. Explain.

4) What is the action of following reagent on Pyridine? Give balance eq".

a. H_2/Ni b. $Br_2/300^0c$ c. $H_2SO_4/350^0c$.

5) What is the action of following reagent on Napthalene? Give balance eq".

a. conc. $H_2SO_4/80^0c$ b. H_2/Pt

c. HNO_3/H_2SO_4,50-60^0c. d. Br_2

e. conc. $H_2SO_4/160^0c$ f. $Na/C_5H_{11}OH$, Reflux.

g. O_2/V_2O_5, 460—480^0c h. CrO_3/ACOH, R. T.

6) Give the reaction of KOH/$CHCl_3$ on----.

a. Thiophene

b. Pyrrole

c. Furan.

Question for 4 marks.

1) Give the Haworth's synthesis of napthalene.

2) How will you synthesize Furan from mucic acid & furfural?

3) Give two methods of preparation of Pyrrole.

4) Give two methods of preparation of Thiophene.

5) Give two methods of preparation of Pyridine

6) How will you convert napthalene into -----

a. 1, 4 –Naptha quione.

b. Decalin.

c. β—Napthalene sulphonic acid.

d. α—bromonapthalene.

7) How will you convert following.

a. Pyridine into piperidine.

b. Pyrrole into pyrrolidine.

c. Furan into furfural.

d. Thiophene into 2-benzoyl Thiophene.

e. Pyrrole into 2-pyrrole Sulphonic acid.

f. Acetylene into pyridine.

g. Pentamethylene diamine into pyridine.

h. Furfural into furan.

i. Acetylene into pyrrole.

j. Acetylene into thiophene.

Question for 6 marks.

1) Discuss the structure of napthalene. Give its canonical structures.

2) Give the Haworth's synthesis of napthalene & Explain in napthalene C_1-C_2 bond length is shorter than C_2-C_3.

3) What are hetero cyclic compounds? Give one method of synthesis of-

a. Furan b. Thiophene c. Pyrrole d. Pyridine

4) Give the Haworth's synthesis of napthalene. Napthalene is aromatic in nature, explain.

5) Explain sulphonation of napthalene at different temperature. Why β-isomers predominates at high temp.?

6) Give synthesis of Thiophene, pyrrole & pyridine from acetylene.

Organic Chemistry in Industry

Question for 2 Marks.

1) Give the structural formula of the following.
    a. Trimethoprim
    b. Ciprofloxacin
    c. Nifedipine
    d. Diclofenac sodium
    e. Tramadol
    f. H-acid

2) Give the IUPAC name for the following.
    a. Trimethoprim
    b. Ciprofloxacin

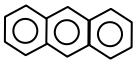
3) Give the Commercial importance of the following compounds.
    a. Trimethoprim
    b. Ciprofloxacin
    c. Nifedipine
    d. Diclofenac sodium
    e. Tramadol
    f. H-acid

Question For 3 Marks.

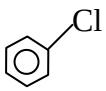
1) Give the synthetics use of following reagent with suitable example.
    a. Na/C_2H_5OH
    b. $NaNO_2/HCl$
    c. CrO_3/CH_3COOH
    d. fuming $HNO_3+H_2SO_4$
    e. fuming H_2SO_4
    f. Fe/HCl

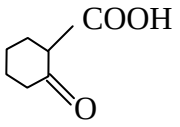
Question for 4 Marks.

1) Complete the following reactions.

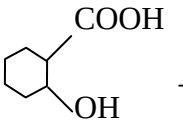
a.  $\xrightarrow[\Delta]{CrO_3/CH_3COOH}$?

b.  $\xrightarrow[30\%\ oleum]{H_2SO_4}$?

c.  $\xrightarrow{fuming\ HNO_3+H_2SO_4}$?

d. 

(i) CH_3O MgBr
(ii) H_3O^+
?

e. 

CrO_3/CH_3COOH ?

Question for 6 Marks.

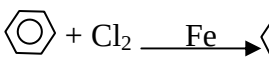
1) Give the synthesis for the following.

a. Trimethoprim
b. Ciprofloxacin
c. Nifedipine
d. Diclofenac sodium
e. Tramadol
f. H-acid
g. 2-hydroxy-3-amino-5-nitrobenzene sulphonic acid
h. Bromomine acid

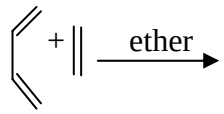
Green Chemistry

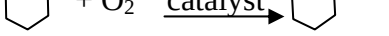
Question for 2 Marks.

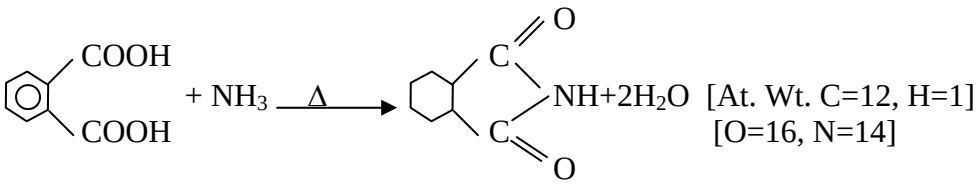
1) Explain the term “Green Chemistry”.
2) Define the “E-factor”.
3) Calculate the % atom economy of the following reaction.

a.  + Cl_2 —Fe→ —Cl +HCl [At.Wt. H=1,C=12 & Cl=35.5]

b. C_6H_6 +CH_3Cl —$AlCl_3$→ Ph-CH_3+HCl [At.Wt. H=1,C=12 & Cl=35.5]

c.  —ether→  [At.Wt. C=12 , H=1]

d.  + O_2 —catalyst→ + H_2O [At.Wt. H=1,C=12 & O=16]

e. 

[At. Wt. C=12, H=1]
[O=16, N=14]

Question for 3 Marks.

1) Explain the folloeing terms

a. Enantioselectivity.

b. Diastereoselectivity.

c. Regioselectivity.

d. Chemoselectivity.

e. Atom economy.

Question for 4 Marks.

1) Write a short note on ‘Atom economy’ in industrial process.

2) Write a short note on selectivity in chemical reaction.

3) Give the importance of Green chemistry.

Question for 6 Marks.

1) Explain the principle of ‘Green chemistry’.

S.Y.B.Sc.-Paper-CH-222
Second Term Q.B. (Analytical Chemistry)
Complexometric titration

Questions of Two marks.

1. Explain the term complex with suitable example.
2. Explain the term monodentate ligand with suitable example.
3. Explain the term ligand with suitable example.
4. Explain the term polydentate ligand with suitable example.
5. Explain the term chelating agent with suitable example.
6. Explain the term chelation with suitable example.
7. Explain the term formation constant with suitable example.
8. Draw the structure of EDTA.
9. What do you mean by chelation effect?
10. What is mean by Complexometric titration?

Questions of Three marks.

1. Draw the titration curve for titration of 100ml 1M Ca^{2+} ion solution with 1M EDTA solution.
2. Give any three general characteristics of metal ion indicator.
3. Discuss in brief principle involved in formation of complex.
4. Explain the term ligand. Discuss the types of ligands.
5. Discuss about Erichrome black T indicator.

Questions of Four marks.

1. Discuss the formation of a complex with suitable example.
2. Discuss the formation constant of a complex with suitable example.
3. Write a note on chelation effect.
4. Discuss the titration curve in complexometric titration curve with respect to EDTA as a titrant.
5. Write a note on chelating agent as EDTA.
6. Discuss in principle involved in detection of end point using metal ion indicators.

7. Write a note on stability constant .

Questions of Six marks.

1. What are complexes? Discuss the formation of a complex with suitable example.
2. Discuss stepwise and overall formation constant.
3. What do you mean by chelation effect? Discuss with suitable example.
4. Discuss the principle involved in colour change of metal ion indicator.Give general characteristic of metal ion indicator.

Redox titration

Questions of Two marks.

1. Define oxidation.
2. Define Reduction.
3. Define Redox reaction.
4. What is mean by Redox titration .
5. Explain oxidising agent.
6. Explain Reducing agent.
7. Enlist the oxidising agent used in Redox titration.
8. Enlist the Reduction agent used in Redox titration.
9. Define the E.M.F.at equilibrium point during titration of Fe^{+2} Vs Ce^{+4}.
10. Enlist the different indicator used in Redox titration.
11. Preparation of Iodine solution.
12. Write the balanced reaction of $Na_2S_2O_3$ & I_2
13. Define Redox indicator.
14. Write the equation for potential range for indicator used in Redox titration.
15. Why KI is required for the preparation of iodine solution? Explain.

Questions of Three marks.

1. Explain self indicator used in Redox titration.
2. Explain starch indicator used in Redox titration.
3. What are the limitation of Iodometric titration.
4. Draw the nature of titration curve in Redox titration.

5. Why oxidising agents are not directly titrated with sodium thiosulphate.
6. Why Iodometric titration are called indirect titration.
7. Discuss the standardisation of $Na_2S_2O_3$.
8. Discuss the standardisation of KM_nO_4.
9. What are the advantages of Ce^{+4} ion solution used in Redox titration.
10. Explain Oxidising agents are not directly titrated with sodium thiosulphate solution.
11. Explain the difficulties in the preparation of $KMnO_4$ solution. How they are avoided?
12. Discuss use of Potassium permanganate as oxidizing titrant in redox titration.
13. Define and explain the terms -Oxidizing agent, Reducing agent,Redox titration.
14. Titration between H_2AsO_3 and I_2 is performed by adding $NaHCO_3$ to the solution of H_3AsO_3.Explain.

Questions of Four marks.

1. Give calculation of E.M.F. before equivalence point for titration of Fe^{+2} with Ce^{+4} ions.
2. Give calculation of E.M.F. after equivalence point for titration of Fe^{+2} with Ce^{+4i}ions.
3. Write a note on Redox indicator.
4. Write a note on iodometric titration.
5. Write a note on iodimetric titration.
6. Why iodometric titration must be performed in neutral, weakly acidic or weakly alkaline conditions.
7. Why iodometric titrations usually done in acidic solution and. iodimetric titrations in neutral solutions ?
8. Distinguish bet^n iodimetry &iodometry.
9. Explain the principle of iodimetry and iodometry titration.
10. Discuss the preparation of Ce^{+4}solution What are it's advantages.

11. How Ce(IV) ion solution is prepared and standardised ? Give its advantages.
12. Discuss the reducing agent used in redox titration.
13. Give the criteria of selection of redox indicator .
14. Explain the nature of titration curve involved in Redox titration.
15. How the iodine purified?Explain standardisation of iodine solution.
16. Explain the use of starch in the detection of end point in iodometry titrations.What precaution are to be taken while using starch indicator.
17. Describe in brief about Redox indicators used in redox titrations.
18. Explain in brief about the iodometric titration.
19. Explain in brief about Iodimetric titrations. Give their limitations.

Questions of Six marks.

1. Discuss the calculation of E.M.F.during titration of Fe^{+2} Vs Ce^{++}.
2. Discuss different type of indicator used for detection of end point in redox titration.
3. Discuss iodimetric titration.Comment on pH condition & limitation of iodometric titration.
4. Discuss iodometric titration explain determination of dichromate by useing iodometric titration.
5. Explain the following oxidising agent in brief
    a) $KMnO_4$
    b) $K_2Cr_2O_7$
    c) Ce^{+4} in Ceric sulphate.
6. Distinguish between iodometry & iodimetry. Explain iodometric titration's?
7. Distinguish bet iodimetry & iodometry. Explain iodimetric titration with suitable example.
8. Explain the principle of iodometry titration.Discuss titration of $K_2Cr_2O_7$ with $Na_2S_2O_3$.Give the quantitative reaction.

9. Explain the use of following indicator in Redox titrations.
    a) Potassium permanganate
    b) Starch
    c) Diphenyl - amine

Chromatogrphic analysis

Questions of Two marks.

1. Define the term Chromatography.
2. Mention the two phases involved in Chromatography.
3. Discuss the limitation of chromatographic technique.
4. Name the classes of Chromatography with one example of each.
5. What do you mean by Partition chromatography?
6. What do you mean by Adsorption chromatography?
7. Define the term adsorbent with suitable examples.
8. Name the two adsorbent used for Thin Layer Chromatography.
9. Define the term R_f value.
10. What is ion exchange chromatography?
11. What do you mean by Cation exchange resin.
12. What do you mean by Anion exchange resin.
13. What do you mean by resins?
14. Write the type of ion exchange resins with suitable example.
15. What is cross linkage?
16. Give the example of cation and anion exchange resins.
17. Mention the use of deionised water.

Gas Liquid Chromatography

18. Explain the term retention time.
19. Give the types of Gas Chromatography.
20. Mention the types of column used in Gas Chromatogarphy.

Questions of Three marks.

1. Discuss the limitation of chromatographic technique.
2. Give the advantages of chromatography.

3. Give the disadvantages of chromatography.
4. Explain the precautions that should be taken while preparation of chromatoplate.
5. The chromatographic chamber is saturated by the vapours of volatile solvent. Explain why?
6. Explain the principle involved in Partition chromatography
7. Explain the principle involved in Adsorption chromatography
8. Explain the principle involved in ion exchange chromatography
9. Describe in brief ascending development of Paper Chromatography.
10. Describe in brief descending development of Paper Chromatography.
11. What is ion exchange chromatography? Explain stationary phase in it.

Gas Liquid Chromatography

12. Describe any one column used in gas Chromatography.
13. Sketch labelled schematic diagram of a gas liquid chromatography.

Questions of Four marks.

1. Distinguish between Ascending and Descending Paper chromatography.
2. Give the principle of chromatography & explain the Rf value.
3. Give the important advantages of Thin Layer Chromatography.
4. Give the applications of Thin Layer Chromatography.
5. Write a note on thin layer chromatography ?
6. Outline of general procedure of Thin layer chromatography.
7. Define the term a) R_f value and give the factors on which R_f Value depends.
8. Discuss the methods used for location of spots in Thin layer chromatography.
9. What are the requirements of good resins?
10. Write in brief cation exchange resins and anion exchange resins.
11. Explain principle of ion exchange chromatography.
12. Discuss ‘ Ion exchange resins’ in chromatography.
13. Give the applications of ion exchange chromatography.

14. Explain, Purification of water using ion exchange chromatography.
    Or What is mean by Deionised water, how it is obtained by ion exchangers.
15. Discuss the separation of amino acid by using chromatographic method.
16. How Thin layer chromatography is superior to paper Chromatography. Explain

Gas Liquid Chromatography

17. Give the advantages of gas liquid chromatography.
18. Explain the principle of gas liquid chromatography.
19. Sketch labelled schematic diagram of a gas liquid chromatography.
20. Write a note on Gas Chromatography column.

Questions of Six marks.

1. What is chromatography? Mention different types of the chromatography? Give advantages of chromatography technique.
2. What is chromatography? Mention different types of the chromatography? Give limitation of chromatography technique.
3. Discuss general Principle of Chromatography. Give the classification of chromatography.
4. What is chromatography? Discuss the principle and classification of chromatography.
5. Discuss in brief principles of adsorption chromatography and partition chromatography.
6. What is chromatography? Describe how paper of chromatography can be used for separation of qualitative analysis.
7. Explain in brief the Principle and technique of paper chromatography. Give important application.
   OR Explain in brief the Principle ,technique and applications of paper chromatography.

8. What is chromatography? Explain in brief the technique of paper chromatography.
9. Explain in brief about the terms :a)Stationary phase,b)Mobile phase, c)Principle of separation with reference to paper chromatography.
10. What is chromatography. Explain in brief about the technique of Thin Layer chromatography.
11. Explain in brief the Principle and technique of Thin layer chromatography.
12. Write a note on thin layer chromatography ?
13. Discuss the principle of ion exchange chromatography. Explain any two resin that are used in it.
14. Explain in brief the Principle and technique of Ion exchange chromatography.

Gas Liquid Chromatography

15. What is the principle of gas liquid chromatography. Explain the components used in instrument of gas liquid chromatography.
16. Discuss the technique of gas liquid chromatography with respect to a)The stationary phase, b)mobile phase and c)Principle of separation.
17. Discuss the technique of gas liquid chromatography with respect to a)Carrier gas tank, b)Sample injection port, c)Separating column.
18. Give the principle, construction and working of thermal conductivity detector.
19. Explain principle, construction and working of thermal conductivity detector.

– The End –