D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1
DEPARTMENT OF CHEMISTRY (UG)
General Chemistry-II
Unit – I   Section A

1. What is meant by ionic bond?
2. What are the conditions for the formation of ionic bond?
3. What is meant by hydration energy?
4. What is meant by solvation energy?
5. Define lattice energy.
6. Why ionic solids conduct electricity in the molten state?
7. What is meant by polarization of ions?
8. What is meant by polarity of bonds?
9. What are the different types of orbital overlap?
10. What is meant by bond length?
11. What is meant by sigma and pi bond?
12. Write the geometry of NH_3 molecule.
13. Write the geometry of H_2O molecule.
14. What are bonding orbitals?
15. What are anti bonding orbitals?
16. What is meant by bond order?
17. Calculate the bond order for He_2 molecule.
18. Calculate the bond order for CO molecule.
19. Calculate the bond order in O_2^- molecule.

Section – B

1. What are the characteristic properties of ionic bond?
2. Explain Born Haber Cycle.
3. Write the different types of overlap and the formation of sigma and pi bond.
4. Discuss the geometry of ClF_3 and Pcl_5 molecule.
5. Write the partial ionic character of a covalent molecule based on dipole moment data.
6. Draw the MO diagram for O_2 molecule.

7. Give the similarities and differences between valence bond and molecule orbital bonds.

Section – C

1. How will you calculate lattice energy by means of Born Haber cycle?
2. State and explain Fajan's rule.
3. What are the conditions for the formation of covalent bond?
4. Based on VSEPR theory, predict the geometry of H_2O, NH_3 and PCl_5 molecules.
5. Based on MOT theory explain why O_2 molecule is paramagnetic in nature?

Unit – II   Section – A

1. What are alkali metals?
2. Write the occurrence of Li metal.
3. What is meant by diagonal relationship?
4. Write the diagonal relationship between Li and Mg.
5. Write the flame colouration of alkali metals.
6. What are alkaline earth metals?
7. Write the occurrence of Be metal.
8. Which is more reducing Li or Na? Why?

Section – B

1. Write the diagonal relationship between Li and Mg.
2. How Li is extracted from its ore?
3. Write the exceptional property of Li.
4. Write the exceptional property of Be.
5. How be is extracted from its ore?
6. Show the diagonal relationship between Be and Al.

Section – C

1. Write a comparative study of oxides, halides, hydroxides and carbonates of alkali metals.
2. Write the extraction of Li metal.
3. Write a comparative study of the elements with respect to oxides, hydroxides, halides and sulphates of alkaline earth metals.

4. Write the extraction of Berylium.

Unit – III   Section – A

1. What are ideal gases?
2. What are real gases?
3. What is meant by Boyle's temperature?
4. Define inversion temperature.
5. State Boyle's law.
6. State Charles' law.
7. Write Graham's law of diffusion.
8. Write Avagadro's law.
9. Write the expression for RMS velocity.
10.   What is meant by equipartition of energy?
11.   State Joule's law.
12.   Define Joule- Thomson effect.

Section – B

1. Derive Boyle's law and Charles' law from kinetic gas equation.
2. Derive the relationship between RMS velocity and most probable velocity.
3. Derive the relationship between RMS velocity and average velocity.
4. Discuss the postulates of kinetic theory of gases.
5. Explain Joule – Thomson effect.
6. Derive an expression for Joule – Thomson coefficient.
7. Write notes on Boyle's law and ideal gas equation.

Section – C

1. Write notes on Maxwell's distribution of molecular velocities. Define Boyle's law and Charles' law
2. Derive an expression for kinetic gas equation.
3. Discuss Joule Thomson effect, Joule -Thomson coefficient and its derivation.
4. Write notes on virial equation of state, inversion temperature and Joule's law.
5. Derive gas laws from kinetic gas equation.

6. Give the expressions for average velocity, most probable velocity and rms velocity and give the relation between them.

UNIT – IV   Section – A

1. Write the structural formula for the following: Neopentane and 2,2-dimethyl butane.
2. Write the general molecular formula of alkanes, alkenes and alkynes.
3. What is Markownikoff's rule?
4. What is meant by peroxide effect?
5. What are alkynes? Give example.
6. Name the following: $CH_2= CH CH= CH CH_2 CH= CH CH_3$ and $(CH_3)_2 C = CH_2$

Section – B

1. Discuss the mechanism of free radical substitution in alkanes.
2. What happens when propylene is treated with HI in presence and absence of peroxide?
3. Write short notes on the reactions which are used to detect the position of double bonds.
4. Write notes on the allyic substation by NBS.
5. Write notes on ozonalysis.
6. Discuss the acidity of alkynes.
7. Explain the addition of water to alkynes with mercuric sulphate catalyst.

Section – C

1. Write notes on hydroboration, hydroxylation with $KMnO_4$ and ozonalysis.
2. What happens when propylene is treated with sulphuric acid, water, halogen and HX?
3. Write notes on Markownickoff's rule and peroxide effect.
4. (i). Discuss the acidic nature of acetylene.
   (ii) How will you prepare the following? n- Propyl bromide from propene, Allyl chloride from propyne and Glycol from ethylene.

5. Write down the structural formula of olefins from which the following products are obtained on ozonalysis: ethylmethylketone and propanaldehyde, formaldehyde only.

Unit – V   Section – A

1. What is Grignard regent?
2. What happens when glycerol is oxidized?
3. What is LTA?
4. How will you prepare allyl alcohol?
5. What is Wurtz reaction?
6. What is meant by Dieckmann's condensation?
7. What are cycloalkanes? Give example.
8. What are alicyclic compounds? Give example.
9. How will you convert benzene to cyclohexane?
10. What happens when cyclopentanone is reduced?
11. What is the action of heat on calcium adipate?
12. What happens when 1, 4- Dibromobutane is treated with sodium?
13. How is cyclohexane prepared from benzene?

Section – B

1. What is meant by oxymercuration reaction?
2. Write notes on theory of strainless rings.
3. Complete the reaction:
   I.   Cyclopropane + Chlorine $\longrightarrow$
   II. Cyclopropane + Br_2 $\longrightarrow$
4. Describe Sashase Mohr theory of strainless rings.
5. Explain hydroboration reaction and its application.
6. Write notes on ozonalysis and oxidation with $KMnO_4$ reaction of olefins.

Section – C

1. Give the preparation and properties of allyl alcohol.
2. Show how Bayer's strain theory accounts for the relative stability of cycloalkanes.
3. Discuss the substitution and ring opening reactions of cycloalkanes.
4. How the stability of cycloalkanes is explained on the basis of Baeyer strain theory?

5. Explain why:

(i) Angle strain for cyclopropane is more than that of cyclobutane.

(ii) Cyclohexane is more stable than cyclopentane.

GENERAL CHEMISTR-IV (15CCH5A)

UNIT-I   SECTION -A

2 Marks

1. Name the elements of Carbon family

2. What is catenation?

3. What is carborundam? Write its uses.

4. Write any two similar properties of Carbon & Silicon?

5. Why is CO_2 a gas and SiO_2 a gaint molecules?

6. What are carbides? How do we classify them?

7. CCl_4 resists hydrolysis with $SiCl_4$ gets readily hydrolysis?

8. What are P block elements?

9. Mention the structure of IF_3 & IF_7.

10. Write the structure of hydroxylamine? What are its uses?

11. What are interhalogen compounds? Give examples.

SECTION-B   5marks

1. Discuss the comparative study of N_2 family?

2. Discuss the comparative study of Carbon family?

3. How is iodine monochloride prepared? How does it react with: (i) Chlorine (ii) KI

4. How are IF_7 and IF_5 prepared and how are react with H_2O?

5. Explain the hybridization with reference to BrF_3 and IF_5?

6. Explain the basic properties of Iodine.

7. Write notes on interhalogen compounds as solvent systems.

8. How is anhydrous peroxomonosulphuric acid prepared?

9. Describe the electrolytic preparation of peroxo disulphuric acid?

10. Give the uses of peroxy disulphuric acid.

11. Write notes on stability of Caro's acid.

12. Write note on Marshall's acid.

13. Write a comparative study of chemistry of As, Sb, & Bi

14. Write a note on the anomalous behaviour of O_2.

15. How is iodine tetra fluoride prepared? Explain its uses.
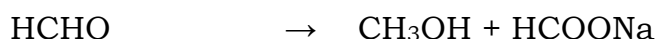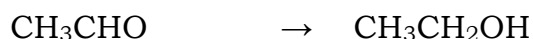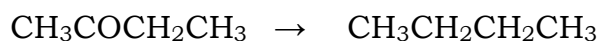
SECTION-C   10 marks

1. Write the preparation, properties, and uses of peroxy acids of sulphur.

2. Give a comparative study of carbon family

3. Give a comparative study of O_2 family.

4. Write the preparation and properties and uses of hydrazine.

5. Explain the structure, preparation, properties, of any two interhalogen compounds.

6. Write the preparation and properties of carbides.

7. Write the preparation and properties and uses of hydroxyl amine.

UNIT II   SECTION-A   2 Marks

1. Write a note in basic nature of amines.

2. What is meant by diazotisation?

3. Write the coupling reaction of aniline.

4. Write a note on Libermann's reaction?

5. Why aniline is less basic than methylamine.

6. What is Carbylamine reaction?

7. What is Hoffmann's bromamide reaction?

8. How is acetic acid prepared from Grignard Reagent?

SECTION-B   5 marks

1. Write notes on (i) Gabriel's pthalamide reaction.

2. What are the differences between primary, secondary and tertiary amines?

3. Write note on basic nature of aniline.

4. Write short note on Friedelcraft's alkylation . Write its mechanism.

5. How would you convert the following? Give details.

$$CH_3COCH_2CH_3 \rightarrow CH_3CH_2CH_2CH_3$$

$$CH_3CHO \rightarrow CH_3CH_2OH$$

$$HCHO \rightarrow CH_3OH + HCOONa$$

SECTION-C   10 marks

1. Explain mechanisms of Reformatsky& Witting reaction.

2. Discuss the mechanisms of Mannichand Friedel crafts reactions.

3. Write thereactions of ethyl amine with Grignard reagent

4. Write the coupling and condensation reactions of aniline.

5. Discuss the ring substitution reactions of aniline.

6. Write the preparation and properties and uses of Aniline.

UNIT-III   SECTION-A   2 Marks

1. What is Friedel craft's reaction?

2. What is Rosenmunds reduction reaction?

3. How will you prepare benzaldehyde using Stephens method?

4. How will you synthesize acetone from alcohol?

5. Write the IUPAC name of CH_3COOH.

6. Write the preparation of acetic acid from alcohols.

7. How will you prepare acetic acid using Grignard reagent?

8. How will you prepare acetic acid from nitrile?

9. Give the esterification reaction of acetic acid.

10. Write the dehydration reaction of acetic acid.

11. What happens when acetic acid is treated with $LiAlH_4$.

12. What happens when acetic acid is treated with HI and red phosphorous?

13. How will you prepare benzoic acid using organometallic compounds?

14. How will you prepare benzoic acid by Friedel Craft's reaction?

15. Write the dehydration reaction of benzoic acid.

16. Write the IUPAC name of phthalic acid.

17. Write the IUPAC name of oxalic acid.

18. Give the general method of preparation of acetoacetic ester

19. Give the action of heat on malonic acid.

5 marks

1. Discuss the mechanism of Reformatsky reaction.

2. Write notes on Cannizzaros reaction.

3. Write short note on Friedel craft's reaction.

4. Write the mechanism of Aldol condensation?

5. Explain the acidic nature of monocarboxylic acids.

6. Explain why chloroacetic acid is stronger than acetic acid.

7. Why p-nitro benzoic acid is stronger than benzoic acid?

8. Explain the acid strengths of substituted benzoic acids.

9. Write the general method of preparation of dicarboxylic acids from acetoacetic ester.

10 marks

10. Explain mechanisms of Reformatsky and Witting reaction.

11. Discuss the mechanismsof Benzoin condensation and Michael addition reaction

12. Explain the mechanisms of Perkin's reaction & Benzoin condensation reaction.

13. Explain the mechanisms of Knoevenegal reaction andCannizzaros reactions.

14. Write the action of heat on oxalic acid, adipic acid, Glutaric acid and phthalic acid.

15. Explain the acid strengths of substituted benzoic acids.

16. Give the preparation and properties of acetic acid.

17. Write the preparation and properties of benzoic acid.

UNIT-IV
2 marks:

1. State Henry's law.

2. State Raoult's law.

3. What are ideal solutions.

4. What are real/non-ideal solutions?

5. Define activity.

6. Give vapour pressure-composition curve for ideal solution.

7. What are azeotropic mixtures?

8. What is the enthalpy change of mixing for an ideal solution?

9. What is the volume change of mixing for an ideal solution?

10. Give an example for azeotropic mixtures.

11. Give the thermodynamical definition for an ideal solution.

5 marks

1. Derive an expression for free energy change of mixing for an ideal solution.
2. Explain vapour pressures of an ideal and non-ideal solutions.
3. Explain activity of a component in an ideal solution.
4. Explain vapour pressure – composition and boiling point - composition curves of completely miscible binary solutions

10 marks

1. Write notes on fractional distillation of binary liquid solutions.
2. Derive an expression for free energy change , volume change, enthalpy change and entropy changes of mixing for an ideal solution

UNIT-V   2 marks

1. What are colligative properties?
2. Define ebullioscopic constant.
3. Define cryoscopic constant.
4. What is Van't Hoff factor?
5. What is mean by abnormal molar mass?
6. Define CST.
7. What is upper CST/ UCST?
8. What is lower CST/LCST?
9. State Nernst distribution law.
10. Write the unit of ebullioscopic constant.

5 marks

1. Write the effects of impurities on CST.
2. Explain abnormal molar mass.
3. Write thermodynamic derivation of elevation in boiling point.
4. Write thermodynamic derivation of depression in freezing point
5. Write notes on CST.

10 marks

1. Write thermodynamic derivation and applications of Nernst Distribution law.
2. Write notes on CST.
3. Write thermodynamic derivation of elevation in boiling point.

NUCLEAR CHEMISTRY AND INORGANIC POLYMERS (15CCH6A)

Unit – I

Section – A

1. How is positron discovered?

2. What is anti electrons?

3. What is anti proton?

4. What is anti neutron?

5. What are nuclear particles?

6. What is neutrino and anti neutrino?

7. What is meson?

8. What are the different types of meson?

9. What are nuclides?

10. Define isotopes.

11. Define isobars.

12. Define isotones.

13. Explain nuclear radius.

14. Define mass defect?

15. Define N/P ratio.

16. Define binding energy.

17. Define the term packing fraction.

18. What is magic numbers?

19. How will you represent the two nuclei of an element with atomic number 11 and how 11 and 12 neutron each.

Section – B

1. Explain the nuclear forces operating between nucleons.

2. Explain the stability of the nucleus based on N/P ratio

3. Discuss in detail isotopes, isobars and isotones.

4. Explain the stability of nucleus based on packing fraction.

5. Write a note on the stability belt.

6. The mass of Li3 is 7.016005 a.m.u. mass of a proton is 1.007277a.m.u. period out the mass defect of Li3 nucleus.

Section – C

1. Discuss nuclear radius, nuclear mass and nuclear forces.
2. Define binding energy. Explain the stability of the nucleus based onbinding energy.
3. Explain nuclear models.
4. Discuss in detail the nuclear shell model.
5. Discuss in detail the liquid drop model.

Unit – II

Section - A

1. What is meant by radioactivity?
2. What are the different types of radiation?
3. Define natural radioactivity.
4. Define artificial radioactivity.
5. What are α particles?
6. What are β particles?
7. What are the laws of radioactive disintegration.
8. Define half life period.
9. Define average life period?
10. What is meant by group displacement law?

Section – B

1. Write the difference between natural radioactivity and artificial radioactivity.
2. Write the difference between chemical reaction and nuclear reaction.
3. Discuss the different types of radioactive emission.
4. Explain group displacement law.
5. Write a note 4n+2 series.
6. Derive the half – life period of radioactive decay process.
7. Explain group displacement law.
8. How many α and β particles will be emitted when U   changes to pb .

Section – C

1. Define radioactivity. Explain different types of radioactivity and different types of radiation.
2. Explain radioactive disintegration.

3. Explain group displacement law with 4n+2 and 4n series.
4. How will detect and measure radioactivity by Wilson cloud chamber and Geiger mullercounter method.

UNIT 3

Section – A

1. Write any two uses of radioisotope in medicine.
2. Gamma-rays are harmful to living tissues.it is a boon or bane? Explain
3. What are the industrial applications of radioisotope?
4. Define fission
5. Define fusion
6. Compare nuclear reaction and chemical reaction.
7. What are moderators?
8. What is the liquid used as coolant?
9. Compare fission and fusion reaction.
10. Define fission energy.

Section – B

1. Explain the production on energy in sun and stars
2. Explain how nuclear fission reaction is a controlled reaction.
3. Write note on Hydrogen bomb.
4. Write note on atomic bomb.
5. What are the different types of fission energy?
6. The binding energy per nucleon is maximum for iron nuclei. What do you understand by this statement?

Section – C

1. Explain the components of the nuclear reactor
2. Write a note on radioactive isotope

3. Explain nuclear fission and fusion reaction

UNIT 4
Section – A

1. How is borazine prepared?
2. Write types of silicone compounds?
3. What are chelated polymers?
4. What are metal alkoxide polymers? Give example.
5. How silicon halides are prepared?

Section – B

1. Write notes on phosphonitrilic polymers?
2. Discuss about tetra sulphur tetra nitride polymers?
3. Write notes on coordination polymers?
4. Write about phosphorous polymers? Give an example.
5. Write the preparation, properties and uses of Borazole (or) Borazine.
6. Write notes on silicones.
7. Mention the properties of uses of silicones

Section – C

1. How inorganic benzene is prepared? Compare its structure properties with benzene.
2. Write the preparation, properties and uses of phosphonitrilic halides.
3. Discuss about Tetra sulphurtetranitride polymers.
4. Write notes onmetal alkoxide andchelated polymers with examples

UNIT 5
Section – A

1. Write the structure of SiO_4^{4-} ion.
2. What is a silicate mineral? Give example.

3. Write any two differences between silicates of borates?
4. What are cyclic silicates?
5. What is the difference between silica & silicates?

Section – B

1. Explain about phospherouspentoide polymers.
2. Write notes on any four types of silicates?
3. Write short notes about Borates.
4. Write short notes of the following.
   a) Felspars b) zeolits c) Ultramarines

Section – C

1. What are silicates? Mention difference types of silicates.
2. Write the preparation, properties and structure of silicones and related compounds?
3. Write short notes on vanadales, niobates and tantalates.
4. Explain poly molybdate and polytantalate polymers.

CHEMISTRY OF NATURAL PRODUCTS-15CCH6B

UNIT-I

2 marks:

1. Define the term carbohydrates.
2. What are carbohydrates? Give an example.
3. What is monosaccharide? Give an example.
4. What are disaccharides? Give an example.
5. What are oligosaccharides? Give an example.
6. What are polysaccharides? Give an example.
7. What happens when glucose is treated with sodium acetate and acetic acid?
8. Why glucose and fructose form same osazone?
9. What is meant by epimerization?
10. What are reducing sugars? Give an example.
11. What happens when glucose is treated with bromine water?
12. What are epimers?
13. What is mutarotation?
14. Mention any two uses of glucose.

5 marks:

1. Write the classification of carbohydrates.
2. Give evidences for open chain structure of glucose.

3. What is mutarotation? Give the mechanism of it.
4. Discuss the structural elucidation of glucose.
5. Deduce the structure of fructose.
6. What happens when glucose is treated with (i) conc. HNO_3 (ii) HCN (iii) phenyl hydrazine.
7. Write notes on osazone formation.
8. Draw Haworth's projection formulae of α- and β-D-glucose.
9. Write the uses of glucose.
10. Give the analytical tests of carbohydrates.
11. What is Lobry de Bruyn-Ekenstein rearrangement?

10 Marks:

1. Elucidate the structure of glucose
2. Elucidate the structure of fructose.
3. Explain mutarotation and epimerization.
4. Explain the configuration of glucose.
5. Give evidences for pyranose structure of glucose

UNIT-II

2 marks:

1. What is gun cotton?
2. Mention any two uses of starch.
3. Give any two uses of cellulose.
4. What happens when sucrose is hydrolysed?
5. What is meant by inversion of cane sugar?
6. What is pyroxin?
7. What is barely sugar?
8. What happens when sucrose is treated with conc. HCl?
9. Write the fermentation reaction of sucrose.

5 marks:

1. Discuss the carbon chain lengthening of aldose.
2. What is Kiliani synthesis? Give an example.
3. Discuss the carbon chain shortening of aldose.
4. How is aldohexose converted to ketohexose?

5. How will you convert (i) glucose to fructose (ii) arabinose to glucose (iii) fructose to glucose.

6. Explain inversion of cane sugar.

7. Write short notes on the structure of cellulose.

8. Explain the properties and structure of starch.

9. Give the properties of cellulose.

10. Write the uses of starch.

11. Give the applications of cellulose derivative.

12. Explain the ring size of maltose.

13. Give the properties of starch

10 Marks:

1. Elucidate the structure of maltose.

2. Discuss the structure of sucrose.

3. Discuss the structure of starch.

4. Explain the uses of cellulose.

5. Elucidate the structure of cellulose.

UNIT-III

2 marks:

1. What are amino acids?

2. Define zwitter ion.

3. What is isoelectric point?

4. What are essential amino acids?

5. What are α-amino acids? Give an example.

6. What are essential amino acids? Give an example

7. What are non-essential amino acids? Give an example

8. What happens when α-amino acids are heated?

9. What happens when β-amino acids are heated?

10.   What happens when γ-amino acids are heated?

5 marks:

1. What is the action of heat on α, β and γ-amino acids?

2. Write any two reactions involving amino and acid group of amino acids.

3. Write Gabriel phthalimide synthesis

4. Give the reaction of Strecker synthesis

5. Write the classification of amino acids.

6. Write ninhydrin test.

7. Give Erlenmeyer synthesis of amino acids.

8. Write important properties of amino acids.

9. Give the reactions of amino acids due to amino group.

10 Marks:

1. Discuss various methods of preparation of amino acids.

2. Give the reactions of amino acids due to amino group.

3. (i) What is the action of heat on α, β and γ-amino acids.

    (ii) Write any two reactions involving amino and acid group of amino acids.

UNIT-IV

2 marks:

1. What do you meant by peptide linkage?

2. What are simple proteins?

3. What are nucleic acids?

4. What are proteins?

5. What are nucleosides?

6. What are nucleotides?

7. What are simple proteins?

8. What are lipoproteins?

9. What are phosphoproteins?

10.   What are conjugated proteins?

5 marks:

1. Explain primary and secondary structure of proteins.

2. Enumerate the properties of proteins.

3. How will you prepare peptides using Bergmann method?

4. What are two major types of nucleic acids? Name them.
5. Discuss the biological importance of nucleic acids.
6. What is meant by denaturation of proteins?
7. Explain the structure of nucleic acids.
8. Explain alpha- helical and beta- sheet structures of proteins.
9. What are globular proteins?
10. Explain end terminal analysis using Sanger's method.
11. Explain degradation of nucleic acids.
12. Write notes on synthesis of proteins.
13. How proteins are classified based on physiological functions?
14. Write the biological functions of RNA.
15. Write notes oon solid phase synthesis/Merrifield synthesis.

10 Marks:

1. How proteins are classified based on chemical properties?
2. Enumerate the properties of proteins.
3. Explain the N-termainal and C-terminal analysis of proteins.
4. Explain the end group analysis of proteins.
5. Give the structures of proteins.
6. Explain the structure of DNA.
7. Give the structure of RNA

UNIT-V
2 marks:

1. What is isoprene rule?
2. What are alkaloids? Give an example.
3. How will you obtain hygrinic acid from nicotine?
4. Give any two uses of chloramphenical.
5. Mention the therapeutic uses of Penicillin G.
6. What are antibiotics?
7. What are terpenoids/terpenes?
8. Draw the structure of chloramphenicol.

5 marks:

1. How alkaloids are classified?
2. Elucidate the structure of coniine.
3. How are alkaloids isolated from plants?
4. How will you establish the presence and position of double bond in α-terpeniol?
5. Discuss in detail the structural elucidation of menthol.
6. Explain the structure of piperine.
7. Discuss the structure of nicotine.
8. Give the structural elucidation of geraniol.
9. Give the classification of antibiotics.

10 marks

1. Elucidate the structure of menthol.
2. Elucidate the structure of α-terpeniol.
3. Establish the structure of geraniol.
4. Describe the structural elucidation of Penicillin G.
5. Describe the structural elucidation of chloramphenicol.

ELECTROCHEMISTRY (15CCH6C)
UNIT – I
SECTION A

1. Define specific conductance.
2. Define molar conductance.
3. What are strong and weak electrolytes? Give examples.
4. What is cell constant? What is its unit?
5. What is transport number of an ion?

6. State Kohlrausch's law.

7. What is meant by Henderson equation?

8. Define pH of a solution.

9. What are buffer solutions? Give example.

10. What is meant by buffer action?

11. What is hydrolysis constant of a salt?

12. What is degree of hydrolysis?

13. Write any two differences between metallic and electrolytic conductors.

14. What is salt hydrolysis? Mention different types.

15. Define solubility product.

16. Define pOH of a solution.

SECTION B

1. What is meant by equivalent conductance of an electrolyte? How is it determined experimentally?

2. Explain why the equivalent conductance of a strong electrolyte gradually increases with dilution and ultimately assumes a limiting value.

3. Define the terms specific conductance, equivalent conductance and cell constant. Write their units.

4. Describe the method of determining equivalent conductance of a weak electrolyte.

5. What is cell constant? How is it determined experimentally?

6. What is transport number of an ion? How is it determined using Hittorff's method?

7. Discuss Hittorff's method for determination of transport number of ions.

8. What is meant by transport number of an ion? How is it determined by moving boundary method?

9. State Kohlrausch's law and explain any two of it applications.

10. Give reason for the following: The pH of a buffer solution is not appreciably altered by the addition of small quantities of an acid or base.

11.   Explain the following terms: hydrolysis, degree of hydrolysis and hydrolysis constant.

12.   Establish the relation between degree of hydrolysis and hydrolysis constant.

13.   Explain the variation of dilution of specific conductance and equivalent conductance with dilution.

14.   Explain the buffer action.

15.   What is cell constant? How is it determined experimentally?

SECTION C

1. Define the terms specific and equivalent conductance. Explain clearly why at dilution   equivalent conductance increases and specific conductance decreases. How is the equivalent conductance determined experimentally?

2. How will you show that in the solution of an electrolyte undergoing electrolysis, the ions are moving towards the electrodes at different speed?

3. Derive the Henderson equation for pH of a basic buffer solution.

4. Explain the working of a buffer solution. How will you calculate pH of a buffer solution?

5. Derive the equation for the hydrolysis constant of a salt of weak acid and strong base. Explain how pH of such salt solution can be calculated.

6. What is meant by the terms degree of hydrolysis and hydrolysis constant. Deduce the relation between hydrolysis constant and dissociation constant of the base in the case of the hydrolysis of salt of a strong acid and weak base.

7. Derive the relation between hydrolysis constant and dissociation constant of strong acid and weak base.

8. Define salt hydrolysis and degree of hydrolysis. Establish the relation between hydrolysis constant and dissociation constant a salt of weak acid and weak base.

9. How will you determine the pH of a salt solution formed from weak acid and weak base.

UNIT – II

SECTION A

1. Define ionic strength.
2. What is meant by activity?
3. What is meant by activity coefficient?
4. Define ionic mobility.
5. Write the principle behind conductometric titrations.
6. What is degree of hydrolysis?
7. What are strong electrolytes? Give examples.
8. What is meant by solubility product?
9. Write the principle behind Debye- Huckel theory?
10. Write the principle behind Wien effect?

SECTION B

1. Draw and explain the conductometric titration curves for the following titrations: HCl Vs NH_4OH, NaOH Vs HCl.
2. Explain the main assumptions of Arrhenius theory of electrolytic conduction. What are its merits and demerits?
3. Explain the Debye-Falkenhagen effect.
4. Explain the activity and activity coefficient
5. Write notes on the conductometric titrations.
6. Write notes on Falkenhagen and Wein effect.
7. Write the principle behind conductometric titrations.
8. Explain the principle of determining the solubility of a sparingly soluble salt conductometrically.

SECTION C

1. Discuss the Debye-Huckel theory of strong electrolytes. Give Debye- Huckel- Onsager equation and explain the terms involved.
2. Explain the following a) Debye-Falkenhagen effect   b) Activity and activity coefficient
3. What is the principle behind condutometric titrations? Discuss the titration curves obtained in the titration of $AgNO_3$ Vs KCl, HCl Vs

acetic acid + NaOH. What are the advantages of condutometric titrations?

4. Explain in detail Debye-Huckel- Onsager theory?

UNIT – III
SECTION A

1. What are galvanic cells? Give an example.
2. What is meant by a standard cell?
3. What is meant by oxidation potential?
4. Define electrode potential.
5. Write the different types of electrodes.
6. What is meant by standard electrode potential?
7. Define EMF.
8. What is single electrode potential?
9. Write the disadvantages of standard hydrogen electrode.
10. Write any four types of electrodes.
11. Write the uses of EMF.
12. Write the cell relation of Daniel cell.
13. Explain any four types of electrode.
14. What is meant by a reversible cell? Give an example.
15. What are the conditions for reversible cells?
16. Write the difference between reversible cell and irreversible cell.

SECTION B

1. What are reversible and irreversible electrodes? Give an example.
2. Explain the construction and use of calomel electrode.
3. What is meant by single electrode potential? How is it determined?
4. Write notes on reference electrodes. Give an example.
5. Describe a method of determination of EMF.
6. What is quinhydrone electrode? Write the representation of it.
7. Write the uses of EMF.
8. What are the procedures to representation a cell?
9. How will you construct a Weston cadmium cell?

10.   Explain any four types of electrode reactions.

SECTION C

1. Write notes on reference electrodes. Describe a method of determination of EMF.
2. How will you construct a Weston cadmium cell and calomel electrode.
3. What is meant by a standard cell? Compare standard hydrogen electrode with calomel electrode.

UNIT – IV
SECTION A

1. What are concentration cells?
2. What are chemicals cells?
3. What is salt bridge?
4. What is meant by electrochemical series?
5. What is meant by cell emf?
6. What is liquid junction potential?
7. What is cell reaction?
8. What do you understand by cell emf?
9. Write the differences between concentration cell and galvanic cell.
10.   What is single electrode potential?

SECTION B

1. Derive an expression for emf of a concentration cell without transference.
2. Derive an expression for the potential of metal-metal ion electrode.
3. Explain what is meant by standard reduction potential.
4. Deduce the Nernst equation for the emf of the cell.
5. What is salt bridge? Why it is used? What substance is used as a standard in preparing the salt bridge?
6. What is electrochemical series? Write the applications of electrochemical series.

7. In what way an indicator electrode is different from a reference electrode? Describe an experiment for the measurement of emf of a cell.

8. What is meant by hydrogen electrode? How would you made use of this electrode to determine H^+ ion concentration in a solution?

9. Write notes on liquid junction potential. Write the emf of electrode concentration cells.

10. Derive an expression for emf of a concentration cell with transference.

11. Write the Nernst equation for the following equation. $M = M^{n+} + ne^-$

12. Mention the applications of concentration cells.

SECTION C

1. How do concentration cells with and without transference differ from each other? How will you determine the strength of $AgNO_3$ solution accurately with the help of emf measurements?

2. Describe the construction of a simple electrochemical cell. Indicate the positive and negative electrodes. What are the reactions taking place at these electrodes? Give the overall cell reaction.

3. What are chemical cells? Write the difference between reversible and irreversible cells. Explain two uses of emf measurements.

4. What do you understand by emf? Discuss briefly the Nernst concept of the origin of EMF.

5. Give the half cell reactions and explain the standard electrode potential for the following electrodes. (i) H^+ / $H_{2\ (g)}$ Pt   (ii) Cl^- /AgCl (insoluble) /Ag.

6. Deduce the Nernst equation for emf of the cell.

7. What is single electrode potential? Derive the Nernst equation for single electrode potential of calomel electrode, hydrogen electrode and Fe3+/Fe2+ electrode.

8. Write notes on liquid junction potential. Write the emf of electrode concentration cells.

9. Discuss electrochemical series and its applications.

10.   Explain concentration cells with and without transference with examples. Mention the applications of concentration cells.

UNIT – V
SECTION A

1. Define fuel cell.
2. What are storage cells?
3. What is H_2-O_2 fuel cell?
4. What is known as discharging of a battery?
5. Write the merits of glass electrode.
6. Write the principle behind potentiometric titrations.

SECTION B

1. Discuss potentiometric titrations.
2. Explain H_2-O_2 fuel cell.
3. How will you determine pH of a solution using quinhydrone electrode?
4. Explain any two types of potentiometric titrations.
5. How will you construct a H_2-O_2 fuel cell?
6. Discuss the mechanism of discharging and recharging in lead-acid battery.
7. Write notes on fuel cells.
8. How will you determine pH of a solution using glass electrode?

SECTION C

1. Define the construction and working of lead storage battery in detail.
2. Explain the following a) Electrode reactions b) Reference electrodes.
3. Write notes on (i) lead acid battery (ii) Determination of pH using glass electrode.
4. Obtain an expression to calculate the G, S and H for a cell reaction from emf measurements.
5. Derive expression for equilibrium constant using emf measurements.
6. How will you determine the pH using quinhydrone and glass electrodes?

7. How will you determine the G, S, H and equilibrium constant of a cell reaction using emf measurements?

8. Discuss the construction and working of lead storage battery in detail. Write notes on H_2-O_2 fuel cell.

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SPECTROSCOPY(12CCH6D)

TWO MARKS

UNIT-I

2 marks

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1. Define Molecular Spectroscopy.

2. State Lambert's law

3. State Beer's law

4. What is meant by auxochrome?

5. What do you mean by absorption spectrum?

1. Explain (a) Emission spectrum (b) Absorption spectrum.

2. Write note on chromophores & auxochromes.

3. Explain the factors governing absorption maximum and intensity.

4. Discuss the different types of electronic transitions.

10 marks

1. Explain the instrumentation of UV spectrophotometer.

2. Explain briefly on electronic transitions with suitable examples.

3.(i) Explain the factors governing λ_{max} & ϵ_{max}.

  (ii) Define the terms: Chromophore & Auxochrome.

4. Explain in detail about the double beam spectrophotometer with description of components.

UNIT-II
2 marks

1. What is the essential condition for a molecule to have infrared spectrum?

2. Define anti stokes lines.

3. What is Rayleigh scattering?

4. State Hooke's law

5. What are the differences between the Rayleigh and Raman scattering?

5 marks

1. Distinguish between IR & Raman spectroscopy.

2. Illustrate mutual exclusion principle.

3. How will you identify aldehyde & ketone molecules in IR spectra?

4. Discuss about sampling techniques in IR spectroscopy.

5. What are the factors affecting vibrational frequencies.

10 marks

1. Describe the sampling techniques in IR spectroscopy.
2. (i) Discuss the instrumentation of Raman spectroscopy with block diagram
   (ii) Identify the aldehydes & ketones by using IR spectroscopy.
3. Describe the instrumentation of IR spectroscopy with all the components.

UNIT-III
2 marks

1. What is base peak?
2. State Nitrogen rule.
3. What is a metastable peak?
4. State ring rule with an example.
5. What is isotopic peak?

5 marks

1. Explain the factors influencing the fragmentation.
2. Describe the instrumentation of mass spectrometer.
3. Discuss about metastable ion.
4. How will you determine the molecular formula of a compound using mass spectroscopy?

10 marks

1. Explain the following (i) Molecular peak (ii) Isotopic peak (iii) Metastable peak.
2. Explain different fragmentation patterns with examples.
3. Discuss the mass spectra of (i) Alkene (ii) Branched alkane.
4. Explain the basic principle and instrumentation of mass spectroscop

UNIT-IV
2 marks

1. Define Chemical shift.

2. How many NMR peaks are obtained for toluene?

3. Write the principle behind NMR spectroscopy.

4. Mention the number of NMR signals in (a) Methane (b) Methyl alcohol

5. What is meant by coupling constant?

5 marks

1. Explain spin-spin coupling.

2. Explain the basic instrumentation of NMR spectroscopy.

3. Represent the NMR spectrum of 1,1,2-tribromo methane & acetophenone.

10 marks

1. Describe the NMR spectra of the following (i) Ethyl alcohol (ii) acetaldehyde.

2. Discuss the NMR spectrum of any five simple organic components.

3. Describe the basic instrumentation of NMR spectroscopy with all the components.

UNIT-V

2 marks

1. Calculate the media for 10.20; 10.02 and 10.08.

2. What is a computer?

3. Write the basic principle of ESR spectroscopy.

4. What are the different types of computers?

5. Calculate mean deviation.

5 marks

1. Mention the applications of computers in chemistry.
2. How will you calculate (i) Mean deviation (ii) Standard deviation?
3. Write the characteristic of computers.
4. Explain in detail about the calculations of statistical data-sum, average & median deviation.
5. Explain the principle of ESR spectroscopy.

10 marks

1. **(i)**Explain briefly on the applications of computers in chemistry.

   (ii)List the applications of ESR.

2. Write the various applications of ESR spectroscopy.

3. (i)Explain the characteristic of a computer

   (ii)Define average and standard deviation.

4. (i)Draw a block diagram of a digital computer.

   (ii)Explain the instrumentation of photo calorimeter.

APPLIED CHEMISTRY (15SCH6A)

UNIT 1

2 marks

- Define milk
- What is meant by sterilization?
- What is meant by homogenization?
- What is pasteurization?
- Define milk powder
- Write the general composition of milk
- Define Ice cream?
- What is the role emulsifier in ice cream?

5 marks

- Define milk powder. Discuss the need for making milk powder.
- Write short note on Pasteurization and Homogenisation of milk.
- Write short notes on ice-cream stabilizer and emulsifiers.

10 marks

- Explain the components of milk in detail?
- Write the definition of composition of cream of butter?
- Write the manufactured of milk powder by spray drying method?
- Discuss the physiological changes taking place in milk due to boi

UNIT 2

2 marks

- Define soil
- Define soil reclamation
- What are secondarynutrients?
- What is pH of soil?
- Define soil alkalinity

5 marks

- Explain buffering of soil and its effect.
- Write note on soil fertility and its evaluation
- Write note on soil water and soil temperature.

10 marks

- Explain in detail the classification and properties of soil.
- Explain the following terms; soil pH, soil minerals, soil fertility and soil colloids.

UNIT 3

2 Marks

- What are fertilizers?
- Define compost
- Define manure
- What are primary nutrients? Give examples
- Write the uses of fertilisers.
- What are insecticides? Give examples.

5 marks

- Write short notes on fluoride compound insecticides.
- Write the classification of insecticides with examples.
- Explain the role on the growth and development of composting and manures.
- Writ note on pyridine compound insecticides.

10 marks

- What are the importances of fertilizers? Discuss the adverse effects of pesticides of fertilizers.
- Write short notes on pyridine and boron compound insecticides.
- What are fertilizers? Discuss the ill effects of continuous use of chemical fertilizers and insecticides.

- Describe about pyridine compound and fluoride compound insecticides.

UNIT 4

2 marks

- Define calorific value?
- Give the composition of producer gas.
- Mention the composition of water gas.
- What are the uses of natural gas?
- What is LPG?
- Give the composition of Natural gas.

5 marks

- What is LPG? State its composition and its uses.
- Write the composition and uses of carburetted water gas.
- Mention the composition of producer gas and carburetted water gas.

10 marks

- Give details of composition and sources of the following gases:
  (a) Semi water gas (c) producer gas (d) biogas (e) water gas.
- How are the following produced:
  (a) Natural gas (b) oil gas (c) carburetted water gas.
- How is the producer gas obtained? What are its uses?

UNIT 5

2 marks

- What are the types of glasses?
- What is the composition of cement?
- What is meant by setting of cement?

5 marks

- Write short notes on paints.
- Write a short note on pigments.
- Explain the different types of glasses.

10 marks

- Explain composition and manufacture of cement.
- Explain the manufacture and different types of glasses.
- Discuss about the manufacture and types of glass.

ALLIED-II (15CACH2A)
UNIT-I
2 marks

1. What are fertilizers? Give examples.

2. Write the uses of saccharin.

3. Draw the structure of gammaxane.

4. Mention any four gaseous pollutants.

5 marks

1. Write a note on NPK fertilizers.

2. Write a note on air pollution.

3. Write the preparation & uses of Freon & Gammaxane.

4. Write short note on soil pollution.

5. Explain the preparation & mode of action for detergents.

6. Write the causes and remedies of air pollution.

7. Write the preparation & properties of permono sulphuric acid.

8. Write short notes on urea & triple superphosphate.

10 marks

1.(i) Discuss the mode of action of soaps & detergents.

   (ii) Write the preparation & properties of per mono sulphuric acid.

2. Explain in detail about water pollution & its remedies.

3. Write the preparation & use of saccharin & carbon tetra chloride.

4. Explain the preparation & uses of the following (a) gammaxene (b) triple super phosphate.

5. Explain the preparation & properties of per acids of sulphur.

6. Write the preparation & mode of action of soaps & detergents.

UNIT-II
2 marks

1. What is meant by hypnotics?
2. What are the uses of antiseptics?
3. Differentiate analgesics and antiseptics.
4. Give the causes for cancer.
5. What are the causes of AIDS?
6. What are antipyretic drugs? Give one example.

5 marks

1. Define the terms analgesics & antipyretics with one example.
2. Explain about general and local anaesthetics.
3. Write short note on diabetes.
4. Write short notes on anaesthetic.

10 marks

1. Explain the following (i) antipyretics (ii) anaesthetics.
2. Write the cause & treatment of cancer & diabetes.

UNIT-III
2 marks

1. What are non-essential amino acids?
2. Write any two properties of glycine.
3. Give at least two example for essential amino acids.

5 marks

1. Differentiate between DNA & RNA.
2. Discuss the classification of proteins.

3. Write the preparation and properties of glycine.

10 marks

1. Explain the preparation of glycine.

2. Write a note on antioxidants, colouring & flavouring agents.

3. Discuss the classification of proteins based on physical & biological functions.

4. Give a detailed account of classification of proteins based on physical properties & biological functions.

UNIT-IV

2 marks

1. Define bond order.

2. What are silicates?

3. Write any two uses for EDTA.

4. Give the IUPAC name of $[Fe(CN)_6]^{4-}$.

5 marks

1. Write the postulates of Werner's theory.

2. Explain the MO diagram for N_2 molecule.

10 marks

1.(i) Discuss the biological functions of chlorophyll.

   (ii) Write an essay on the structure of ortho silicates & cyclic silicates.

2. Discuss about the function & structure of haemoglobin & chlorophyll.

3. Discuss the preparation & structure of silicates.

4. Explain the applications of EDTA & functions of haemoglobin & chlorophyll.

UNIT-V

2 marks

1. Write the medicinal applications for neem.

2.What is meant by Rh factor.

5 marks

1. Explain the causes & symptoms for malaria.

2. Write short note on blood pressure.

10 marks

1. Write a note on Indian medicinal plants.

2. Write a note on the causes, symptoms & treatment of (i) Cholora (ii) Jaundice & (iii) Malaria.