PART – I

Note: i) Answer all the questions.

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer $15 \times 1 = 15$

1. The number of water molecules in a drop of water weighing 0.018 g is
   a) 6.022×10^{26} b) 6.022×10^{23}
   c) $\mathbf{6.022 \times 10^{20}}$ d) 9.9×10^{22}
2. Two electrons occupying the same orbital are distinguished by
   a) azimuthal quantum number **b) spin quantum number**
   c) magnetic quantum number d) principal quantum number
3. Which of the following pairs of elements exhibit diagonal relationship?
   a) Be and Mg b) Li and Be c) Be and B **d) Be and Al**
4. The cause of permanent hardness of water is due to
   a) $Ca(HCO_3)_2$ b) $Mg(HCO_3)_2$ **c) $\boldsymbol{CaCl_2}$** d) $MgCO_3$
5. Match the flame colours of the alkali and alkaline earth metal salts in the Bunsen burner

1) Sodium	(i) Blue
2) Caesium	(ii) Apple green
3) Calcium	(iii) Yellow
4) Barium	(iv) Brick red

   a) (1)-(iii), (2)-(iv), (3)-(i), (4)-(ii) b) (1)-(i), (2)-(ii), (3)-(iv), (4)-(iii)
   c) (1)-(iii), (2)-(i), (3)-(iv), (4)-(ii) d) (1)-(ii), (2)-(i), (3)-(iv), (4)-(iii)
6. The value of the gas constant R is
   a) 0.082 $dm^3\ atm$ b) 0.987 $cal\ mol^{-1}k^{-1}$
   c) $\mathbf{8.3\ J\ mol^{-1}k^{-1}}$ d) 8 $erg\ mol^{-1}k^{-1}$
7. The temperature of the system, decreases is an _____
   a) Isothermal expansion b) Isothermal Compression
   c) adiabatic expansion d) adiabatic compression
8. $\frac{K_c}{K_p}$ for the reaction $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ is :
   a) $\frac{1}{RT}$ b) $\sqrt{RT}$ c) RT **d) $\boldsymbol{(RT)^2}$**
9. Normality of 1.25 M sulphuric acid is :
   a) 1.25 N b) 3.75 N **c) 2.5 N** d) 2.25 N
10. According to Valence bond theory a bond between two atoms is formed when :
    a) fully filled atomic orbitals overlap **b) half filled atomic orbitals overlap**
    c) non-bonding atomic orbitals overlap d) empty atomic orbitals overlap
11. In an organic compound, phosphorus is estimated as:
    a) $\boldsymbol{Mg_2P_2O_7}$ b) $Mg_3(PO_4)_2$ c) H_3PO_4 d) P_2O_5
12. Homolytic fission of covalent bond leads to the formation of
    a) Electrophile b) Nucleophile c) Carbo cation **d) Free radical**
13. The compounds formed at anode in the electrolysis of aqueous solution of potassium acetate are
    a) CH_4 and H_2 b) CH_4 and CO_2 **c) $\boldsymbol{C_2H_6}$ and $\boldsymbol{CO_2}$** d) C_2H_4 and Cl_2
14. The name of $C_2F_4Cl_2$ is _____
    a) Freon – 112 b) Freon – 113 **c) Freon – 114** d) Freaon – 115

15. Bhopal gas Tragedy is a case of _____
a) Thermal pollution **b) Air pollution** c) Nuclear pollution d) Soil pollution

PART – II

Note: Answer any six questions. Question no.24 is compulsory. $\mathbf{6 \times 2 = 12}$

16. What do you understand by the term mole? Ch 1
17. Define orbital. Ch 2
18. How is tritium prepared? Ch 4
19. Explain intensive properties with two examples. Ch 7
20. Distinguish between diffusion and effusion Ch 9
21. Write K_p and K_C for the reaction Ch 8

$$2CO\ (g) \rightleftharpoons CO_2\ (g) + C(S)$$

22. Give the IUPAC name of the following compounds Ch 11

i) $CH_2 = CH - CH = CH_2$

ii) $CH_3 - \underset{\displaystyle Cl}{\underset{|}{C}} \equiv C - CH - CH_3$

23. What happens when acetyl chloride is treated with excess of CH_3MgI ? Ch 14
24. Complete the following : Ch 13

$$CH_3CH_2OH \xrightarrow[430-440\,K]{Conc.H_2SO_4} A \xrightarrow[Benzoyl\ \ Peroxide]{HBr} B$$

PART – III

Note : Answer any six questions. Question no.33 is compulsory. $\mathbf{6 \times 3 = 18}$

25. Explain the fact that he second ionisation potential is always higher than first ionisation potential. Ch 3
26. What are the uses of heavy water? Ch 4
27. Give any three similarities between Beryllium and Aluminium. Ch 5
28. Mention the three methods used for liquefaction of Gases. Ch 6
29. Define Molality. Ch 9
30. State Fajan's rule Ch 10
31. Which is considered to be earth's protective umbrella? Why? Ch 15
32. How the aromatic character of a compound can be decided by Huckel's rule? Ch 13
33. Define : i) Sigma bond ii) Pi bond Ch 10

PART – IV

Note : Answer all the questions. $\mathbf{5 \times 5 = 25}$

34. a) Write shorts note on: Ch 2
    i) Magnetic Quantum Number
    ii) Azimuthal Quantum Number

(OR)

b) Calculate the effective nuclear charge on 4s electron and 3d electron in Scandium Ch 3

35. a) i) What is water gas shift reaction? Ch 4
ii) Write the uses of sodium bicarbonate Ch 5

(OR)

b) i) State Joule-Thomson effect Ch 6
ii) A sample of gas at $15°C$ at 1 atm has a volume of 2.58 dm^3. When the temperature is raised to $38°C$ at 1 atm, does the volume of the gas increase? If so calculate the final volume. Ch 6

36. a) Derive the relation between ΔH and ΔU for an ideal gas. Explain each term involved in the equation Ch 7

(OR)

b) i) What is reaction Quotient (Q)? Ch 8
ii) Write the four colligative properties. Ch 9

37. a) Discuss the formation of N_2 molecule using MO Theory. Ch 10

(OR)

b) Describe the classification of organic compounds based on their structure. Ch 11

38. Complete the reaction Ch 13
i) $CaC_2 \xrightarrow{H_2O}$
ii) How is DDT prepared?

(OR)

b) i) Differentiate BOD and COD Ch 15
ii) What is green chemistry? Ch 15

MARCH – 2023

PART – I

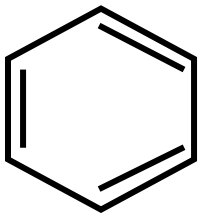
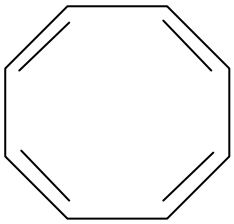
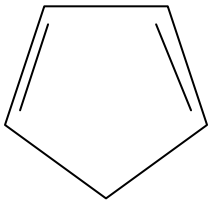
Note : i) Answer all the questions. **$15 \times 1 = 15$**

ii) Choose the most appropriate answer from the given four Alternatives and write the option code and corresponding answer.

1. Chloroform reacts with Nitric acid to produce:
a) Chloropicrin b) Nitro toluene
c) Chloropicric acid d) Nitro glycerine
2. Sodium is stored in _____
a) Kerosene b) Alcohol c) Ether d) Water
3. Osmotic pressure (π) of a solution is given by the equation:
a) $\pi v = nRT$ b) $\pi RT = n$ c) $\pi = nRT$ d) none of these
4. The IUPAC name of the compound

$$CH_3 - \underset{\displaystyle HO}{\underset{|}{CH}} - CH_2 - CH = CH - CH_3$$

a) hex-2-en-4-ol **b) hex-4-en-2-ol** c) hex-2-en-4-al d) hex-4-en-2-al

5. $-I$ effect is shown by :
   a) $-Cl$ b) $-Br$ **c) both a) and b)** d) $-CH_3$
6. Which of the following compound has percentage of Carbon same as that in Ethylene (C_2H_4)?
   a) benzene **b) Propene** c) Ethane d) Ethyne
7. The boiling point of heavy water $[D_2O]$ is _____
   a) 375.4 K b) 373.4 K c) 376.2 K **d) 374.4 K**
8. Which of the following is not a thermodynamic function?
   a) entropy b) internal energy **c) frictional energy** d) enthalpy
9. The pH of Normal rain water is :
   a) 5.6 b) 6.5 c) 4.6 d) 7.5
10. Which one of the following is aromatic ?
    a) 
    b) 
    c) 
    d) both a) and b)
11. The total number of orbitals associated with the Principal Quantum Number n = 3?
    a) 5 **b) 9** c) 7 d) 8
12. Assertion : Oxygen molecule is Paramagnetic
    Reason : It has two unpaired electrons in its bonding molecular orbital
    a) Assertion is true but reason is false
    b) Both assertion and reason are true and reason is the correct explanation of assertion.
    c) Both Assertion and reason are false
    d) Both Assertion and reason are true but reason is not the correct explanation of assertion
13. What would be the IUPAC name for an element with atomic number 222?
    a) didibium b) bibibiium **c) bibibium** d) bididium
14. An unknown gas diffuse at a rate of 0.5 times that of Nitrogen at the same temperature and pressure. The molar mass of the unkown gas is _____
    a) 114 $g\ mol^{-1}$ **b) 112 $g\ mol^{-1}$** c) 120 $g\ mol^{-1}$ d) 110 $g\ mol^{-1}$
15. Solubility of carbon-di-oxide gas in cold water can be increased by :
    a) decrease in pressure b) increase in volume
    c) increase in pressure d) none of these

PART – II

Note : Answer any six questions, Question no.24 is compulsory. **$6 \times 2 = 12$**

16. Distinguish between oxidation and reduction Ch 1
17. State Heisenberg's Uncertainty principle Ch 2
18. Mention the uses of Plaster of Paris Ch 5
19. State Le-Chatelier principle Ch 8
20. Define Osmotic Pressure Ch 9

21. Draw the Lewis structure for : i) H_2O ii) HNO_3 Ch 10
22. Write short notes on Friedel Craft's Reaction. Ch 13
23. What are Particulate Pollutants? Give example Ch 15
24. Calculate the entropy change during the melting of one mole of ice into water at $0°C$ and 1 atm pressure. Enthalpy of fusion of ice is $6008\ J\ mol^{-1}$ Ch 7

PART – III

Note: Answer any six questions. Question no.33 is compulsory. **$6 \times 3 = 18$**

25. Balance the following equations by oxidation number method Ch 1
    i) $KMnO_4 + Na_2SO_3 \longrightarrow MnO_2 + Na_2SO_4 + KOH$
    ii) $Cu + HNO_3 \longrightarrow Cu(NO_3)_2 + NO_2 + H_2O$
26. Write shorts notes on Principal Quantum number. Ch 2
27. Explain the Diagonal Relationship Ch 3
28. How do you convert Para hydrogen into Ortho hydrogen Ch 4
29. Derive ideal Gas equation Ch 6
30. What are State and Path Functions? Give two examples. Ch 7
31. An organic compound (A) with molecular formula C_2H_5Cl reacts with aqueous KOH and gives compound (B) and with alcoholic KOH gives compound (C). Identify (A), (B) and (C). Ch 13
32. Explain inductive effect with suitable example Ch 12
33. Write the structural formula for the following compounds. Ch 12
    i) m-dinitro benzene
    ii) p-dichloro benzene
    iii) 1,3,5 trimethyl benzene

PART – IV

Note: Answer all the questions. **$5 \times 5 = 25$**

34. a) A compound on analysis gave $Na = 14.31\%$, $S = 9.97\%$, $H = 6.22\%$, $O = 69.5\%$. Calculate the molecular formula of the compound, if all the Hydrogen in the compound is present in combination with Oxygen as water of Crystallisation. [molecular mass of the compound is 322] Ch 1

(OR)

b) i) State Pauli Exclusion Principle Ch 2
ii) State Modern Periodic law Ch 3

35. a) i) What are isotopes? Write the names of isotopes of Hydrogen. Ch 4
ii) Give the uses of Calcium Ch 5

(OR)

b) Derive the values of Critical Constants in terms of vander Waals constants Ch 6

36. a) State the various statements of Second law of Thermodynamics. Ch 7

(OR)

b) i) State law of Mass action Ch 8
ii) What are the limitations of Henry's Law? Ch 9

37. a) Explain the salient feature of Molecular Orbital theory. Ch 10

(OR)

b) i) Give any three characteristic of organic compounds. Ch 12

ii) Find the functional group of the following compounds

A) Acetaldehyde

B) Oxalic acid

C) Dimethyl ether

D) Methylamine

38. Explain the structure of Benzene Ch 13

(OR)

b) i) Starting from CH_3MgI, how will you prepare the following? Ch 14

A) Ethyl alcohol

B) Acetaldehyde

C) Ethyl methyl ether

ii) What is Eutrophication?

JULY - 2022

PART – I

Note: i) Answer all the questions.

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer $\mathbf{15 \times 1 = 15}$

1. Total number of electrons present in 1.7 g of ammonia is:
   a) $\mathbf{6.022 \times 10^{23}}$ b) $\frac{6.022\times10^{22}}{1.7}$ c) $\frac{6.022\times10^{24}}{1.7}$ d) $\frac{6.022\times10^{23}}{1.7}$
2. The total number of orbitals associated with the principal quantum number n = 3
   a) 9 b) 8 c) 5 d) 7
3. Tritium, is a _____ emitter
   a) α **b)** $\boldsymbol{\beta}$ c) γ d) none of these
4. _____ is used in devising photoelectric cells.
   a) Lithium b) Sodium c) Potassium **d) Caesium**
5. Among the following the least thermally stable is :
   a) K_2CO_3 b) Na_2CO_3 c) $BaCO_3$ **d)** $\boldsymbol{Li_2CO_3}$
6. If temperature and volume of an ideal gas is increased to twice its values, the initial pressure P becomes:
   a) 4P b) 2P **c) P** d) 3P
7. The amount of heat exchanged with the surrounding at constant pressure is given by the quantity:
   a) ΔE **b)** $\boldsymbol{\Delta H}$ c) ΔS d) ΔG
8. If X is the fraction of PCl_5, the total number of moles of reactants and products at equilibrium is;
   a) $0.5 - X$ **b)** $\boldsymbol{X + 0.5}$ c) $2X + 0.5$ d) $X + 1$
9. Which one of the following binary liquid mixtures exhibit positive deviation from Raoult's law?
   a) Acetone + Chloroform b) Water + Nitric acid
   c) HCl + Water **d) Ethanol + water**
10. The ratio of number of sigma (σ) and pi (π) bonds in 2-butynal is :
    a) $\frac{8}{3}$ b) $\frac{5}{3}$ c) $\frac{8}{2}$ d) $\frac{9}{2}$

11. The IUPAC name of the compound

$$CH_3 - CH_2 - \underset{\displaystyle COOH}{\underset{|}{CH}} - CH = CH_2$$

a) 2-ethylbut-2-enoic acid
b) 3-ethylbut-3-enoic acid
c) 3-ethylbut-2-enoic acid
d) 2-ethylbut-3-enoic acid

12. Match the following

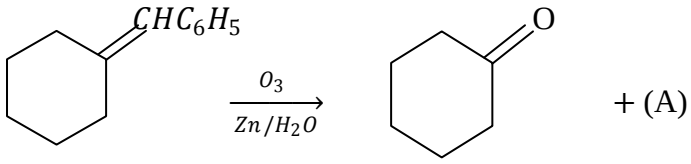
1) $-NH_2$	i) Sulpho-
2) $-CN$	ii) Formyl –
3) $-SO_3H$	iii) Amino –
4) $-CHO$	iv) Cyano –

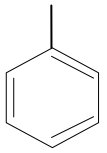
a) 1) – i), 2) – ii), 3) – iii), 4) – iv)
b) 1) – iv), 2) – iii), 3) – ii), 4) – i)
c) 1) – iii), 2) – iv), 3) – i), 4) – ii)
d) 1) – iii), 2) – i), 3) – iv), 4) – ii)

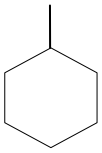
13. $-I$ effect is not shown by

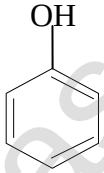
a) $-CH_2CH_3$ b) $-F$ c) $-Cl$ d) $-NO_2$

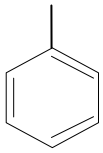
14. Identify the compound (A) in the following reaction :



a) 

b) 

c) 

d) 

15. Assertion : Increasing order of boiling points of halo alkanes are

$$CH_3Cl < CH_2Cl_2 < CHCl_3 < CCl_4$$

Reason : The boiling points of halo alkanes increase with increase in the number of halogen atoms
a) Assertion is true but reason is false
b) both assertion and reason are true and reason is the correct explanation of assertion
c) Both Assertion and reason are false
d) both assertion and reason are true but reason is no the correct explanation of assertion

PART – II

Note: Answer any six questions. Question no. 24 is compulsory. $6 \times 2 = 12$

16. What is meant by limiting reagents? Ch 1
17. State Heisenberg's uncertainty principle Ch 2
18. Give an example for ionic hydride and covalent hydride. Ch 4
19. What is path function? Give two examples Ch 7
20. Define reaction quotient Ch 8
21. 50g of tab water contains 20 mg of dissolved solids. What is the TDS value in ppm? Ch 9
22. How will you prepare ethane by Kolbe's electrolytic method? Ch 13
23. Mention any two methods of preparation of haloalkanes from alcohols. Ch 14
24. If an automobile engine burns petrol at a temperature of 1089 K and if the surrounding temperature is 294 K, calculate its maximum possible efficiency. Ch 7

Note: Answer any six questions. Question no.33 is compulsory. **$6 \times 3 = 18$**

25. Calculate the empirical formula of a compound containing 76.6% carbon, 6.38%, hydrogen and rest oxygen. Ch 1
26. Compare the ionisation energy of beryllium and boron Ch 3
27. Distinguish between diffusion and effusion. Ch 6
28. At particular temperature $K_c = 4 \times 10^{-2}$ for the reactions Ch 8

    $H_2S_{(g)} \rightleftharpoons H_{2\,(g)} + \frac{1}{2} S_{2\,(g)}$

    Calculate K_c for each of the following reactions

    i) $2H_2S_{(g)} \rightleftharpoons 2H_{2\,(g)} + S_{2\,(g)}$

    ii) $3H_2S_{(g)} \rightleftharpoons 3H_{2\,(g)} + \frac{3}{2} S_{2\,(g)}$
29. What are the conditions when a solution tends to behave like an ideal solution? Ch 9
30. Describe fajan's rule Ch 10
31. Write short notes on hyper conjugation Ch 12
32. Explain Brich reduction Ch 13
33. Give an example for each of the following type of organic compounds Ch 11

    i) Non-benzonoid aromatic compound

    ii) Aromatic heterocyclic compound

    iii) carbocyclic compound

PART – IV

Note: Answer all the questions. **$5 \times 5 = 25$**

34. a) i) Describe about magnetic quantum number? Ch 2

    ii) Give the electronic configuration of Mn^{2+} and Cr^{3+} Ch 2

    (OR)

    b) i) What are f-block elements? Ch 3

    ii) State the trends in the variation of electronegativity in group and periods Ch 3
35. a) Discuss the similarities between lithium and magnesium Ch 5

    (OR)

    b) i) Define entropy. Give its unit. Ch 7

    ii) List any three characteristics of gibbs free energy. Ch 7
36. a) Derive K_c and K_p for synthesis of ammonia Ch 8

    (OR)

    b) Discuss the formation of C_2 molecule using MO theory Ch 10
37. a) Mention the shape of the following molecules based on VSEPR theory Ch 10

    i) BF_3 ii) BrF_3 iii) PCl_5 iv) SF_6 v) IF_7

    (OR)

    b) Describe any two types of constitutional isomers. Ch 11

38. a) An organic compound (A) C_2H_4 decolourises bromine water. (A) on reaction with chlorine gives (B). (A) reacts with HBr to give (C), identify (A), (B) and (C) explain the reactions. Ch 13

(OR)

b) Starting from CH_3MgI, how will you prepare the following? Ch 14

i) Acetaldehyde ii) Acetone iii) Methane

MAY – 2022

PART – I

Note: i) Answer all the questions. $\mathbf{15 \times 1 = 15}$

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer

1. Which of the following is aliphatic saturated hydrocarbon?
   a) C_9H_{18} b) C_8H_{14} **c) $\boldsymbol{C_8H_{18}}$** d) All of the above
2. Equimolal aqueous solutions of NaCl and KCl are prepared. If the freezing point of NaCl is $-2℃$, the freezing point of KCl solution is expected to be
   a) $-1℃$ **b) $-2℃$** c) $0℃$ d) $-4℃$
3. The correct relative order of $+1$ effect of alkyl groups is :
   a) $-C(CH_3)_3 > -CH(CH_3)_2 > -CH_2CH_3 > -CH_3$
   b) $-CH_3 > -CH_2CH_3 > -CH(CH_3)_2 > -C(CH_3)_3$
   c) $-CH_2CH_3 > -CH_3 > -C(CH_3)_3 > -CH(CH_3)_2$
   d) $-CH(CH_3)_2 > -C(CH_3)_3 > -CH_2CH_3 > -CH_3$
4. 7.5 g of a gas occupies a volume of 5.6 L at 0℃ and 1 atm pressure. The gas is
   a) CO **b) NO** c) CO_2 d) N_2O
5. Assertion: In monohaloarenes, electrophilic substitution occurs at ortho and para positions
   Reason: Halogen atom is a ring deactivator
   a) Assertion is true but reason is false
   b) Both assertion and reason are true and reason is the correct explanation of assertion
   c) Both assertion and reason are false
   d) Both assertion and reason are true but reason is not the correct explanation of assertion
6. The intensive property among the quantities below is:
   a) Enthalpy b) mass **c) $\frac{mass}{volume}$** d) volume
7. Which one of the following is incorrect statement?
   a) Presence of catalyst affects both the forward reaction and reverse reaction to the same extent.
   b) for a system at equilibrium Q is always less than the equilibrium constant
   c) equilibrium constant varies with temperature
   d) equilibrium can be attained from either side of the reaction
8. Match the following

(1) $-NO_2$	(i) propyl
(2) $-OCH_3$	(ii) Amino
(3) $-CH_2-CH_2-CH_3$	(iii) Methoxy
(4) $-NH_2$	(iv) Nitro

a) (1)-(iii), (2)-(ii), (3)-(iv), (4)-(i) b) (1)-(iii), (2)-(iv), (3)-(i), (4)-(ii)

c) (1)-(iv), (2)-(iii), (3)-(i), (4)-(ii) d) (1)-(ii), (2)-(i), (3)-(iv), (4)-(iii)

9. Spodumene is the mineral source for which of the following alkali metal?

a) Lithium b) Sodium c) Rubidium d) Potassium

10. Which of the following has highest hydration energy?

a) $BaCl_2$ **b) $MgCl_2$** c) $SrCl_2$ d) $CaCl_2$

11. Tritium nucleus contains :

a) $1p + 2n$ b) $1p + 0n$ c) $1p + 1n$ d) $2p + 1n$

12. Which one of the following is diamagnetic?

a) O_2^{2-} b) O_2^{+} c) O_2 d) None of these

13. Splitting of spectral lines in an electric field is called:

a) Compton effect b) Zeeman effect **c) Stark effect** d) shielding effect

14. A bottle of ammonia and a bottle of HCl connected through a long tube are opened simultaneously at both ends. The white ammonium chloride ring will be first formed :

a) near the ammonia bottle c) at the centre of the tube

c) throughout the length of the tube **d) near the hydrogen chloride bottle**

15. $\overset{\ominus}{C}H_2 - \underset{\underset{O}{\|}}{C} - CH_3$ and $CH_2 = \underset{\underset{O_{\ominus}}{|}}{C} - CH_3$ are

a) optical isomers b) resonating structures

c) conformers **d) tautomers**

PART – II

Note: Answer any six questions. Question no.24 is compulsory. **$6 \times 2 = 12$**

16. Define Gram equivalent mass Ch 1
17. Calculate the maximum number of electrons that can be accommodated in L shell Ch 2
18. Mention the three types of covalent hydrides Ch 4
19. What are the conditions for the spontaneity of a process Ch 7
20. Explain sign convention of heat? Ch 7
21. Give a balanced chemical equation for the equilibrium reaction for which the equilibrium constant is given by expression $K_C = \frac{[NH_3]^4\,[O_2]^5}{[NO]^4[H_2O]^6}$ Ch 8
22. Define the term "isotonic" solution Ch 9
23. How will you convert ethyl chloride to ethane? Ch 13
24. Complete the following reactions

i) $C_6H_5Cl + 2NH_3 \xrightarrow[50\ atm]{250℃}$

ii) $C_6H_5Cl + 2Na + Cl - C_6H_5 \xrightarrow[\Delta]{Ether}$

PART – III

Note: Answer any six questions. Question no. 33 is compulsory **$6 \times 3 = 18$**

25. Calculate the oxidation number of underlined elements Ch 1

i) $\underline{C}O_2$ ii) $H_2\underline{S}O_4$

26. Define electron affinity Ch 3

27. State Dalton Law of partial pressures. Ch 6
28. Write the formula to calculate the molar mass of a solute from realative lowering of vapour pressure values. Ch 9
29. Describe the formation of HF molecule by orbital overlap Ch 10
30. What is meant by optical isomerism? Ch 11
31. Give any three differences between nucleophiles and electrophiles Ch 12
32. What happens when ethylene is passed through cold dilute alkaline potassium permanganate? Ch 13
33. The equilibrium concentrations of NH_3, N_2 and H_2 are $1.8 \times 10^{-2} M$. $1.2 \times 10^{-2} M$ and $3 \times 10^{-2} M$ respectively. Calculate the equilibrium constant for the formation of NH_3 from N_2 and H_2 Ch 8

PART – IV

Note: Answer all the questions. $\mathbf{5 \times 5 = 25}$

34. a) i) How many orbitals are possible for $n = 4$? Ch 2
ii) Write the electronic configuration and orbital diagram for nitrogen? Ch 10

(OR)

b) Describe the pauling method for the determination of ionic radius Ch 3

35. a) i) What are the reasons for the anomalous properties of Berylium? Ch 5
ii) Give any three properties of beryllium that are different from other elements of the group Ch 5

(OR)

b) Explain the characteristics of internal energy. Ch 7

36. a) How will you determine the molar mass of solute from elevation of boiling point? Ch 9

(OR)

b) Define i) Bond length ii) Bond angle iii) Bond enthalpy Ch 10

37. a) How will you determine the ionic character in covalent bond using electronegativity values? Ch 10

(OR)

b) Give the IUPAC names of the following compounds. Ch 11

i) $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - \underset{\displaystyle Br}{\underset{|}{CH}} - CH_3$

ii) $H_3C - O - CH_3$

iii) $CH_3 - CH_2 - \underset{\displaystyle OH}{\underset{|}{CH}} - CHO$

iv) $H_3C - C \equiv C - \underset{\displaystyle Cl}{\underset{|}{CH}} - CH_3$

v) $CH_2 = CH - CH = CH_2$

38. a) How will you prepare the following compounds from benezene? Ch 13
i) nitrobenzene ii) benzene sulphonic acid iii) BHC

(OR)

b) Simplest alkene (A) reacts with HCl to form compound (B). Compound (B) reacts with ammonia to form compound (C) of molecular formula C_2H_7N. Compound (C) undergoes carbylamines test. Identify (A), (B) and (C) Ch 14

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PART – I

Note: i) Answer all the questions.

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer. **$15 \times 1 = 15$**

1. Which one of the following of represents 180g of water?
   a) $\frac{6.022\times10^{24}}{180}$ moles of water b) 5 moles of water
   c) 6.022×10^{24} moles of water d) 90 moles of water
2. Which of the following compound(s) has/have percentage of carbon same as that in ethylene (C_2H_4)?
   a) benzene **b) propene** c) ethane d) ethyne
3. Assertion: Permanent hardness of water is removed by treatment with washing soda
   Reasons: Washing soda reacts with soluble calcium and magnesium chlorides and sulphates in hard water to form insoluble carbonates.
   a) Assertion is true but reason is false
   b) Both assertion and reason are true and reason is the correct explanation of assertion
   c) Both assertion and reason are false
   d) Both assertion and reason are true but reason is not the correct explanation of assertion.
4. Flame colour of potassium salts in Bunsen burner
   a) Lilac (violet) b) crimson red c) Apple green d) yellow
5. Formula of plaster of paris
   a) $3CaSO_4.H_2O$ b) $CaSO_4.2H_2O$ c) $2CaSO_4.2H_2O$ **d) $CaSO_4.\frac{1}{2}H_2O$**
6. Rate of diffusion of a gas is:
   a) directly proportional to the square root of its molecular weight
   b) directly proportional to its density
   c) inversely proportional to the square root of its molecular weight
   d) directly proportional to its molecular weight
7. Heat of combustion is always:
   a) Zero b) positive
   c) either positive or negative **d) negative**
8. For the following reversible reactions at equilibrium $A + B \rightleftharpoons C$. If the concentration of the reactants A and B are doubled, then the equilibrium constant will:
   a) be halved b) be doubled **c) remain the same** d) become one fourth
9. The molality of a solution containing 1.8g of glucose dissolved in 250 g of water is
   a) 0.02M b) 0.2M **c) 0.04M** d) 0.01M
10. Match the following

1) N_2 molecule	i) Chemical bond
2) BF_3 molecule	ii) Triple covalent bond
3) HF molecule	iii) Electron deficient molecule
4) NaCl	iv) Polar covalent bond

a) 1)-iii), 2)-i), 3)-iv), 4)-ii) b) 1)-ii), 2)-iv), 3)-i), 4)-iii)
c) 1)-i), 2)-iv), 3)-ii), 4)-iii) **d) 1)-ii), 2)-iii), 3)-iv), 4)-i)**

11. The structure of isobutyl group in organic compound

a) $\boldsymbol{CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 -}$ b) $CH_3 - CH_2 - CH_2 - CH_2 -$

c) $CH_3 - \underset{|}{CH} - CH_2 - CH_3$ d) $H_3C - \underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}} - CH_3$

12. Which of the following is optically active?
a) meso-tartaric acid b) 3-chloropentane **c) glucose** d) 2-chloropropane

13. The geometrical shape of carbocation is
a) planar b) linear c) pyramidal d) tetrahedral

14. An alkane is obtained by decarboxylation of sodium propionate. Same alkane can be prepared by:
a) reduction of 1-chloro propane b) catalytic hydrogenation of propene
c) reduction of bromo methane **d) action of sodium metal in iodomethane**

15. Of the following compounds, which has the highest boiling point?
a) t-butyl chloride **b) n-butyl chloride** c) n-propyl chloride d) isobutyl chloride

PART – II

Note: Answer any six questions. Question no.24 is compulsory. **$6 \times 2 = 12$**

16. What is the empirical formula of the following? Ch 1
i) Fructose $(C_6H_{12}O_6)$ ii) Caffeine $(C_8H_{10}N_4O_2)$
17. State Aufbau principle Ch 2
18. How do you convert para hydrogen into ortho hydrogen? Ch 4
19. Give any two characteristics of gibbs free energy? Ch 7
20. Define Hess's law of constant heat summation. Ch 7
21. What is the relation between K_P and K_C? Give one example for which K_P is equal to K_C. Ch 8
22. What is molal depression constant? Ch 9
23. Write short notes on Swarts reaction? Ch 14
24. Complete the following: Ch 13

a) $CH_3 - CH = CH_2 + H_2 \xrightarrow{Pt}$
b) $CH_3MgCl + H_2O \longrightarrow$

PART – III

Note: Answer any six questions. Question no.33 is compulsory. **$6 \times 3 = 18$**

25. Distinguish between oxidation and reduction. Ch 1
26. Define electronegativity. State the trends in the variation of electronegativity in group and period. Ch 3
27. What are homogeneous and heterogeneous equilibria? Give example Ch 8
28. What are ideal solutions? Give example Ch 9
29. Give the shapes of molecules predicted by VSEPR theory Ch 10
a) $BeCl_2$ b) NH_3 c) H_2O
30. Give the general formula for the following class of organic compounds Ch 11
a) Alkanes b) alkenes c) Alkynes

31. What is resonance? Ch 12
32. Suggest a simple chemical test to distinguish propane and propene Ch 13
33. Inside a certain automobile engine, the volume of air in a cylinder is 0.375 dm^3,when the pressure is 1.05 atm. When the gas is compressed to a volume of 0.125 dm^3 at the same temperature. What is the pressure of the compressed air?

PART – IV

Note: Answer all the questions. **$5 \times 5 = 25$**

34. a) i) What is exchange energy? Ch 2
    ii) Write a note on principal quantum number Ch 2

(OR)

b) i) Define atomic radius. Ch 3
   ii) Explain diagonal relationship Ch 3

35. a) Discuss the similarities between beryllium and aluminium Ch 5

(OR)

b) i) State the first law of thermodynamics Ch 7
   ii) What are the conditions for the spontaneity of a process? Ch 7

36. a) How will you determine the molar mass of a solute from osmotic pressure? Ch 9

(OR)

b) i) Define Bond order. Ch 10
   ii) What are the salient features of VB theory? Ch 10

37. a) i) What is meant by homologous series? Ch 11
    ii) Give the structure for the following compounds. Ch 11
        1) 3-methylpentane
        2) 2-methylpropan-2-ol
        3) Propanone

(OR)

b) Explain the formation of H_2 molecule using MO-theory Ch 10

38. a) i) How does Huckel rule help to decide the aromatic character of a compound? Ch 13
    ii) Write the rection for conversion of acetylene to benzene Ch 13

(OR)

b) Simplest alkene (A) reacts with HBr to form compound (B). Compound (B) reacts with ammonia to form compound (C) of molecular formula C_2H_7N. Compound (C) undergoes carbylamines test. Identify (A), (B) and (C). And write the reactions.

PART – I

Note: i) Answer all the questions.

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer. $15 \times 1 = 15$

1. The maximum number of electrons that can be accommodated in L orbit is
   a) 8 b) 2 c) 4 d) 6
2. The relative molecular mass of ethanol is _____
   a) 0.46g b) 4.6 g c) 460 g **d) 46g**
3. Intra molecular hydrogen bonding is present in _____
   a) Ortho-nitro phenol b) Ice c) water d) Hydrogen fluoride
4. Ozone deplection will cause
   a) Global warming b) Forest fire c) Eutrophication **d) Bio-magnification**
5. Among the following which is the path function?
   a) G b) U c) H **d) q**
6. Match the following

1) lodoform	i) fire extinguisher
2) Carbon tetrachloride	ii) Insecticide
3) CFC	iii) Antiseptic
4) DDT	iv) Refrigerants

   a) (1)-(iii), (2)-(i), (3)-(iv), (4)-(ii) b) (1)-(ii), (2)-(iv), (3)-(i), (4)-(iii)
   c) (1)-(iii), (2)-(ii), (3)-(iv), (4)-(i) d) (1)-(i), (2)-(ii), (3)-(iii), (4)-(iv)
7. Cold dilute alkaline $KMnO_4$ is known as
   a) Schiff's reagent b) Fenton's reagent c) Tollen's reagent **d) Baeyer's reagent**
8. Osmotic pressure (π) of a solution is given by the relation
   a) $\pi\, RT = n$ b) $\pi = nRT$ **c) $\boldsymbol{\pi\, V = nRT}$** d) None of these
9. n-propyl bromide on reaction with alcoholic KOH gives
   a) Butyl alcohol b) Propene c) Butene d) Propyl alcohol
10. Which of the following is incorrect statement?
    a) Equilibrium constant varies with temperature
    b) For a system at equilibrium, Q is always less than the equilibrium constant
    c) Equilibrium can be attained from either side of the reaction
    d) Presence of catalyst affects both the forward reaction and reverse reaction to the same extent.
11. Assertion: Helium has the highest value of ionisation energy among all the elements known.
    Reason: Helium has the highest value of electron affinity among all the elements known.
    a) Both assertion and reason are false
    b) Both assertion and reason are true and the reason is correct explanation for the assertion
    c) Both assertion and reason are true but the reason is not the correct explanation for the assertion
    d) Assertion is true and reason is false.

12. Write the IUPAC name of $CH_3 - CH_2 - \underset{\displaystyle OH}{\underset{|}{CH}} - CHO$
    a) 1-formyl propanol b) 1-hydroxy butanal
    c) 2-hydroxy butanal d) 3-hydroxy butanal

13. Formula of Gypsum is
a) $CaSO_4$ **b) $CaSO_4.2H_2O$** c) $CaSO_4.\frac{1}{2}H_2O$ d) $CaSO_4.H_2O$

14. Gases tend to behave ideally only at
a) Low temperature and low pressure b) High temperature and High pressure
c) High temperature and low pressure d) Low temperature and High pressure

15. Which of the following is electron deficient?
a) NH_3 b) PH_3 c) $(CH_3)_2$ **d) BH_3**

PART – II

Note: Answer any six questions. Question no.24 is compulsory. **$6 \times 2 = 12$**

16. Define basicity. Find the basicity of ortho-phosphoric Acid. Ch 1
17. Write the exchange reactions of Deuterium. Ch 4
18. State zeroth Law of Thermodynamics. Ch 7
19. Explain homogeneous and heterogeneous equilibria. Ch 8
20. Write the shape and molecular geomentry for BF_3 Ch 10
21. Which element exhibits maximum catenation and why? Ch 11
22. Write the no bond resonance structure shown by propene? Ch 12
23. Give the structure and uses of DDT. Ch 14
24. In degenerate orbitals, why do the completely filled and half filled configurations are more stable than the partially filled configurations? Ch 2

PART – III

Note: Answer any six questions. Question no.33 is compulsory. **$6 \times 3 = 18$**

25. State Heisenber's Uncertainty Principle. Ch 2
26. Derive ionic radius using pauling's method. Ch 3
27. How do you convert para hydrogen into ortho hydrogen. Ch 4
28. Distinguish between extensive and intensive property. Ch 7
29. Calculate the mole fraction of methanol and water when 0.5 mole of methanol is mixed with 1.5 moles of water. Ch 9
30. What is hybridisation? Mention the type of hybridization found in CH_4 Ch 10
31. Explain the different types of polymerisation in ethyne. Ch 13
32. What is green house effect? Name the gases that cause green house effect. Ch 15
33. Explain geometrical isomerism in 2-butene. Ch 11

PART – IV

Note: Answer all the questions. **$5 \times 5 = 25$**

34. a) Calculate the empirical formula and molecular of a compound containing 76.6% carbon, 6.38% of hydrogen and rest oxygen. Its vapour density is 47. Ch 1

(OR)

b) i) Calculate the total number of angular nodes and radial nodes present in 3d and 4f orbitals. Ch 2
ii) Explain why the electron affinity of Be and N is almost zero Ch 3

35. a) i) Write the laboratory method of preparation of hydrogen Ch 4
ii) Name the different methods of liquefaction of gases Ch 6

b) i) How is bleaching powder prepared? Ch 5

ii) Write the uses of magnesium. Ch 5

iii) Write the mathematical formula for compressibility factor 'Z' Ch 6

36. a) i) Derive the relation between enthalpy ΔH and internal energy ΔU for an ideal gas. Ch 7

ii) Define reaction quotient. Ch 8

(OR)

b) i) Calculate the entropy change during the melting of one mole of ice into water at 0℃ and 1 atm pressure. Enthalpy of fusion of ice is $6008 J\ mol^{-1}$ Ch 7

ii) Write any four postulates of molecular orbital theory. Ch 10

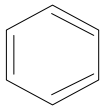
37. a) i) What is van't hoff factor 'i'? Ch 9

ii) Complete

A) $CH_2 = CH_2 + H - Br \xrightarrow{Benzoyl\ \ Peroxide}$

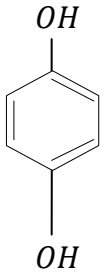
B) $CH_3CHO \xrightarrow{Acid\ dichromate}$

C)



$\xrightarrow{Pt/H_2}$

D)



$\xrightarrow[H_2SO_4]{K_2Cr_2O_7}$

(OR)

b) Explain the purification of a solid organic compound by crystallization method

38. a) i) Write Brich reduction. Ch 13

ii) Write any three strategies to control environmental pollution. Ch 15

(OR)

b) explain the mechanism involved in the elimination reaction of tertiary butyl chloride with alcoholic KOH. Ch 14

PART – I

Note: i) Answer all the questions.

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer $15 \times 1 = 15$

1. The oxidation number of carbon in CH_2F_2 is _____
   a) $+4$ b) -4 **c) 0** d) $+2$
2. The energy of an electron in the third orbit of hydrogen atom is $-E$. The energy of an electron in the first orbit will be _____
   a) $-3E$ b) $-\frac{E}{3}$ c) $-\frac{E}{9}$ **d) $-9E$**
3. The effective nuclear charge experienced by the d^1 electron in the given electronic configuration, $(1s)^2\ (2s, 2p)^8 (3s, 3p)^8 (3d)^1 (4s)^2$ is:
   a) 4 **b) 3** c) 2.1 d) 6.9
4. The type of H-bonding present in orthonitro phenol and p-nitro phenol are _____ respectively.
   a) Inter molecular H-bonding and intra molecular H-bonding
   b) Intra molecular H-bonding and inter molecular H-bonding
   c) Intra molecular H-bonding and no H-bonding
   d) Intra molecular H-bonding and intra molecular H-bonding
5. When CaC_2 is heated in atmospheric nitrogen in an electric furnace, the compound formed is _____
   a) $Ca(CN)_2$ **b) $CaNCN$** c) CaC_2N_2 d) $CaNC_2$
6. When an ideal gas undergoes unrestrained expansion, no cooling occurs because the molecules _____
   a) are above the inversion temperature **b) exert no attraction force on each other**
   c) do work equal to the loss ion kinetic energy d) collide without loss of energy
7. Among the following statements, which one is/are correct?
   i) During cyclic process the amount of heat absorbed by the surrounding is equal to work done on the surrounding
   ii) Refractive index is an example for intensive property
   iii) If the enthalpy change of a process is positive then the process of spontaneous
   iv) The entropy of an isolated system increased during spontaneous process
   a) (i), (ii), (iii) b) (i), (iv) **c) (ii), (iv)** d) (ii) only
8. If k_b and k_f for a reversible reaction are 0.8×10^{-5} and 1.6×10^{-4} respectively the value of equilibrium constant is _____
   a) 20 b) 0.2×10^{-1} c) 0.05 d) 0.2
9. Assertion: Mixture of carbon tetrachloride and chloroform show positive deviation from raoult's law
   Reason: In the mixture the inter molecular force of attraction between chloroform and carbon tetrachloride is weaker than those between molecules of carbon tetrachloride and chloroform molecules.
   a) Both assertion and reason are correct and reason is the correct explanation of assertion
   b) Both assertion and reason are correct and reason is not the correct explanation for assertion
   c) Both assertion and reason are false
   d) Assertion is true, but reason is false
10. Shape and hybridation of IF_5 are
    a) Trigonal bipyramidal sp^3d^2 b) Trigonal bipyramidal sp^3d
    c) Square pyramidal sp^3d^2 d) Octahedral, sp^3d^2

11. Which of the following is optically active?
    a) 3-chlolro pentane b) 2-chloro propane
    c) meso-tartaric acid **d) glucose**
12. Which of the following species is not electrophile in nature?
    a) Cl^+ b) BH_3 **c) H_3O^+** d) $^+NO_2$
13. _____ group is ortho para directing and deactivating group
    a) amino b) methyl **c) halogen** d) aldehyde
14. The raw material for Rasching process is _____
    a) chloro benzene b) phenol **c) benzene** d) anisole
15. _____ cause kidney damage
    a) Cadmium, mercury b) Lead, Cadmium
    c) Freon, Fluoride d) copper, Cadmium

PART – II

Note: Answer any six questions. Question no.24 is compulsory. **$6 \times 2 = 12$**

16. What is syn gas? How it is prepared? Ch 4
17. Write any two similarities between beryllium and aluminium Ch 5
18. What is inversion temperature? Ch 6
19. What is the effect of added inert gas on the rection at equilibrium? Ch 8
20. Linear form of carbon dioxide molecules has two polar bonds. Yet the molecule has zero dipole moment. Why? Ch 10
21. How do you detect the presence of nitrogen and sulphur together in an organic compound? Ch 11
22. What happens when acetylene undergoes ozonolysis? Ch 13
23. What is green chemistry? Ch 15
24. Calculate the orbital angular momentum for d and f orbital. Ch 2

PART – III

Note: Answer any six questions. Question no.33 is compulsory. **$6 \times 3 = 18$**

25. What do you understand by the term mole? Ch 1
26. Ionisation potential of nitrogen is greater than that of oxygen. Explain by giving appropriate reason. Ch 3
27. Among the alkali metal halides which is covalent? Explain with reason Ch 5
28. Derive ideal gas equation. Ch 6
29. Define molar heat capacity. Give its unit. Ch 73
30. What is vapour pressure of a liquid? What is relative lowering of vapour pressure? Ch 9
31. Explain a suitable method for purifying and separating liquids present in a mixture having very close boiling point. Ch 11
32. What is polymerisation? Explain the two types of polymerisation rection of acetylene. Ch 13
33. The bond length between all the four carbon atoms is same in 1,3-butadiene. Explain with reason. Ch 12

PART – IV

Note: Answer all the questions. **$5 \times 5 = 25$**

34. a) i) What are auto redox rections? Give an example. Ch 1
    ii) Define orbital. What are the n and l values for 3px and $4dx^2 - y^2$ electron? Ch 2

(OR)

b) i) Why hydrogen peroxide is stored in plastic containers, not in glass container? Ch 4

ii) Give the general electronic configuration of lanthanides and actinides. Ch 3

35. a) i) Why blue colour appears during the dissolution of alkali metals in liquid ammonia? Ch 5

ii) What is boyle's temperature? What happens to real gases above and below the boyle's temperature? Ch 6

(OR)

b) i) Derive the relation between k_p and k_c for a general homogeneous gaseous reaction. Ch 7

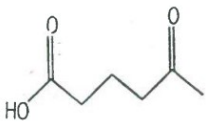
ii) How do you measure heat changes at constant pressure? Ch 7

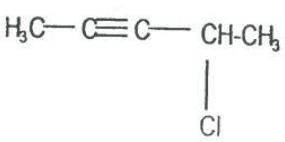
36. a) i) Draw the M.O diagram for oxygen molecule. Calculate its bond order and magnetic character. Ch 8

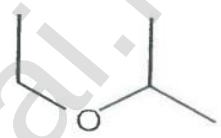
ii) Draw and explain the graph obtained by plotting solubility versus temperature for calcium chloride. Ch 9

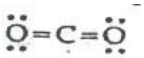
(OR)

b) i) Write the IUPAC names for the following compounds: Ch 11

(X) 

(Y) 

(Z) 

ii) Calculate the formal charge on carbon and oxygen for the following structure  Ch 10

37. a) i) Explain about inductive effect. Ch 12

ii) What do you mean by conformation? Explain about staggered conformation in ethane. Ch 13

(OR)

b) i) Among the following compounds, o-dichloro benzene and p-dichloro benzene which has higher melting point? Explain with reason. Ch 14

ii) Write notes on the adverse effect caused by ozone depletion. Ch 15

38. a) i) Calculate the uncertainty in the position of an electron, if the uncertainty velocity is $5.7 \times 10^5 ms^{-1}$ Ch 2

ii) what is the mass of glucose $(C_6H_{12}O_6)$ in it one litre solution which is isotonic with $6gl^{-1}$ of urea (NH_2CONH_2)? Ch 1

(OR)

b) i) An organic compound (A) of molecular formula $C_2H_6O,$ on heating with conc.H_2SO_4 gives compound (B). (B) on treating with cold dilute alkaline $KMnO_4$ gives compound (C). Identify (A), (B) and (C) and explain the reactions. Ch 13

ii) A simple aromatic hydrocarbon (A) reacts with chlorine to give compound (B) compound (B) reacts with ammonia to give compound (C) with undergoes carbylamines reaction. Identify (A), (B) and (C) and explain the reactions. Ch 13

PART – I

Note: i) Answer all the questions.

ii) Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer $15 \times 1 = 15$

1. Many of the organic compounds are inflammable because of its:
   a) vander waal's force b) co-ordinate nature
   c) covalent nature d) ionic nature
2. When Δng is negative in chemical equilibrium reaction then:
   a) $K_P < K_C$ b) $K_P = 1/K_C$
   c) $K_P = K_C(RT)^{-ve}$ d) $K_P > K_C$
3. Find A in the following reaction
   $CaO + 3C \xrightarrow{3273\,K} A + CO$
   a) CaC_2 b) CO_2 c) Ca d) Ca_2O
4. Splitting of spectral lines in an electric field is called:
   a) Compton effect **b) stark effect**
   c) Zeeman effect d) shielding effect
5. Which of the following species does not exert a resonance effect?
   a) $C_6H_5NH_2$ **b) $C_6H_5NH_3^+$** c) C_6H_5OH d) C_6H_5Cl
6. Match the following:

Compound	uses
1) Chloro picrin	i) detection of primay amine
2) Methyl isocyanide	ii) DDT
3) Chlolro benzene	iii) paint remover
4) Methylene chloride	iv) soil sterilizer

   a) (1)-(iv), (2)-(iii), (3)-(ii), (4)-(i) b) (1)-(iii), (2)-(iv), (3)-(ii), (4)-(i)
   c) (1)-(i), (2)-(ii), (3)-(iv), (4)-(iii) **d) (1)-(iv), (2)-(i), (3)-(ii), (4)-(iii)**
7. Use of hot air balloon in meteorological observatory is an application of:
   a) Kelvin's Law b) Brown's Law **c) Boyle's law** d) Newton's law
8. What is the pH of rain water?
   a) 5.6 b) 4.6 c) 6.5 d) 7.5
9. Which compound is named as "blue john" among the following compounds?
   a) $Ca_3(PO_4)_2$ b) CaO c) CaH_2 **d) CaF_2**
10. The element with positive electron gain enthalpy is _____
    a) Argon b) Fluorine c) Hydrogen d) sodium.
11. Which of the following molecule does not contain π bond?
    a) CO_2 **b) H_2O** c) SO_2 d) NO_2
12. Which of the following compound has same percentage of carbon as that of ethylene (C_2H_4)?
    a) benzene b) ethane **c) propene** d) ethyne
13. They SI unit of molar heat capacity is: _____
    a) $JK^{-1}mol^{-1}$ b) $KJ\ mol^{+1}$ c) $KJ\ mol^{-1}$ d) cm
14. What percentage of solution of H_2O_2 is called as '100-volume' H_2O_2?
    a) 15% b) 50% c) 20% **d) 30%**
15. Osmotic pressure (π) of a solution is given by the relation:
    a) $\pi\ RT = n$ b) $V = \pi\ nRT$ c) $\pi = n\ RT$ **d) $\pi\ V = n\ RT$**

Note: Answer any six questions. Question no.24 is compulsory. **$6 \times 2 = 12$**

16. State and explain pauli's exclusion principle. Ch 2
17. Define valency Ch 1
18. What are ideal gas? Ch 6
19. State the third law of thermodynamics? Ch 7
20. What is called bond length? Name the techniques through which the length of a bond can be determined. Ch 10
21. Describe the reaction involved in the detection of nitrogen in an organic compound by lassaigne method. Ch 11
22. How is alkane prepared from Grignard reagent? Ch 13
23. Define-acid rain Ch 15
24. Which is the suitable method for detection of nitrogen present in food and fertilizers? Ch 11

PART – III

Note: Answer any six questions. Question no.33 is compulsory. **$6 \times 3 = 18$**

25. Calculate the equivalent mass of H_2SO_4 Ch 1
26. Explain diagonal relationship. Ch 3
27. How is Tritium prepared? Ch 4
28. Define –Le-Chatelier principle. Ch 8
29. State the term " isotonic solution" Ch 9
30. Both C_2H_2 and CO_2 have the same structure. Explain why. Ch 10
31. Write note on Williamson's synthesis. Ch 13
32. Explain why $Ca(OH)_2$ is used in white washing. Ch 5
33. Give the structural formula for the following compounds. Ch 12
    a) m-dinitrobenzene b) p-dichlorobenzene c) 1,3,5, Tri-methyl Benzene

PART – IV

Note: Answer all the questions **$5 \times 5 = 25$**

34. a) i) Calculate oxidation number of oxygen in H_2O_2 Ch 1
    ii) Write the de-brogile equation. Ch 2

(OR)

    b) i) State and explain Dobereiner's Triad Ch 3
    ii) Complete the following equation Ch 4

$$Na_2O_2 + ? \longrightarrow Na_2SO_4 + H_2O_2$$

35. a) i) Among the alkaline earth metals BeO is insoluble in water but other oxides are soluble. Why? Ch 5
    ii) State Diffusion law. Ch 6

(OR)

    b) i) Calculate the entropy change during the melting of one mole of ice into water at 0°C. Enthalpy of fusion of ice is 6008 $J\ mol^{-1}$. Ch 7
    ii) Write the balanced chemical equation for the $K_c = \frac{[CaO_{(s)}][CO_{2\,(g)}]}{[CaCO_{3\,(s)}]}$ Ch 8

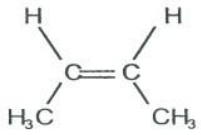
36. a) i) NH_3 and HCl do not obey Henry's law. Why? Ch 9

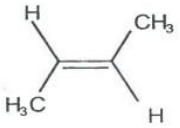
ii) Write the structure of the following compounds Ch 10

(A) NH_3 (B) BF_3

(OR)

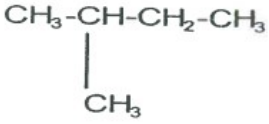
b) i) identify the cis and trans isomers for the following compounds Ch 11

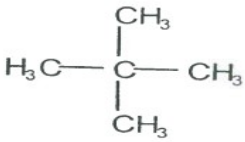
a) 

b) 

ii) Explain with example the positive mesometric effect. Ch 12

37. a) i) Write the IUPAC names for the following compounds. Ch 11

(A) 

(B) 

ii) What are nucleophiles and electrophiles? Give one example each Ch 12

(OR)

b) i) How will you get the following products with the given reactants? Ch 13

(A) Acetylene ➔ Benzene

(B) Phenol ➔ Benzene3

(C) Benzene ➔ Tolune

ii) Write any two different components you get during fractional distillation of coal tar at any two different temperatures. Ch 13

38. a) i) A compound having the empirical formula C_6H_6O has the vapour density 47. Find its molecular formula. Ch 1

ii) The simple aromatic hydrocarbon compound (A) reacts with bromine to give (B). Compound (A) reacts with Raney Ni and gives (C). Identify (A), (B) and (C).

(OR)

b) i) $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$

Calculate the standard entropy change for the above reaction, given the standard entropies of $CO_{2(g)}, C_{(s)}, O_{2(g)}$ are 213.6, 5.740 AND 205 JK^{-1} respectively. Ch 7

ii) Identify the compound (A) and (B) Ch 14

$$R - C \equiv N \xrightarrow{H_2O\ /\ H^+} (A) \xrightarrow{H_2O\ /\ H^+} (B)$$

For any doubts and assistance, feel free to reach me on 90806628732 (Whatsapp)

ALL THE BEST

By,

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