Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION-A

Q.1	Questions	A	B	C	D
1.	Splitting of spectral lines when atoms are subjected to strong electric field is called:	Zeeman effect	Photoelectric effect	Stark effect	Compton effect
2.	Which of the given molecules has zero dipole moment?	BF_3	H_2O	$CHCl_3$	NH_3
3.	For a given process, the heat changes at constant pressure (q_p) and at constant volume (q_v) are related to each other as:	$q_p = q_v$	$q_p > q_v$	$q_p < q_v$	$q_p = q_v/2$
4.	The enthalpy of solution of sodium carbonate is:	$-16.2\ KJmol^{-1}$	$+16.2\ KJmol^{-1}$	$-25.0\ KJmol^{-1}$	$-285.8\ KJmol^{-1}$
5.	For which system does the equilibrium constant, K_c has the units of (concentration)$^{-1}$?	$N_2 + 3H_2 \rightleftharpoons 2NH_3$	$H_2 + I_2 \rightleftharpoons 2HI$	$2HF \rightleftharpoons H_2 + F_2$	$2NO_2 \rightleftharpoons N_2O_4$
6.	The solution having zero pH will be:	acidic	Highly acidic	neutral	basic
7.	Which one of the given salts will not hydrolyse in water?	NaCl	$AlCl_3$	Na_2CO_3	CH_3COONa
8.	If a strip of Cu metal is placed in a solution of $FeSO_4$:	Cu will be deposited	Fe is precipitated out	Cu and Fe both dissolve	No reaction takes place
9.	During a redox reaction, an oxidizing agent:	Gains electrons	Is oxidized	Loses electrons	Is hydrolyzed
10.	If the rate equation of a reaction $2A+B \rightarrow$ Product Rate$=[A]^2[B]$, and A is present in large excess, then the order of reaction is:	2.5	3	1	2
11.	Which of the given hydrocarbons has the highest value of heat of vaporization?	CH_4	C_2H_6	C_3H_8	C_6H_{14}
12.	Ionic solids are characterized by:	Low melting points	Good conductivity in solid state	High vapour pressures	Solubility in polar solvents
13.	The density of an ideal gas at a given temperature and pressure can be calculated by employing the formula:	$d=\dfrac{PM}{RT}$	$d=\dfrac{P}{RT}$	$d=\dfrac{nP}{RT}$	$d=\dfrac{PM}{V}$
14.	Pressure remaining constant, at which temperature, the volume of a gas will become twice of what it is at $0\ ^\circ C$:	$546\ ^\circ C$	$200\ ^\circ C$	$273\ ^\circ C$	$100\ ^\circ C$
15.	The comparative rates at which the solutes move in paper chromatography depend on:	The size of paper	R_f values of solutes	Temperature of the experiment	Size of the chromatographic tank used
16.	One dm^3 of N_2 at S.T.P contains about:	5.37×10^{22} atoms	3.01×10^{23} atoms	6.02×10^{23} atoms	2.68×10^{19} atoms
17.	The number of moles of CO_2 which contains 16g of Oxygen:	0.25	0.50	1.0	1.50

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Note:- Section B is compulsory. Attempt any Three questions from Section C.

SECTION-B

2. **Write short answers to any Eight parts.**   (8 x 2 = 16)

i. No individual Neon (Ne) atom in the sample of element has mass of 20.18 amu. Why?
ii. Calculate the number of molecules in 10g of ice.
iii. How efficiency of reaction is expressed?
iv. Derive units of 'R' in general gas equation in SI(System International) system.
v. Why normal air cannot be used in diver's tank?
vi. Prove that $d = \dfrac{PM}{RT}$ from ideal gas equation.
vii. State Pauli exclusion principle.
viii. Why nature of Cathode rays is independent of gas used in discharge tube.
ix. What is origion of spectrum of hydrogen?
x. Define standard enthalpy of neutralization with one example.
xi. What is state function? Give one example.
xii. Burning of candle is spontaneous process. Justify.

3. **Write short answers to any Eight parts.**   (8 x 2 = 16)

i. Define analytical chemistry.
ii. Write four salient features of an ideal solvent, used in the process of crystallization.
iii. What is the difference between adsorption and partition chromatography?
iv. Write difference between evaporation and condensation.
v. Why boiling point of H_2O is higher than that of HF.
vi. Write difference between crystalline solid and amorphous solid.
vii. Define zeotropic solutions and concentrated solution.
viii. Justify that boiling points of the solvents increase due to the presence of solute.
ix. Non-ideal solutions do not obey the Raoult's law. Give reason.
x. Differentiate between homogeneous and heterogeneous catalyses.
xi. Define Enzyme catalysis. Give one example.
xii. The radioactive decay is always a first order reaction. Justify.

4. **Write short answers to any Six parts.**   (6 x 2 = 12)

i. Define ionization energy with an example.
ii. Pi (π) bonds are more diffused than sigma (σ) bonds. Justify.
iii. O_2 is paramagnetic. Why?
iv. State Le-Chatelier's principle.
v. Buffers are important in many areas of Chemistry. Justify.
vi. How K_c predicts the direction of a chemical reaction.
vii. Calculate oxidation number of chromium in $Cr_2(SO_4)_3$.
viii. Define electrode potential with an example.
ix. Write down the importance of Standard Hydrogen Electrode (SHE).

SECTION-C

Note: Attempt any Three questions. Each question carries Eight (08) marks.   (8x3=24)

5. (a) What is a limiting reactant? Give example. Also write down steps to identify it.   (4)

(b) A sample of Krypton with a volume of 6.25 dm^3, a pressure of 765 torr and a temperature of 20 °C is expanded to a volume of 9.55 dm^3 and a pressure of 375 torr. What will be its final temperature in °C ?   (4)

6. (a) Discuss structure of sodium chloride in detail.   (4)

(b) Differentiate between spontaneous and non-spontaneous process with examples.   (2+2=4)

7. (a) Describe defects in Bohr's atomic model.   (4)

(b) Calculate the pH of a buffer solution in which 0.11 molar CH_3COONa and 0.09 molar acetic acid solutions are present. K_a for CH_3COOH is 1.85×10^{-5}.   (4)

8. (a) Define bond energy. Discuss relation between Ionic character and bond energy.   (1+3=4)

(b) What is a Galvanic cell? Draw diagram. Explain its electrodes with reactions occuring on electrodes.   (1+1+2=4)

9. (a) Enlist colligative properties and why some properties are colligative? Also give conditions for observing colligative properties.   (4)

(b) Discuss any two factors affecting rate of reactions.   (4)

Note: - You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number in your answer book. Use marker or pen to fill the circles. Cutting or filling up two or more circles will result no mark.

SECTION-A

Q.1	Questions	A	B	C	D
1.	Angle in water molecule is.	104.5°	107.5°	109.5°	120°
2.	$(n+l)$ value for 5s orbital will be.	3	5	7	9
3.	The transition temperature of KNO_3 is.	$13.2\,^\circ C$	$95.6\,^\circ C$	$128\,^\circ C$	$32.05\,^\circ C$
4.	Hydrogen bonding is maximum in.	H_2O	HCl	HBr	HI
5.	The comparative rates at which solute moves in paper chromatography depend upon.	The size of paper	R_f value of solute	Temperature of experiment	Size of chromatographic tank used
6.	A real gas obeying van der Waals equation will resemble ideal gas if.	Both (a) and (b) are large	Both (a) and (b) are small	(a) is small and (b) is large	(a) is large and (b) is small
7.	Critical temperature of water vapours is.	217.0 atm	111.5 atm	39.6 atm	73.0 atm
8.	The largest number of molecules are present in.	3.6g of H_2O	4.8g of C_2H_5OH	2.8g of CO	5.4g of N_2O_5
9.	Isotopes differ in.	Properties which depend upon mass	Arrangements of electrons in orbitals	Chemical properties	The extent to which they may be affected in electromagnetic field
10.	Which of the given statements is not correct about galvanic cell.	Anode is negatively charged	Reduction occurs at anode	Cathode is positively charged	Reduction occurs at cathode
11.	All radioactive disintegration nuclear reactions are of.	First order	Second order	Third order	Zero order
12.	Oxidation number of 'Cl' in $Ca(ClO_3)_2$ is.	-1	$+1$	$+5$	-5
13.	The molal boiling point constant is the ratio of the elevation in boiling point to.	Molarity	Molality	Mole fraction of solvent	Mole fraction of solute
14.	The ionization constant of pure water at $25^\circ C$ is.	1.8×10^{-16} moles dm^{-3}	1.6×10^{-16} moles dm^{-3}	1.0×10^{-14} moles^2 dm^{-6}	1.8×10^{-14} moles^2 dm^{-6}
15.	Which aqueous solution has highest pH.	0.1M H_2SO_4	0.1M NaOH	0.1M HCl	0.2M HNO_3
16.	Which one is not state function?	Work	Internal energy	Enthalpy	Volume
17.	At constant volume q_v is equal to.	ΔH	ΔE	ΔP	ΔV

Note:- Section B is compulsory. Attempt any 3 questions from Section C.

SECTION-B

2. Write short answers to any Eight parts. (8 x 2 = 16)

i. 180g of glucose and 342g of sucrose have the same number of molecules but different number of atoms present in them. Give the reason.

ii. What is electrometer? Give its function in mass spectrometer.

iii. Calculate the mass in grams of 2.78×10^{21} molecules of CrO_2Cl_2.

iv. State Avogadro's law of gases. Give an example.

v. Give two characteristics of plasma.

vi. Define critical temperature. On what factors does it depend?

vii. State Pauli Exclusion Principle and Hund's rule.

viii. How is atomic emission spectrum obtained?

ix. What particles are formed by the decay of free neutron?

x. What is meant by standard enthalpy of atomization? Give an example.

xi. Differentiate between spontaneous and non-spontaneous process.

xii. Why is it necessary to mention the physical states of the reactants and products in thermochemical equation?

3. Write short answers to any Eight parts. (8 x 2 = 16)

i. Define non ideal solution. Give example.

ii. How do you justify that NaCl and KNO_3 are used to lower the melting point of ice?

iii. Define molality. Give its equation.

iv. Differentiate between Rate and Rate Constant of a reaction.

v. How does the increase of temperature increase the rate of the chemical reaction?

vi. Why the reaction having lower energies of activation have faster rates?

vii. Differentiate between stationary and mobile phase.

viii. Why is there a need to crystallize a crude product?

ix. Iodine is more soluble in water in the presence of KI. Give reason.

x. Define transition temperature. Give example.

xi. What are the advantages of vacuum distillation?

xii. Why are the ionic crystals highly brittle?

4. Write short answers to any Six parts. (6 x 2 = 12)

i. What is meant by octet rule? Give one example.

ii. Fluoride has electron affinity less than the chloride. Give reason.

iii. Define electronegativity. Give its variation in periodic table.

iv. Enlist the ways to maximize the yield of ammonia in Haber's process.

v. Briefly give the difference between reversible and irreversible reactions.

vi. How buffer solutions are prepared?

vii. Write down the oxidation states of oxygen in peroxide and super oxides.

viii. What is meant by Ionization? Briefly explain.

ix. Write down the chemical equation for electrode processes of electrolysis of fused lead chloride.

SECTION-C

Note: Attempt any Three questions. Each question carries Eight (08) marks.

5. (a) Define STOICHIOMETRY. Write down its assumptions. (1+3=4)

(b) Calculate the mass of $1 dm^3$ of NH_3 gas at 30°C and 1000 mm Hg pressure, considering that NH_3 is behaving ideally. (4)

6. (a) What are liquid crystals? Give their six uses in daily life. (4)

(b) Describe how is the enthalpy of combustion (ΔH_c) of a substance measured by bomb calorimeter? (4)

7. (a) Define quantum numbers. Explain Azimuthal Quantum number in detail. (1+3=4)

(b) N_2 and H_2 combine to give NH_3. The value of K_c in this reaction at 500 °C is 6.0×10^{-2}. Calculate the value of K_p for this reaction. (4)

8. (a) Define and explain electron affinity. Describe the factors influencing it. Also give its trends in periodic table. (4)

(b) Explain lead accumulator. Also illustrate its discharging process. (4)

9. (a) State and explain Raoult's law when one component is non-volatile. (4)

(b) Define order of a reaction and explain it with at least two examples. (4)