ام _____ (To be filled in by the candidate) **(Academic Sessions 2017 – 2019 to 2020 – 2022)**

CHEMISTRY 221-(INTER PART – I) Time Allowed : 20 Minutes

Q.PAPER – I (Objective Type) GROUP – II Maximum Marks : 17

PAPER CODE = 6486 LHR-02-21

Note : Four possible answers A, B, C and D to each question are given. The choice which you think is correct, fill that circle in front of that question with Marker or Pen ink in the answer-book. Cutting or filling two or more circles will result in zero mark in that question.

1-1	The pH of 10^{-3} mol dm^{-3} of an aqueous solution of H_2SO_4 is :			
	(A) 3	(B) 2.7	(C) 2.0	(D) 1.5
2	Bond angles $\alpha = \gamma = 90°$; $\beta \neq 90°$ and axes $a \neq b \neq c$ is for crystal system :			
	(A) Tetragonal	(B) Hexagonal	(C) Monoclinic	(D) Triclinic
3	If the rate equation of a reaction $2A + B \rightarrow$ Products is , rate $= K[A]^2[B]$ and A is present in large excess, then order is :			
	(A) 1	(B) 2	(C) 3	(D) Zero
4	Nickel has number of isotopes :			
	(A) 3	(B) 5	(C) 7	(D) 2
5	pH of human blood is :			
	(A) 7.35	(B) 6.35	(C) 5.35	(D) 4.35
6	The number of bonds in nitrogen molecule is :			
	(A) One σ and one π	(B) One σ and two π	(C) Three sigma only	(D) Two σ and one π
7	Pressure remaining constant, at which temperature the volume of the gas will become twice of what it is at 0 °C :			
	(A) 546 °C	(B) 200 °C	(C) 546 K	(D) 273 K
8	1 gram formula of $NaC\ell$ is equal to :			
	(A) 58.5 g	(B) 23 g	(C) 35.5 g	(D) 12 g
9	18 g glucose is dissolved in 90 g of water, the relative lowering of vapour pressure is :			
	(A) $\frac{1}{5}$	(B) 5.1	(C) $\frac{1}{51}$	(D) 6
10	de-Broglie equation is represented as :			
	(A) $\lambda = \frac{h}{mv}$	(B) $m = \frac{h}{\lambda}$	(C) $m = \frac{h}{v}$	(D) $\lambda = \frac{2h}{mv}$
11	1-calorie is equivalent to :			
	(A) 0.4184 J	(B) 41.84 J	(C) 418.4 J	(D) 4.184 J
12	The temperature of a natural plasma is about :			
	(A) 20000 °C	(B) 1000 °C	(C) 5000 °C	(D) 10000 °C
13	Ionization energy for $Mg \rightarrow Mg^+ + 1e^-$ has $\Delta H = ---$:			
	(A) 738 $KJ\,mol^-$	(B) 238 $KJ\,mol^-$	(C) 448 $KJ\,mol^-$	(D) 138 $KJ\,mol^-$
14	The velocity of photon is :			
	(A) Independent of wavelength	(B) Depends on wavelength		
	(C) Equal to square of its amplitude	(D) Depends on its source		
15	Solvent extraction is an equilibrium process and it is controlled by :			
	(A) Law of mass action	(B) The amount of solvent used		
	(C) Distribution law	(D) The amount of solute		
16	Stronger the oxidizing agent, greater is the :			
	(A) Oxidation potential	(B) Reduction potential		
	(C) Redox potential	(D) E.M.F of cell		
17	Which of the following is a pseudo solid :			
	(A) CaF_2	(B) Glass	(C) $NaC\ell$	(D) All of these

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EMISTRY 221-(INTER PART – I) Time Allowed : 2.40 hours

APER – I (Essay Type) GROUP – II Maximum Marks : 68

SECTION – I LHR-G221

2. Write short answers to any EIGHT (8) questions : 16

(i) Define stoichiometry. Give two assumptions for stoichiometeric calculations. Justify it.

(ii) How percentage yield is calculated?

(iii) Define Avogadro's number. Give one example.

(iv) Differentiate between stationary phase and mobile phase in chromatographic technique?

(v) What is ether extraction?

(vi) Derive Avogadro's law from KMT.

(vii) Why the graph plotted between pressure and volume moves away from pressure axis at higher temperature?

(viii) Calculate SI unit of ' R ' gas constant.

(ix) Why does pilots feel uncomfortable breathing at high altitude?

(x) State Raoult's law. Give one mathematical expression.

(xi) Relative lowering of vapour pressure is independent of temperature. Justify this statement.

(xii) Give two applications of colligative properties.

3. Write short answers to any EIGHT (8) questions : 16

(i) What are dipole dipole forces? Give one example.

(ii) Name the factors which affect the London forces.

(iii) Cleavage of the crystals is itself anisotropic behaviour, explain.

(iv) Define transition temperature with two examples.

(v) Why cathode rays are also called as electron?

(vi) Write down any four properties of positive rays.

(vii) Define spectrum and name any two types of spectrum.

(viii) For Azimuthal quantum number, $\ell = 2$ and $\ell = 3$, calculate the total values of magnetic quantum number (m).

(ix) How equilibrium constant (K_c) predicts direction of a reaction?

(x) Define pH and write how it is helpful to know nature of solutions.

(xi) What do you mean by order of reaction? Give two examples.

(xii) What is the effect of temperature on rate of chemical reaction? Also write Arrhenius equation.

4. Write short answers to any SIX (6) questions : 12

(i) Bond distance is the compromise distance between two atoms. Justify.

(ii) Write down the two postulates of VSEPR theory.

(iii) Differentiate between covalent and co-ordinate covalent bond.

(iv) Draw the hypothetical orbital picture of He_2 molecule according to M.O.T.

(v) Define enthalpy of formation with an example.

(vi) Prove $q_v = \Delta E$.

(vii) Calculate the oxidation numbers of the elements underlined : (a) $Na_2\underline{P}O_4$ (b) $H\underline{N}O_3$

(viii) How salt bridge maintains the electrical neutrality in the cell? Justify.

(ix) What is standard hydrogen electrode (SHE)?

(Turn Over)

SECTION – II LHR-G2-21

Note : Attempt any THREE questions.

5. (a) Calculate the number of grams of K_2SO_4 and H_2O produced when 14 gram of KOH reacts with excess of H_2SO_4 under the following equation : 4

$$2KOH + H_2SO_4 \rightarrow K_2SO_4 + 2H_2O$$

(b) Explain the structure of ice on the basis of hydrogen bonding. 4

6. (a) State Charles's law. Explain its experimental verification. 4

(b) Write down experiment that how neutrons were discovered? 4

7. (a) Define ionization energy, write factors affecting ionization energy and explain its trend along group. 4

(b) Prove that $\Delta H = q_p$ 4

8. (a) A buffer solution is prepared by mixing 0.2 M CH_3COONa and 0.5 M CH_3COOH in $1\,dm^3$ of solution. Calculate pH of solution. pK_a of acid is 4.74. 4

(b) Explain energy of activation. 4

9. (a) Define solubility curve. Explain different types of solubility curves with the help of graphs. 4

(b) Describe electrochemical series. Give its three applications. 4