

Roll No. of Candidate : \_\_\_\_\_

**GVT-41-21**

**CHEMISTRY**

**(INTERMEDIATE PART - I) 321 - (III) Paper - I Group - I**

**Time: 20 Minutes**

**OBJECTIVE - - - - - Code : 6485**

**Marks: 17**

**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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

1. 1 - 18 g glucose is dissolved in 90 g of water. The relative lowering of vapour pressure is equal to  
(A)  $\frac{1}{51}$  (B)  $\frac{1}{5}$  (C) 5.1 (D) 6
- 2 - The unit of the rate constant is the same as that of the rate of reaction in  
(A) first order reaction (B) second order reaction (C) third order reaction (D) zero order reaction
- 3 - The crystal system of sulphur is  
(A) cubic (B) hexagonal (C) triclinic (D) monoclinic
- 4 - An excess of aqueous silver nitrate is added to aqueous barium chloride and precipitate is removed by filtration. What are the main ions in the filtrate?  
(A)  $\text{Ag}^+$  and  $\text{NO}_3^-$  only (B)  $\text{Ba}^{2+}$  and  $\text{NO}_3^-$  only  
(C)  $\text{Ag}^+$  and  $\text{Ba}^{2+}$  and  $\text{NO}_3^-$  (D)  $\text{Ba}^{2+}$  and  $\text{NO}_3^-$  and  $\text{Cl}^-$
- 5 - Which of the hydrogen halide has the highest percentage of ionic character?  
(A)  $\text{HCl}$  (B)  $\text{HBr}$  (C)  $\text{HI}$  (D)  $\text{HF}$
- 6 - The value of quantum number is  $n = 1, 2, 3, 4, 5, \dots$  for  
(A) principal quantum number (B) azimuthal quantum number  
(C) magnetic quantum number (D) spin quantum number
- 7 - Equal masses of methane and oxygen are mixed in an empty container at  $25^\circ\text{C}$ . The fraction of total pressure exerted by oxygen is  
(A)  $\frac{1}{3}$  (B)  $\frac{8}{9}$  (C)  $\frac{1}{9}$  (D)  $\frac{16}{17}$
- 8 - Number of isotopes of oxygen is  
(A) two (B) three (C) four (D) five
- 9 - The type of hybridization in  $\text{NH}_3$  is  
(A)  $\text{sp}$  (B)  $\text{sp}^2$  (C)  $\text{sp}^3$  (D)  $d\text{sp}^2$
- 10 - Stronger the oxidizing agent, greater is the  
(A) oxidation potential (B) reduction potential (C) redox potential (D) E.M.F. of cell
- 11 - Law of mass action states that the rate at which the reaction proceeds is directly proportional to the product of the active masses of  
(A) reactants (B) products (C) concentration (D) equilibrium
- 12 - A limiting reactant is the one which  
(A) is taken in lesser quantity in grams as compared to other reactants  
(B) is taken in lesser quantity in volume as compared to the other reactants  
(C) gives the maximum amount of the product which is required  
(D) gives the minimum amount of the product under consideration
- 13 - The comparative rates at which the solutes move in paper chromatography depend on  
(A) the size of paper (B)  $R_f$  values of solutes  
(C) temperature of the experiment (D) size of the chromatographic tank used
- 14 - One calorie is equivalent to  
(A) 0.4184 J (B) 4.184 J (C) 41.84 J (D) 418.4 J
- 15 - Oxygen molecule is heavier than hydrogen by  
(A) 1 time (B) 8 times (C) 16 times (D) 32 times
- 16 - Acetone and chloroform are soluble in each other due to  
(A) intermolecular hydrogen bonding (B) ion-dipole interaction  
(C) instantaneous dipole (D) all of these
- 17 - The nature of the positive rays depends on  
(A) the nature of electrode (B) the nature of the discharge tube  
(C) the nature of the residual gas (D) all of these

Note: Section I is compulsory. Attempt any three (3) questions from Section II.

## (SECTION - I)

**2. Write short answers to any EIGHT questions.**

(2 x 8 = 16)

- i - Differentiate between theoretical yield and experimental yield.
- ii - Define mole with two examples.
- iii - Law of conservation of mass has to be obeyed during stoichiometric calculations. Justify it.
- iv - Iodine dissolves readily in  $CCl_4$ . Why?
- v - What is chromatography and  $R_f$  value?
- vi - Calculate S.I. unit of R.
- vii - Derive Boyle's law from kinetic molecular theory of gases.
- viii - Write down any two characteristics of plasma.
- ix - State Charles's law. Write down its mathematical form.
- x - Relative lowering of vapour pressure is independent of temperature. Justify this statement.
- xi - Define hydration energy of ions.
- xii - What are continuous solubility curves? Give one example.

**3. Write short answers to any EIGHT questions.**

(2 x 8 = 16)

- i - What is role of hydrogen bonding in paints, dyes, and textile materials?
- ii - What do you mean by liquid crystal? Write down any two uses of it.
- iii - Define the property of solids allotropy and give two examples.
- iv - The crystals showing isomorphism mostly have the same atomic ratios; explain.
- v - How neutron was discovered by Chadwick? Also write down reaction.
- vi - Write down postulates of Bohr's atomic model.
- vii - How azimuthal quantum number ( $l$ ) gives information about types of subshells?
- viii - Explain the concept of atomic spectrum.
- ix - Write down optimum conditions of temperature and pressure in the manufacture of ammonia by Haber's process.
- x - Define pH and pOH of solutions.
- xi - What do you understand by rate determining step? Give a suitable example.
- xii - How does Arrhenius equation help us to calculate the energy of activation of a reaction?

**4. Write short answers to any SIX questions.**

(2 x 6 = 12)

- i - Define ionization potential of element. How ionization potential vary across the period?
- ii - Anionic radius is greater than that of its parent atomic radius. Why?
- iii - Draw the structure of  $NH_3$  with reference to VSEPR Theory.
- iv - How do electronegativity values change in a group?
- v - Define enthalpy of solution with an example.
- vi - State first law of thermodynamics. Give its mathematical expression.
- vii - Calculate the oxidation numbers of elements underlined:  
(a)  $Na_2\underline{C}O_3$  (b)  $K_2\underline{Mn}O_4$
- viii - Give function of salt bridge.
- ix - Why SHE acts as cathode when connected with Zn electrode but SHE acts as anode when connected with Cu? Justify.

(Turn Over)

(SECTION – II) **GUT-6421**

5. (a) When limestone ( $\text{CaCO}_3$ ) is roasted then quicklime ( $\text{CaO}$ ) is formed according to the following equation. The actual yield of ( $\text{CaO}$ ) is 2.5 kg, when 4.5 kg of limestone is heated. What is the percentage yield of this reaction? (4)



- (b) Discuss the role of Hydrogen Bonding in Biological Compounds. (4)
6. (a) Write fundamental postulates of kinetic molecular theory of gases. (4)
- (b) Discuss four postulates of Bohr's model of atom. (4)
7. (a) What is  $\text{Sp}^3$  hybridization? Explain the structure of methane. (4)
- (b) Explain measurement of enthalpy by a glass calorimeter. (4)
8. (a) Calculate the pH of  $1.0 \text{ mole dm}^{-3}$  of  $\text{NH}_4\text{OH}$ , which is 1% dissociated. (4)
- (b) Explain half life method for determination of order of reaction. (4)
9. (a) Freezing points of solutions are depressed when non-volatile solutes are present in volatile solvents. Justify it. Plot a graph to elaborate your answer. (4)
- (b) Discuss measurement of electrode potential by standard hydrogen electrode (S.H.E) (4)



Roll No. of Candidate : \_\_\_\_\_

GVF-62-21

CHEMISTRY

(INTERMEDIATE PART - I) 321 - (III) Paper - I Group - II

Time: 20 Minutes

OBJECTIVE ----- Code : 6486

Marks: 17

**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. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave others blank.

- 1 - An excess of aqueous silver nitrate is added to aqueous barium chloride and precipitate is removed by filtration. What are the main ions in the filtrate?  
(A)  $\text{Ag}^+$  and  $\text{NO}_3^-$  only (B)  $\text{Ag}^+$  and  $\text{Ba}^{2+}$  and  $\text{NO}_3^-$   
(C)  $\text{Ba}^{2+}$  and  $\text{NO}_3^-$  only (D)  $\text{Ba}^{2+}$  and  $\text{NO}_3^-$  and  $\text{Cl}^-$
- 2 - Pressure remaining constant, at which temperature the volume of a gas will become twice of what it is at  $0^\circ\text{C}$   
(A)  $546^\circ\text{C}$  (B)  $200^\circ\text{C}$  (C) 546 K (D) 273 K
- 3 - The number of bonds in nitrogen molecule is  
(A) one  $\sigma$  and one  $\pi$  (B) one  $\sigma$  and two  $\pi$   
(C) three sigma only (D) two  $\sigma$  and one  $\pi$
- 4 - When water freezes at  $0^\circ\text{C}$ , its density decreases due to  
(A) cubic structure of ice (B) empty spaces present in the structure of ice  
(C) change of bond lengths (D) change of bond angles
- 5 - Isotopes differ in  
(A) properties which depend upon mass  
(B) arrangement of electrons in orbitals  
(C) chemical properties  
(D) the extent to which they may be affected in electromagnetic field
- 6 - 18 g glucose is dissolved in 90 g of water. The relative lowering of vapour pressure is equal to  
(A)  $\frac{1}{5}$  (B) 5.1 (C)  $\frac{1}{51}$  (D) 6
- 7 - The nature of the positive rays depend on  
(A) the nature of electrode (B) the nature of the discharge tube  
(C) the nature of the residual gas (D) all of these
- 8 - The velocity of photon is  
(A) independent of its wavelength (B) depends on its wavelength  
(C) equal to square of its amplitude (D) depends on its source
- 9 - One calorie is equivalent to  
(A) 0.4184 J (B) 41.84 J (C) 4.184 J (D) 418.4 J
- 10 - Acetone and chloroform are soluble in each other due to  
(A) intermolecular hydrogen bonding (B) ion - dipole interaction  
(C) instantaneous dipole (D) all of these
- 11 - 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
- 12 - In zero order reaction, the rate is independent of  
(A) temperature of reaction (B) concentration of reactants  
(C) concentration of products (D) none of these
- 13 - Which of the following species has unpaired electrons in antibonding molecular orbitals?  
(A)  $\text{O}_2^{2+}$  (B)  $\text{N}_2^{-2}$  (C)  $\text{B}_2$  (D)  $\text{F}_2$
- 14 - 27 g of Al react completely with how much mass of  $\text{O}_2$  to produce  $\text{Al}_2\text{O}_3$   
(A) 8 g of oxygen (B) 16 g of oxygen (C) 32 g of oxygen (D) 24 g of oxygen
- 15 - The cathodic reaction in electrolysis of dil.  $\text{H}_2\text{SO}_4$  with Pt electrodes is  
(A) reduction (B) oxidation  
(C) both oxidation and reduction (D) neither oxidation nor reduction
- 16 - The molar volume of  $\text{CO}_2$  is maximum at  
(A) STP (B)  $127^\circ\text{C}$  and 1 atm (C)  $0^\circ\text{C}$  and 2 atm (D)  $273^\circ\text{C}$  and 2 atm
- 17 - The pH of  $10^{-3}$  mol  $\text{dm}^{-3}$  of an aqueous solution of  $\text{H}_2\text{SO}_4$  is  
(A) 3.0 (B) 2.7 (C) 2.0 (D) 1.5

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Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

**(SECTION – I)**

1. Write short answers to any EIGHT questions.

**(2 x 8 = 16)**

- i - What is gram formula? Give example.
- ii - Define stoichiometry, write down its two laws.
- iii - How limiting reactant is identified?
- iv - What is distribution law?
- v - What is mobile phase and stationary phase?
- vi - What is physical meaning of value of R?
- vii - What is Avogadro's law? Give example.
- viii - Where plasma is found?
- ix - How pressure of dry gas is calculated?
- x - Define solubility curve, give its types.
- xi - Give two differences between ideal and non-ideal solutions.
- xii - What is fractional crystallization?

3. Write short answers to any EIGHT questions.

**(2 x 8 = 16)**

- i - Explain cleavage plane is anisotropic property.
- ii - Amorphous solids like glass are also called super cooled liquids. Explain.
- iii - Define isomorphism by giving one example.
- iv - Explain why HF is weak acid than HI?
- v - Define Zeeman effect and stark effect.
- vi - State Heisenberg's uncertainty principle, write down its mathematical form.
- vii - What is spin quantum number? Give its significance.
- viii - What is difference between orbit and orbital?
- ix - Write down equilibrium constant expression for the reaction:
 
$$\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$$
- x - Calculate pH of 0.001 M HCl solution.
- xi - Explain the radioactive decay is 1<sup>st</sup> order reaction.
- xii - Justify the statement "the unit of rate constant of a second order reaction is  $\text{dm}^3 \text{mole}^{-1} \text{s}^{-1}$  but the unit of rate of reaction is  $\text{mole dm}^{-3} \text{s}^{-1}$ ."

4. Write short answers to any SIX questions.

**(2 x 6 = 12)**

- i - Name the four factors affecting ionization energies.
- ii - Why ionization energy decreases down the group inspite of the increase in proton number?
- iii - Why second ionization energy is higher than first ionization energy?
- iv - Define electron affinity with an example.
- v - Define first law of thermodynamics.
- vi - Define heat and work.
- vii - Calculate oxidation state of chromium in dichromate ion.
- viii - What is the use of salt bridge in voltaic cell?
- ix - Why voltaic cell is a reversible cell?

**(Turn Over)**

(SECTION – II)

5. (a) Calculate the gram atoms (moles) in (4)  
(i) 0.1 g of sodium (ii) 0.1 kg of silicon
- (b) Explain the following properties of crystalline solids. Give two examples in each case: (4)  
(i) Isomorphism (ii) Transition Temperature
6. (a) Derive an equation to find out the partial pressure of a gas knowing the individual moles (4)  
of component gases and the total pressure of the mixture.
- (b) Give the postulates of Bohr's atomic model. Which postulate tells us that orbits are (4)  
stationary and energy is quantized?
7. (a) Define electron affinity. Name the factors affecting on it. How does it vary in the (4)  
periodic table.
- (b) State first law of thermodynamics. Write down its mathematical expression. (4)  
Prove that  $\Delta H = q_p$
8. (a) What is the percentage ionization of acetic acid in a solution in which 0.1 mol of it (4)  
has been dissolved per  $\text{dm}^3$  of the solution. ( $K_a = 1.85 \times 10^{-5}$ )
- (b) Explain half life method and large excess method to find the order of reaction. (4)
9. (a) Freezing points of solutions are depressed when non-volatile solutes are present in (4)  
volatile solvents. Justify it. Plot a graph to elaborate your answer.
- (b) Write down the various rules for assigning oxidation number. (4)