

Time: 3 hours

Marks: 85

Note: There are three sections in the paper i.e. A, B & C. Attempt Section-A and return it to the Superintendent within the given time. No mark will be awarded to cutting, erasing & overwriting. Mobile phones are strictly prohibited.

Time: 20 mins

SECTION-A

Marks: 18

Q1. There are four possible answers (A, B, C, D) for each question. Select the correct one and write it in the answer box.

- i. Which of the following has lowest polarizability?  
 a)  $F_2$                       b)  $Cl_2$                       c)  $Br_2$                       d)  $I_2$                       D
- ii. Salts of weak acids and weak bases may produce Neutral solution of \_\_\_\_\_  
 a)  $PK_a > PK_b$               b)  $PK_a < PK_b$               c)  $PK_a = PK_b$               d)  $K_a = K_b$               D
- iii.  $HgCl_2$  is iso-structural with \_\_\_\_\_  
 a)  $SnCl_2$                       b)  $C_2H_2$                       c)  $NO_2$                       d)  $CO_2$                       D
- iv. Vapour pressure of solution as compared to the solvent is \_\_\_\_\_  
 a) Higher                      b) Lower                      c) Variable                      d) Remain the same              B
- v. What will be the wave number of a radiation with  $2 \times 10^4$  nm?  
 a)  $0.5 \times 10^{-4} \text{ nm}^{-1}$               b)  $2 \times 10^4 \text{ nm}^{-1}$               c)  $5 \text{ nm}^{-1}$                       d)  $0.5 \times 10^{-4} \text{ nm}$               A
- vi. A cell which produces electric current by a Redox reaction is called \_\_\_\_\_  
 a) Electrolytic cell              b) Voltaic cell                      c) Half cell                      d) Standard cell                      B
- vii. The osmotic pressure of colloidal solution is generally \_\_\_\_\_  
 a) Small                      b) Moderately high              c) Negative                      d) Positive                      A
- viii.  $K_n$  is less than  $K_c$  when the difference of the mols of the products and reactants is \_\_\_\_\_  
 a) Zero                      b) One                      c) Negative                      d) Positive                      C
- ix. All of the following are electromagnetic radiations except \_\_\_\_\_  
 a) Gamma rays                      b) U.V rays                      c) Radio waves                      d) Cathode rays                      D
- x. Which of the following will have the largest dipole moment?  
 a)  $HF$                       b)  $HCl$                       c)  $HB_r$                       d)  $F_2$                       A
- xi. For solid and liquids \_\_\_\_\_  
 a)  $\Delta H = \Delta E$                       b)  $\Delta H > \Delta E$                       c)  $\Delta H < \Delta E$                       d)  $\Delta E = 0$                       A
- xii. The pH of a solution of  $NH_4CN$  is \_\_\_\_\_  
 a) 0                      b) 6                      c) 7                      d) 8                      D
- xiii. The face centered cube, each point at the corner is shared by \_\_\_\_\_ unit cells.  
 a) 2                      b) 4                      c) 6                      d) 8                      D
- xiv. The molar volume of He is  $89. \text{dm}^3$  at  $0^\circ\text{C}$  and \_\_\_\_\_  
 a) 1 atm                      b) 0.5                      c) 0.25 atm                      d) 4 atm                      D
- xv. Formation of  $SO_3$  for the manufacture  $H_2SO_4$ . The optimum temperature is \_\_\_\_\_  
 a)  $200-500^\circ\text{C}$                       b)  $300-400^\circ\text{C}$                       c)  $4000-5000^\circ\text{C}$                       d)  $500-3000^\circ\text{C}$                       A
- xvi. When heat is absorbed from the surrounding, the process is \_\_\_\_\_  
 a) Reversible                      b) Mechanical                      c) Exothermic                      d) Endothermic                      D
- xvii. Percentage of Carbon in  $CaCO_3$  is \_\_\_\_\_  
 a) 20 %                      b) 40%                      c) 48%                      d) 12%                      B
- xviii. X-Rays are high frequency radiations, discovered by \_\_\_\_\_  
 a) Max-Plank                      b) Mosely                      c) De-Brogli                      d) Ronetgen                      D

Note: Time allowed for Section - B & C is 2:40 hours.

SECTION - B

Marks: 40

Q2: Answer any TEN parts of the following. All carry equal marks.

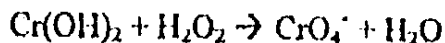
- i. Discuss the difference between sigma and pi-bond.
- ii. Explain the cleavage plane and anisotropic properties of crystalline solids.
- iii. What is the difference between electrolytic and  $\text{Vc} // \text{Zn} // \text{Ca} //$ .
- iv. Write note on Enzyme Catalysis.
- v. How much energy is lost when an electron in Hydrogen atom jumps from  $n_2 = 4$  to  $n_1 = 2$ ?
- vi. Write note on applications of X-Rays.
- vii. Discuss the relation between  $K_p$  and  $K_n$ .
- viii. Write note on pressure volume work done.
- ix. Explain the transition state theory of reaction rate.
- x. Discuss the experimental verification of Graham's Law of Diffusion.
- xi. Explain why balanced chemical equations are used in stoichiometric problems?
- xii. Define and explain leveling effect.
- xiii. Explain hydrophilic and hydrophobic molecules.

SECTION - C

Marks: 27

Note: Attempt any THREE of the following. All questions carry equal marks.

- Q3. (a) Derive Non-Ideal Gas Expression.  
(b) Differentiate between Ionic, Covalent and Molecular Crystalline Solids.
- Q4. (a) Explain Magnetic Quantum Number.  
(b) Explain industrial applications of Le-Chatelier's Principle.
- Q5. (a) Balance the following reaction by ion electron method.



- (b) What is buffer solution? Give an example of an acid and an alkaline buffer solution.

Q6. Write short note on the following:

- (a) Viscosity
- (b) Absolute Zero