[Time: Three Hours] **[Marks: 100]**

Please check whether you have got the right question paper

NB: 1.All questions are compulsory.
2. Answers to the same questions must be written together.
3. Figures to the right indicate full marks.
4. The use of log table/ non programmable calculator is allowed.

Q 1 (A) Select the correct option and complete the following statements**(Any twelve)** **(12)**

i) The H^+ ion concentration in water at 25^0C is _____.
a) 7 b) 10^{-14} c) 10^{-7}

ii) The pH of 0.05M H_2SO_4 is _____.
a) 1 b) 2 c) 4

iii) The pH of Sea water is _____.
a) 7.5 b) 8.5 c) 8.0

iv) Amorphous solids have solid state properties, but they do not posses_____.
a) specific volume b) orderly arrangement c) density

v) _____is the axial distances and axial angles for rhombohedral system?
a) $a = b = c, \alpha = \beta = \gamma \neq 90°$
b) $a = b \neq c, \alpha = \beta = \gamma = 90°$
c) $a \neq b \neq c, \alpha = \beta = \gamma = 90°$

vi) Electromagnetic waves travel_____.
a) without medium
b) with medium
c) with medium and without medium

vii) If steric number of the central atom is five then the arrangement of electron pairs around the central atom is_____.
a) trigonal planar b) pentagonal bipyramidal
c) trigonal bipyramidal

viii) The electrostatic forces of attraction between oppositively charge ions are called as_____.
a) covalent bonds b) ionic bonds c) metallic bonds

ix) Covalent bond is formed when two electrons in a molecule is _____.

a) shared equally by both the atoms.
b) not shared equally by both the atoms.
c) are transformed from one atom to another atom.

x) The bond angle in SF_6 is _____.

a) 120^o b) 90^o c) 180^o

xi) Iodine is insoluble in water, the solutions of iodine is prepared by using _____

a) KI b) NH_4I c) NaCl

xii) Strong oxidizing agent in the electrochemical series is _____.

a) Li b) F_2 c) H_2

xiii) Thiophene is _____.

a) antiaromatic b) aromatic c) non-aromatic

xiv) In nitration of benzene nitric acid is used along with _____.

a) hydrochloric acid b) sulphuric acid c) phosphoric acid

xv) _____is a meta directing group.

a) –OH b) $–NH_2$ c) $–NO_2$

xvi) Transannular strain is in _____conformation of cyclohexane.

a) chair form b) boat form c) half chair form

xvii) Aromatic compound is _____ than anti aromatic compound.

a) less stable b) more stable c) equally stable

xviii) Planar cyclo-octatetraene is_____.

a) aromatic b) antiaromatic c) non aromatic

(B) State whether the following statements are True or False **(3)**
(Any Three)

i) Ionic equilibria is established in aqueous solutions of all electrolytes.

ii) All electromagnetic waves travel through a vacuum at the same speed.

iii) Polarizability of LiCl is more than NaCl.

iv) The number of lone pairs in HF molecule is one.

v) Resonance energy of benzene is 36 kcal / mol.

vi) According to Huckels rule monocyclic ring which have eight pi electrons show aromaticity.

(C) Match the following columns **(Any Five)** **(5)**

Column A		Column B	
(i)	The pH of Human blood	(a)	Edge
(ii)	Intersection of two adjacent faces in a crystal	(b)	Oxidation
(iii)	Decrease of oxidation number	(c)	Staggered form
(iv)	Iodimetry	(d)	Less stable
(v)	Chair conformation	(e)	Interfacial angle
(vi)	Antiaromatic compound	(f)	Free iodine solution
		(g)	7.3
		(h)	Reduction

Q. 2 Attempt any Four of the following

(A) Explain the use of Hendersons equation for the measurement of pH of an acidic buffer solution. **(5)**

(B) Calculate the pH of 0.1M solution of ammonia. **(5)**
[Given, $K_b = 1.77 \times 10^{-5}$].

(C) What is degree of ionization? Discuss the factors that affect the degree of ionization. **(5)**

(D) Determine the wavelength and energy of the microwave radiation emitted **(5)**
a) by a microwave oven of frequency 2.45×10^9 Hz and
b) by a cordless phone of frequency 5.8×10^9 Hz.
[Given: $c = 3 \times 10^8$ m/s: $h = 6.626 \times 10^{-34}$ Js].

(E) Explain the different types of interaction between radiation and matter. **(5)**

(F) Define Unit cell. State the three laws of crystallography. **(5)**

Q. 3 **Attempt any Four of the following**

(A) What is isoelectronic principle ? Explain it with suitable examples. **(5)**

(B) Explain the effect of lone pair of electron in the geometry of molecule by giving suitable example. **(5)**

(C) What is steric number ? Calculate the steric number of the following molecules: **(5)**

a) CO_2 and b) NH_3

(D) Draw the Lewis dot structure of the following: **(5)**

a) BCl_3 and b) H_2O

(E) Balance the following reaction with stepwise explanation: **(5)**

$$CrO_4^{2-} + SO_3^{2-} \rightarrow Cr(OH)_4^- + SO_4^{2-}$$

(in Basic medium)

(F) Discuss redox stability is water with example. **(5)**

Q. 4 **Attempt any Four of the following**

(A) Explain sulphonation of benzene with mechanism. **(5)**

(B) What are the criteria which must be satisfied for the compound to be aromatic? **(5)**

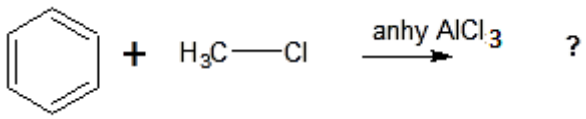
(C) Draw the conformations of cyclohexane. Give the relative stabilities of these conformations ? **(5)**

(D) Which of the following are aromatic, antiaromatic or non aromatic. Justify: **(5)**

a) cyclobutadiene b) pyrrole c) pyridine

(E) Explain why cyclopropane is less stable than cyclopentane. **(5)**

(F) Complete the following reaction? Give its name and mechanism. **(5)**



Q 5 **Attempt any Four of the following**

(A) Calculate the pH of a solution which contains 0.2 mol sodium acetate and 0.1 mol acetic acid per dm^3. [Given : K_a for the acid is 1.8×10^{-5}]. **(5)**

(B) Define axis of symmetry. Draw the different axis of symmetry of a cubic crystal. **(5)**

(C)	i)	Find out the oxidation number of Cr in $K_2Cr_2O_7$ and K_2CrO_4 .	**(2)**
	ii)	What are disproportionation reactions? Explain the disproportionation reaction of Cu^+ to Cu^{2+} and Cu^0.	**(3)**
(D)		Explain the titration curve of reaction between Fe(II) and Ce(IV) solution.	**(5)**
(E)	i)	What is flipping of cyclohexane?	**(3)**
	ii)	Explain steric strain.	**(2)**
(F)		State Hammond's Postulate. How does it help to identify the structure of transition states?	**(5)**
