LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FIRST SEMESTER – **NOVEMBER 2024**

UCH 1501 – BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 09-11-2024 Dept. No. Max. : 100 Marks

Time: 09:00 am-12:00 pm

SECTION A - K1 (CO1)			
Answer ALL the Questions			
1.	**Answer the following.**		**(5 x 1 = 5 Marks)**
	a)	Mention dual nature of electron.	
	b)	Find the oxidation number of Mn in $KMnO_4$.	
	c)	Draw the electron-dot structure of NH_3.	
	d)	What is p-n junction?	
	e)	Write the molecular formula for perchloric acid.	
2.	**Fill in the blanks.**		**(5 x 1 = 5 Marks)**
	a)	Lithium and _____ are diagonally placed in the periodic table.	
	b)	Oxidation number of Cr in $K_2Cr_2O_7$ is _____.	
	c)	The geometry of $BeCl_2$ is _____.	
	d)	N_2^+ is _____magnetic in nature.	
	e)	The molecular formula of thiocyanate ion is _____.	
SECTION A – K2 (CO1)			
3.	**Match the following.**		**(5 x 1 = 5 Marks)**
	a)	Fluorine – Azide	
	b)	Lux-Flood base – Germanium	
	c)	Liq. NH_3 – Electronegativity	
	d)	Semiconductor – Oxide ion donor	
	e)	Pseudohalogen – Non-aqueous solvent	
4.	**TRUE or FALSE**		**(5 x 1 = 5 Marks)**
	a)	The actual outermost electronic configuration of Cr is $4s^1\ 3d^5$.	
	b)	Sodium in liquid ammonia is an oxidising agent.	
	c)	The bond angle in octahedral geometry is 120°.	
	d)	Aluminium is used as a doping element in semiconductors.	
	e)	HF cannot be stored in glass bottles.	
SECTION B - K3 (CO2)			
Answer any TWO of the following in 100 words			**(2 x 10 = 20 Marks)**
5.	a) Describe the periodicity of ionization energy. (5)		
	b) Discuss Mulliken-Jaffee concept of electronegativity. (5)		
6.	Explain HSAB theory and Bronsted Lowry theory of acids and bases.		
7.	a) Explain the hybridization and geometry of $BeCl_2$. (5)		
	b) Outline the nature of conductors, insulators and semiconductors using band theory. (5)		

8.	a) Write the preparation, properties, and structure of dioxygendifluoride. (5) b) Write a note on interhalogen compounds of iodine. (5)
SECTION C – K4 (CO3)	
Answer any TWO of the following in 100 words	**(2 x 10 = 20 Marks)**
9.	Outline the postulates and limitations of Bohr's theory.
10.	a) Write a note on disproportionation and double decomposition reactions. (5) b) Explain Lewis theory of acids and bases with examples. (5)
11.	a) State Sidgwick-Powell theory and explain its role in the prediction of molecular shapes. (5) b) Fluorine is diamagnetic whereas oxygen molecule is paramagnetic. Explain. (5)
12.	a) Write a note on the oxoacids of halogens. (5) b) Compare VB and MO theories of covalent bond. (5)
SECTION D – K5 (CO4)	
Answer any ONE of the following in 150 words	**(1 x 20 = 20 Marks)**
13.	a) Illustrate the Pauling scale of electronegativity. (4) b) Comment on the anomalous behaviour of fluorine. (6) c) Balance the following redox reactions by oxidation number method. (10) (i) $MnO_4^- + C_2O_4^{2-} \rightarrow Mn^{2+} + CO_2$ (acidic medium) (ii) $Cr_2O_7^{2-}{}_{(aq)} + SO_{2\,(g)} \rightarrow Cr^{3+}{}_{(aq)} + SO_4^{2-}{}_{(aq)}$
14.	a) Construct the molecular orbital energy diagram for CO molecule and calculate the bond order. (10) b) How is bleaching powder prepared? Explain a method of estimating the amount of chlorine present in bleaching powder. (10)
SECTION E – K6 (CO5)	
Answer any ONE of the following in 150 words	**(1 x 20 = 20 Marks)**
15.	a) State and explain Pauling-Slator's rule. (5) b) Discuss the following reactions in liquid ammonia as solvent (15) (i) Acid-base reaction (ii) Ammonolysis (iii) Precipitation
16.	a) Explain in detail about the hybridization and geometry of the following compounds using VSEPR theory. (10) (i) SF_4 (ii) PCl_3 (iii) ClF_3 b) Construct a qualitative MO energy level diagram for O_2 molecule. Write the MO electronic configuration and bond order for O_2, O_2^+, O_2^{2+} O^{2-}, O_2^{2-}molecules. (10)
