

LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034



B.Sc. DEGREE EXAMINATION – CHEMISTRY

FIRST SEMESTER – NOVEMBER 2024



UCH1MC01 – BASIC CONCEPTS IN INORGANIC CHEMISTRY

Date: 09-11-2024

Dept. No.

Max. : 100 Marks

Time: 09:00 am-12:00 pm

SECTION A - K1 & K2 (CO1)

Q.No	Levels	Answer ALL the Questions	(10 x 2 = 20)
1	K1	State True/False (i) The dual nature of electron was postulated by de Broglie. (ii) 4s orbital has lesser energy than 2p.	
2		Draw the electron dot formula for acetic acid.	
3		What is a semiconductor? Give an example.	
4		Give any two examples of ionic hydrides.	
5		What are Miller indices?	
6	K2	Which among the following are isoelectronic species? (i) Al^{3+} and S^{2-} (ii) Al^{3+} and F^-	
7		Mention the hybridisation and shape of water molecule.	
8		He_2 molecule does not exist, whereas He_2^+ exists. Why?	
9		Which among the following exhibits hydrogen-bonding, HF or H_2S ? Justify your answer.	
10		What is F-center?	

SECTION B – K3 & K4 (CO2)

		Answer ALL the Questions	(4 x 10 = 40)
11	K3	(a) Explain the diagonal relationship of Li with Mg. (b) Explain the periodicity of ionization potential and electron affinity in the periodic table. (5) [OR]	(5)
12		(a) Write the electronic configuration of (i) Co^{3+} (ii) Cl^- . (b) Arrange the following in the increasing order of electronegativity Cl, O, S and F. (6)	(4)
13		Sketch and explain the hybridisation, geometry and shape of sulphur hexafluoride and phosphorus trichloride by VBT. (10) [OR]	
14		Mention the hybridisation and bond angle for the following geometries. (4 x 2.5) (i) Octahedral (ii) Trigonal planar (iii) Trigonal bipyramidal (iv) Tetrahedral	
15	K4	Sketch and explain the MO diagram of N_2 molecule. (10) [OR]	
16		What is hydrogen-bonding? Distinguish intra- from inter-molecular hydrogen bonding with suitable examples. (10)	
17		(a) Explain the concept of acid and bases by Arrhenius theory with suitable examples. (5) (b) Distinguish crystalline from amorphous solids. (5) [OR]	
18		Sketch and explain the structure of sodium chloride. (10)	

SECTION C – K5 & K6 (CO3)

Answer ALL the Questions			(2 x 20 = 40)
19	K5	(a) State and explain Heisenberg's theory of uncertainty and Pauli's exclusion principle. (6) (b) Explain the postulates of VSEPR theory and arrive at the shape and structure of XeO_3 molecule. (14)	
20		[OR] (a) What is Molecular Orbital theory? Write its key features. (10) (b) Explain the band theory of metals. (10)	
21	K6	(a) Describe the acid-base and precipitation reactions of liq. ammonia. (10) (b) Discuss the Lewis and Bronsted theories of acid and bases. (10)	
22		[OR] (a) Elaborate the various stoichiometric defects in solids. (10) (b) Explain the types of Bravais lattices with suitable examples. (10)	
