LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

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

SECOND SEMESTER – **APRIL 2025**

UCH 2502 – CHEMICAL BONDING AND MAIN GROUP ELEMENTS

Date: 29-04-2025 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

	SECTION A - K1 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
1.	**Define the following**	
a)	Born-Landé equation	
b)	Unit cell	
c)	van der Waals forces	
d)	s-Block elements	
e)	Borax bead test	
2.	**Fill in the blanks.**	
a)	-------- bonding typically occurs between a metal and a non-metal.	
b)	If the radius ratio is between 0.225 and 0.414, the structure is likely to be ----------.	
c)	---------- involve the interaction between a charged ion and a polar molecule.	
d)	---------- lithium compound, are used in the treatment of bipolar disorder.	
e)	The oxidation state of nitrogen in NO is ----------.	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**True or False**	
a)	Ionic compounds are typically poor conductors of electricity in solid form.	
b)	All crystals have the same type of unit cell.	
c)	Hydrogen bonding occurs when hydrogen is bonded to an electronegative atom like oxygen, nitrogen, or fluorine.	
d)	s-Block elements have very high ionization energies.	
e)	The boron group elements have three valence electrons.	
4.	**Match the following**	
a)	ionic bonding - unit cell	
b)	bcc - electrostatic force of attraction	
c)	london forces - borazine	
d)	18-Crown-6 - intermolecular force	
e)	inorganic benzene - K	
	SECTION B - K3 (CO2)	
	Answer any TWO of the following	**(2 x 10 = 20)**
5.	a) Write a note on Fajans' rule.	(5)
	b) Explain the Born-Haber cycle for NaCl.	(5)
6.	a) Draw and explain the crystal structure of sodium chloride.	(5)
	b) How does the hydrogen bonding affect the boiling point of 15, 16, and 17 group hydrides?	(5)
7.	a) Explain the anomalous behaviour of Li.	(5)
	b) How is beryllium extracted from its important ore?	(5)
8.	Discuss the preparation, properties and structure elucidation of diborane.	

	SECTION C – K4 (CO3)	
	Answer any TWO of the following	**(2 x 10 = 20)**
9.	a) Describe the factors influencing the formation of ionic compounds. b) How the radius ratio rule used to determining the coordination number and geometry of a compound?	(5) (5)
10.	a) Explain the types of hydrogen bonding. b) Discuss the preparation, properties and uses of clathrates.	(5) (5)
11.	a) Write a note on biological importance of sodium and potassium pump. b) Explain the alkali metal complexes of crown ether.	(5) (5)
12.	a) Discuss the preparation and properties of hydrazine. b) Explain the classification of nitrides.	(5) (5)
	SECTION D – K5 (CO4)	
	Answer any ONE of the following	**(1 x 20 = 20)**
13.	a) Explain the properties of ionic compounds. b) Illustrate the crystal structure of NaCl and CsCl. c) Mention the importance of hydrogen bonding.	(5) (10) (5)
14.	a) Discuss the preparation and properties of Na_2CO_3, $NaHCO_3$. b) Explain the classification of silicates.	(10) (10)
	SECTION E – K6 (CO5)	
	Answer any ONE of the following	**(1 x 20 = 20)**
15.	a) Discuss the factors affecting lattice energy. b) Explain the Schottky defect and Frenkel defect of solid. c) Write a comparison study of hydrogen bonding strength with fluorine, oxygen and nitrogen.	(5) (10) (5)
16.	a) Discuss the properties of alkali metals in oxides, peroxides and superoxides. b) Write a note on uses of alkali metals. c) Explain the classification of carbides.	(5) (5) (10)
