Name: Enrolment No:	

UPES
End Semester Examination, December 2023

Course: Inorganic Chemistry

Program: B.Sc. Physics + Mathematics + Geology

Course Code: CHEM 1007G

Semester: I

Time   : 03 hrs.

Max. Marks: 100

Instructions: Read the instructions given below carefully:
1. **All questions are compulsory.**
2. **Internal choice is given in Q 9 and 11.**

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Which is larger in size: C or F? Give suitable reason.	4	CO2
Q 2	Which quantum numbers reveals the information about the energy and orientation of orbitals?	4	CO1
Q 3	What are bonding and antibonding molecular orbitals?	4	CO3
Q 4	How can we find out the % ionic character in a covalent compound?	4	CO3
Q 5	What is the speed of an electron whose de Broglie wavelength is 0.1 nm? Given h= 6.626 x 10^{-34} J.s and m=9.1×10^{-31} kg.	4	CO1

SECTION B
(4Qx10M= 40 Marks)

Q 6	Derive the Schrodinger wave equation.	10	CO1
Q 7	Explain the following giving appropriate reasons: (a) The ionization potential of N is greater than that of O. (b) Second ionization potential is always greater than the first.	10	CO2
Q 8	Define electron affinity. Explain why electron affinity I has negative value whereas electron affinity II is positive? Give its trend across the period and down the group of periodic table.	10	CO2
Q 9	Discuss the various properties of ionic compounds. **OR** What is variable valency in covalent bonds? Discuss it taking phosphorous and sulphur as examples.	10	CO4

SECTION-C
(2Qx20M=40 Marks)

Q 10	a) Discuss the hybridization and structure of ClF_3.	10	CO3
	b) Calculate radius ratio of a crystal with coordination number 8.	10	
Q 11	a) Derive Born-Lande equation and explain Madelung constant. **OR** With the help of a suitable example and diagram, discuss sp^3d hybridization.	10	CO4
	b) Draw MO energy level diagram for O_2 molecule. Work out on its bond order and magnetic property. **OR** Use the following data to calculate the lattice energy of sodium chloride using Born Haber cycle. You must write all thermochemical equations for the steps of the cycle. Enthalpy of formation of sodium chloride = -411.3 kJ mol^{-1} Heat of sublimation of Na(s) = 108.7 kJ mol^{-1} Ionization energy of Na(g) = 495 kJ mol^{-1} Dissociation energy of Cl_2(g) = 244 kJ mol^{-1} Electron affinity of Cl(g) = – 349 kJ mol^{-1}	10	