(c) Explain the factors which influence the formation of ionic compounds. (5,5,5)

6. (a) Explain polarization and polarizing power.

(b) Give molecular orbital configuration of O_2, O_2^+ and O_2^-. Give order of stability with appropriate reasons.

(c) Describe Born-Haber cycle for calculating the lattice energy of sodium chloride. (5,5,5)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5044 **J**

Unique Paper Code : 2174001001

Name of the Paper : GE: ATOMIC STRUCTURE AND CHEMICAL BONDING

Name of the Course : **All Undergraduate Courses except with Chemistry**

Semester : II / IV / VI

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **four** questions.
3. **All** questions carry equal marks.

1. (a) Write the schrodinger wave equation for the wave mechanical model of an atom.

(b) Draw three resonance structures of CO_2. Give an example of an isoelectronic species having the same shape as CO_2.

(c) Give radial probability distribution curves for 2p and 3p-orbital and give their characteristics. (5,5,5)

2. (a) Predict the shape, geometry, and type of hybridization in each of the following molecules : **(any three)**

NH_3, PF_5, CIF_3, SF_6

(b) Draw the MO energy level diagram of NO. Calculate its bond order and discuss the stability of NO, NO^- & NO^+.

(c) Discuss the physical significance of various quantum numbers. (5,5,5)

3. (a) Describe Fajan's rules. Explain the stability of carbonates for the following trend :

$BeCO_3 < MgCO_3 < CaCO_3 < SrCO_3 < BaCO_3$

(b) Write the limitations of Bohr's theory.

(c) Discuss Aufbau principle. What are its various limitations? (5,5,5)

4. (a) Give reason as to why :

(i) $BaSO_4$ is insoluble in water.

(ii) Melting point of BaO is high.

(iii) Noble gases do not form ionic halides

(iv) N_2 molecule is diamagnetic while O_2 molecule is paramagnetic.

(b) State the main points of valence bond theory.

(c) What are the main conditions which Ψ must satisfy to give meaningful solution (eigen function). (5,5,5)

5. (a) Determine the wavelength associated with an electron travelling at one-tenth of speed of light, (mass of an electron= 9.1×10^{-31} kg, speed of light = 3.0×10^8 ms^{-1}).

(b) What is Heisenberg Uncertainty Principle? Determine the uncertainty in the position of an electron whose velocity is known to within 1×10^{-6} $m\bar{s}^1$? ($m_e = 9.1 \times 10^{-31}$ kg).

P.T.O.