

20/12/23



**DOON UNIVERSITY, DEHRADUN**

**Final Semester Examination, B.Sc. 1<sup>st</sup> Semester, December, 2023**

**School of Physical Sciences, Department of Chemistry**

**NEP Chemistry**

**Course Code: CYG-101 : Atomic Structure, Chemical Binding and Volumetric analysis**

*Time Allowed 2 Hours*

*Maximum Marks: 30*

**Note: All Questions are compulsory**

**SECTION: A**

**.....10 Marks**

1. In silicates, the oxygen atom forms a tetrahedral void. The limiting radius ratio for tetrahedral void is 0.22. The radius of oxide is 1.4 Å. Find out the radius of the cation?
2. Write the Kapustinskii's equation and its importance?
3. Explain the different types of chemical forces found in the molecule?
4. Write the electronic configuration of As, Pb, I and Cs?
5. Find out the orbital angular momentum of an electron in 3p subshell?
6. Calculate the Bohr radius of electron of lithium in first excited state?
7. Write the increasing order of electronegativity of  $SP^3$ ,  $SP^2$  and  $SP$  hybrid orbitals?
8. Write the difference between semiconductor and insulator on the basis of band theory?
9. Describe the bent rule with example?
10. Calculate the lattice energy of NaCl from the data:  
 $A=1.456$ ,  $r=3.12$  Å,  $n=4$

**SECTION: B**

**.....10 Marks**

1. Write the different postulates of Fajan rule and explain why  $HgCl_2$  is more covalent than  $CaCl_2$ ?
2. Explain the different stoichiometric defects found in solids with example?
3. What is ionic bond? And write the different characteristics and properties of ionic bonds?
4. Explain the hybridisation, geometry and bond angle of  $IF_7$ ,  $CO_3^{2-}$  and  $PCl_5$ ?
5. Calculate the bond order of  $N_2^-$ ,  $B_2$ ,  $NO$  and  $O_2^+$  and explain their diamagnetic and paramagnetic characteristics?

**SECTION: C**

**.....10 Marks**

1. Explain the molecular orbital theory (MOT) and draw the molecular orbital diagram of H-F and CO molecule? and calculate the bond order and their magnetic behaviour?
2. Define the lattice energy. Derive Born Lande equation and give its importance?

