

Exam. Code : 103201

Subject Code : 1268

B.A./B.Sc. 1st Semester

CHEMISTRY (Inorganic Chemistry-I)

Time Allowed—3 Hours] [Maximum Marks—35

Note :— Attempt **five** questions, selecting at least **one** question each from Sections A, B, C and D. The **fifth** question may be attempted from any Section.

SECTION-A

1. (a) Calculate de-Broglie wavelength of an electron that has been accelerated through a potential difference of 120V [Given : Mass of electron = 9.1×10^{-31} kg; Charge on electron = 1.6×10^{-19} C; $h = 6.63 \times 10^{-34}$ kg m²s⁻¹]. 3
- (b) Write Schrodinger wave equation for hydrogen atom. What are the various parameters used in the equation ? Also discuss the significance of ψ and ψ^2 . 4
2. (a) What do you understand by radial probability distribution curves ? Draw radial probability distribution curves for 3s, 3p and 3d orbitals. What information do these curves provide. 5
- (b) Cu (Z = 29) has two oxidation states, Cu⁺ and Cu²⁺; which is more stable and why ? 2

SECTION-B

3. (a) Define effective nuclear charge. Also calculate effective nuclear charge for one of the outer electrons (2p) of oxygen atoms. 3
- (b) What is electronegativity? Discuss Pauling Scale and Mulliken concept of electronegativity. 4
4. (a) Which of these Na^+ , Mg^{2+} and Al^{3+} will have smaller radii and why? 2
- (b) What is ionization energy? Discuss various factors which affect ionization energy and also give its variation in a period and group in periodic table. 5

SECTION-C

5. (a) How will you explain that BeF_2 is a linear molecule? 3
- (b) Give reasons for the following :
- (i) NO^+ has shorter bond length than NO , even though latter has an extra electron.
- (ii) Both CH_4 and H_2O have tetrahedral geometry but their bond angles are different. 4
6. (a) Discuss the shapes of ClF_3 and SF_4 on the basis of VSEPR theory. 4
- (b) Arrange HCl , HBr and HI in decreasing order of their percentage ionic character. Given electronegativity values of H, Cl, Br and I are 2.1, 3.0, 2.8 and 2.4 respectively. 3

SECTION-D

7. (a) Out of LiCl and KCl, which compound is more covalent, according to Fajan's rule ? 2
- (b) What do you understand by defects in crystals ? Discuss in detail the following types of defects in crystals : (i) Schottky defect (ii) Frenkel defect. 5
8. (a) Ionic compounds are poor conductors of heat and electricity in solid state but good conductors in the molten state. Explain. 2
- (b) Draw neat and labelled diagram of CaF_2 and also discuss its structure. 2
- (c) Briefly discuss various types of Van der Waals forces. 3