Exam. Code : 103201
Subject Code : 8001

B.A./B.Sc. 1st Semester (Old Syllabus 2018)

CHEMISTRY

(Inorganic Chemistry-A)

Time Allowed—Three Hours] [Maximum Marks—35

Note :— Attempt any **FIVE** questions, selecting at least **ONE** question from each section. The **fifth** question may be attempted from any section. Each question carries **7** marks.

SECTION—A

1. (a) Draw the shapes of d-orbitals. 2

   (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 ? 5

2. (a) Calculate de-Broglie wavelength of an electron that has been accelerated through a potential difference of 130 V [Given : Mass of electron = 9.1×10^{-31} kg; Charge on electron = 1.6×10^{-19} C; h = 6.63×10^{-34} kg m^2s^{-1}] 3

   (b) Discuss the physical significance of different quantum numbers. 4

SECTION—B

3. (a) Which of these Na^+, Mg^{2+} and Al^{3+} will have smaller radii and why ? 1

(b) Which has largest ionization energy and why (B or Be) ? 2

(c) What is electronegativity ? Briefly discuss Mulliken concept of electronegativity. 4

4. (a) Mention Slater's rules. Calculate the effective nuclear charge for an outer electron (4s) of potassium atoms. 2

(b) What is electron affinity ? Give its variation in a period and in a group in the periodic table. Also discuss various factors which affect electron affinity. 5

SECTION—C

5. (a) Explain Valence Bond Theory. Also discuss its limitations. 3

(b) Draw MO diagram of CO molecule. Also predict its bond order. 4

6. (a) Discuss the shapes of CH_4 and IF_7 on the basis of hybridization. 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) Draw neat and labelled diagram of CaF_2. Also discuss its structure. 2

   (b) What is Born-Haber cycle ? How is it used to calculate the lattice energy of NaCl ? 5

8. (a) Melting point of NaCl is higher than that of $AlCl_3$. Give suitable reason in support of your answer. 2

   (b) What are Fajan's rules ? How do they help in deciding the covalent character in a bond ? 5