Roll No. .....

(01/22-II)

5168

B.Sc. EXAMINATION

(First Semester)

CHEMISTRY

Paper I (CH-101)

Inorganic Chemistry

Time : Three Hours *Maximum Marks : 27*

Note : Q. No. 1 is compulsory. Attempt *four* questions from Section A and Section B, selecting *two* questions from each Section.

(Compulsory Question)

1. (a) Draw the shape of $3d_{z^2}$ orbital.

   (b) How many nodes are present in $3d_{x^2-y^2}$ orbital ?

(c) Which of the following has smallest size :
Fe, Fe^{+2} and Fe^{+3}

(d) Give the Hybridisation of central atom in SO_2.

(e) What are the electron deficient compounds ?

(f) Give the coordination numbers of cations and anions in Calcium Fluoride Structure.

(g) What kind of Hydrogen bonding is present in *p*-chlorophenol ? $1 \times 7 = 7$

Section A

2. (a) What can be maximum number of electrons in the following orbitals : 3*d*, 4*p* and 5*f* ? 3

(b) State and explain the Hund's rule of maximum multiplicity while considering the electronic configuration of the atoms ? 2

3. (a) Which of the following is diamagnetic or paramagnetic ?

(i) Al^{+3} ($z = 13$)

(ii) Co^{+3} ($z = 27$)

(iii) Ni^{+2} ($z = 34$). 3

(b) What is meant by Normalization and Orthogonality ? 2

4. (a) Define electronegativity and discuss Pauling scale of electronegativity. 3

(b) The electron affinity of Noble gases are zero. Why ? 2

Section B

5. Discuss M.O. theory. Explain on the basis of theory N_2 molecule is diamagnetic while O_2 molecule is paramagnetic. 5

6. Using USEPR theory explain the structure of SF_4, ClF_3, H_2O, NH_3 and XeF_4. 5

7. Calculate the lattice energy of NaCl crystal from the following data by use of Born-Haber cycle :

Sublimation energy = 108.7 kJ/m,

Dissociation energy of Cl_2 = 225.9 kJ/m,

Ionisation energy of Na(g) = 489.5 kJ/m,

Electron affinity of Cl(g) = 351.4 kJ/m,

Heat of formation of NaCl = – 414.2 kJ/m.