Roll No. : .....

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B.Sc. (Chemistry Hons.) 1st Semester
(Full & Reappear)
Examination, March-2021
(w.e.f. 2012-13)

INORGANIC CHEMISTRY

Paper-I

Time : Three Hours] *[Maximum Marks : 40*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note :- Attempt *five* questions in all, selecting *one* question from each Section. Question No. 1 is compulsory. All questions carry equal marks.

1. (a) Calculate the number of nodes present in $4p$ orbitals.
   (b) Why half filled orbitals have extrastability ?
   (c) Define Hybridization.
   (d) Why all the P-F bonds on PF_5 are not equivalent ?
   (e) Out of Na and Na^+, which has higher ionization energy ?
   (f) What is Van der Waals' radius ?
   (g) What is the coordination number of Na^+ in NaCl ?
   (h) Why LiCl has higher boiling point than HCl ? 1×8=8

Section-A

2. (a) Differentiate between an Orbit and Orbital.
   (b) Using Heisenberg uncertainty principle, prove that electron cannot exist into the nucleus.
   (c) Explain Hunds rule of maximum multiplicity. 3,3,2

3. (a) Explain $(n + l)$ rule with example.

(b) Derive de-Broglie equation and explain its significance.

(c) Explain the radial probability distribution curve for :

(i) $3s$

(ii) $2p$

(iii) $3p$ 2,3,3

Section–B

4. Describe the hybridization and shape of :

(i) SF_6

(ii) ClF_3

(iii) H_3O^+ 3,3,2

5. (a) Draw the MO diagram of NO and calculate its bond order.

(b) How does hydrogen bonding affect the melting and boiling point of compounds ?

(c) Calculate the percentage ionic character in HF molecule. The electronegativity value of H and F are 2.1 and 4.0 respectively. 3,2,3

Section–C

6. (a) Explain the following :

(i) Electron affinity of noble gases are zero.

(ii) The second electron affinity of oxygen is negative.

(b) Define Ionization Energy. What are the factors that govern it ? 4,4

7. (a) Write the main features of Linnett theory and explain structure of F_2 using it.

(b) What is Electronegativity ? Explain the factors affecting it. 4,4

Section–D

8. (a) Describe the following :

(i) Fajan's Rule

(ii) n– and p-type semiconductors

(b) Describe the structure of CaF_2. 4,4

9. (a) Explain the Bond theory of Metallic Bonding.

(b) Describe Born-Haber cycle for calculating lattice energy of solids. 4,4