NRT/KS/19/2079

Bachelor of Science (B.Sc.) Semester—III Examination

(New and Old)

CH–301 : CHEMISTRY (Inorganic Chemistry)

Compulsory Paper—I

(New Course)

Time : Three Hours]　　　　　　　　　　　　　　　　　　[Maximum Marks : 50

N.B. :— (1)　All **FIVE** questions are compulsory and carry equal marks.

　　　　 (2)　Write equations and draw diagrams wherever necessary.

1.　(A)　Discuss formation of bonding and antibonding MO in terms of wave function. Construct Coulson's MO diagram for CO molecule. Calculate Bond order.　　5

　　(B)　What are interhalogen compounds ? Give one method of preparation of AX and AX_3 type of interhalogen compounds. Discuss structure of IF_5.　　5

OR

　　(C)　Explain polar nature of HF molecule on the basis of MO diagram.　　2.5

　　(D)　Explain paramagnetic nature of oxygen molecule on the basis of MOT.　　2.5

　　(E)　What are polyhalides ? Discuss structure and bonding in I_3^-.　　2.5

　　(F)　Discuss structure of NH_3 and CIF_3 on the basis of VSEPR theory.　　2.5

2.　(A)　Discuss 3d series elements with respect to :

　　　　(i)　Electronic configuration and

　　　　(ii)　Variable oxidation states.　　5

　　(B)　(i)　Explain magnetic properties of first transition series elements.

　　　　(ii)　Write electronic configuration of 4d series elements.　　5

OR

　　(C)　Explain why Ti^{+3} and Cu^{+2} are coloured while Ti^{+4} and Cu^{+1} are colourless.　　2.5

　　(D)　Discuss catalytic activity of 3d series elements.　　2.5

　　(E)　Discuss the trends in atomic and ionic radii of first transition series elements.　　2.5

　　(F)　Compare oxidation states of Cr, MO and W.　　2.5

3.　(A)　Define the terms :

　　　　(i)　Mean

　　　　(ii)　Median

　　　　(iii)　Average deviation and

　　　　(iv)　Standard deviation.

　　　　Calculate average deviation and standard deviation for the following set of results :

　　　　　15.80,　15.75,　15.90,　15.85,　15.86,　15.82　　5

　　(B)　(i)　Discuss various steps involved in rejection of results on the basis of 2.5d rule.

　　　　(ii)　Give classification of solvents on the basis of proton donor acceptor property.　　5

OR

　　(C)　Discuss precipitation reaction in liq. NH_3 and liq. SO_2.　　2.5

　　(D)　Differentiate between accuracy and precision.　　2.5

(E) Find out significant figures in the following :

    (i)   1.0026

    (ii) 22.4200

    (iii) 7.89×10^{15}

    (iv) 0.005042

    (v) 6.023×10^{-23}.   2.5

(F) In the analysis of iron ore the percentage of Fe_2O_3 were found to be 66.00, 65.55, 65.90, 67.85, 66.85, 69.90 and 65.00. Find whether the value 69.90 can be rejected or retained by Q-test. (Q lit value for seven observations is 0.51)   2.5

4. (A) What is Lanthanide contraction ? Give its causes. Discuss any two consequences of Lanthanide contraction.   5

   (B) (i)   Discuss complex formation tendency of Lanthanides

      (ii) Discuss electronic configuration of Actinides.   5

<div align="center">OR</div>

   (C) Discuss oxidation states of Lanthanides.   2.5

   (D) Discuss solvent extraction method for separation of Lanthanides.   2.5

   (E) Discuss electronic configuration of Lanthanides.   2.5

   (F) Write a note on oxidation states of Actinides.   2.5

5. Attempt any **TEN** of the following :

   (i)   Draw probability distribution curves for bonding and antibonding MO.

   (ii) Draw MO diagram for B_2 molecule.

   (iii) Draw structure of SF_4 on the basis of VSEPR theory.

   (iv) State maximum oxidation states shown by Co, Rh and Ir.

   (v)   Explain why Cr have high values of second ionization potential ?

   (vi) Calculate magnetic moment of Mn^{4+} ion.

   (vii) What are systematic errors ?

   (viii) Define absolute and relative error.

   (ix) Give one example of acid and base in liq. SO_2.

   (x)   Why Zr and Hf are called as chemical twins ?

   (xi) What is the position of Lanthanides in periodic table ?

   (xii) What do you mean by Actinide Contraction ? $1 \times 10 = 10$

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(D)   Explain paramagnetic nature of oxygen molecule on the basis of MOT.   2.5

(E)   What are polyhalides ? Discuss structure and bonding in I_3^-.   2.5

(F)   Give any one method for preparation of S_4N_4. Discuss its structure.   2.5

2.   (A)   Discuss 3d series elements with respect to :

(i)   Electronic configuration and

(ii)   Variable oxidation states.   5

(B)   (i)   Explain magnetic properties of first transition series elements.

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(C)   Explain why Ti^{+3} and Cu^{+2} are coloured while Ti^{+4} and Cu^{+1} are colourless.   2.5

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