TKN/KS/16/5827

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

CH–301 : CHEMISTRY (Inorganic Chemistry)

Paper—I

Time—Three Hours] [Maximum Marks—50

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

(2) Write equations and draw diagrams whenever necessary.

1. (A) What is LCAO approximation ? Draw and explain MO diagram of N_2 molecule. Write its MO configuration and calculate bond order. 5

(B) What are interhalogen compounds ? How are they classified ? Discuss structure and bonding in BrF_3. 5

OR

(C) Differentiate between bonding and anti-bonding M.O's. 2½

(D) Draw and explain M.O. diagram of O_2-molecule. 2½

(E) Discuss structure and bonding in S_4N_4 molecule. 2½

(F) What are polyhalides ? Discuss structure and bonding in ICl_4^- ion. 2½

2. (A) What are transition elements ? Discuss first transition series elements with respect to :

(i) Variable oxidation states and

(ii) Complex forming tendency. 5

(B) (i) Write redox reaction in liq. NH_3 and liq. SO_2 with one example of each.

(ii) Give reasons :

(a) Ti^{3+} is purple coloured while Ti^{+4} is colourless

(b) All Zn compounds are diamagnetic. 5

OR

(C) Calculate magnetic moment of Co^{2+} and Mn^{2+} ion (At. No. of Co = 27 and Mn = 25). 2½

(D) Discuss electronic configuration of first transition elements. 2½

(E) Explain catalytic properties of first transition series elements. 2½

(F) Define protie and aprotie solvents with example. 2½

3. (A) (i) Write electronic configuration of 5d-series elements.

(ii) An analyst obtained concentration of iron in a sample : 22.50, 22.42, 22.48 and 22.56. On the basis of Q-test predict whether the value 22.56 is to be retained or rejected. The Q_{table} value for four observations is 0.76. 5

(B) What is error ? How it is classified ? Give detailed account of determinate error. 5

OR

(C) Compare oxidation states of Cr, Mo and W. 2½

(D) Following values were obtained for chlorine :

32.22, 32.64, 32.52 and 32.46.

Calculate mean and median. 2½

(E) What is significant figures ? Find the number of significant figures in the following :

(i) 20.06

(ii) 7.89×10^{10}

(iii) 328.0

(iv) 0.368

(v) 10.010. 2½

(F) Distinguish between accuracy and precision. 2½

4. (A) What are inner transition elements ? Discuss lanthanide elements with respect to :

(i) Electronic configuration and

(ii) Complex forming tendency. 5

(B) (i) Discuss ion-exchange method for the separation of lanthanides.

(ii) Discuss actinides with respect to their oxidation states. 5

OR

(C) What is lanthanide contraction ? Explain basic character of hydroxides of lanthanides. 2½

(D) Name any two minerals of lanthanides. Why are lanthanides known as rare earths ? 2½

(E) What is gadolinium break ? Explain why Eu and Yb shows exceptionally high values of atomic radii. 2½

(F) Discuss the position of actinides in periodic table. 2½

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

(i) Draw MO diagram of H_2 molecule.

(ii) What is meant by nonbonding molecular orbital ?

(iii) Draw structure of I_5^- ion.

(iv) Why is Mn^{2+} more stable than Mn^{+4} ?

(v) Explain why second I.P. of Cr and Cu is higher.

(vi) Define amphoteric solvent with example.

(vii) Explain the terms Mean and Median.

(viii) Define absolute and relative errors.

(ix) Write maximum oxidation state of Co and Rh.

(x) Write stable oxidation state of Ce and Yb.

(xi) Name the reagent used in solvent extraction method of lanthanides separation.

(xii) Define actinide contraction. 10×1=10