

**Bachelor of Science (B.Sc.) Semester-III Examination**  
**CHEMISTRY (Inorganic Chemistry) (New & Old)**  
**Compulsory Paper—I**  
**(New)**

Time : Three Hours]

[Maximum Marks : 50

N.B. :— **FIVE** questions are compulsory and carry equal marks.

(2) Write equations and draw diagrams wherever necessary.

1. (A) What are interhalogen compounds ? How are they classified ? Discuss the structure of  $\text{ClF}_3$ . 5
- (B) Draw and explain MO diagram of  $\text{B}_2$  and  $\text{O}_2$  molecule. Write their MO configuration and calculate bond order. 5

OR

- (C) Explain the shape of  $\text{SF}_4$  molecule using VSEPR theory. 2½
- (D) What are Polyhalides ? Discuss the structure of  $\text{I}_3^-$ . 2½
- (E) Distinguish between bonding and antibonding molecular orbitals. 2½
- (F) Draw MO diagram of HF molecule. Explain its polar nature on the basis of MO theory. 2½
2. (A) What are transition elements ? Discuss the first transition series elements with respect to :
- (i) Electronic configuration
- (ii) Complex formation tendency. 5
- (B) (i) Discuss 3d series elements with respect to variable oxidation states.
- (ii) Give a comparative account of the elements Cr, MO and W with respect to their magnetic properties. 5

OR

- (C) Discuss the colour of first transition series elements. 2½
- (D) Calculate spin magnetic moment of  $\text{Mn}^{2+}$  and  $\text{Cu}^+$  ions. 2½
- (E) Discuss atomic and ionic radii of 3d series elements. 2½
- (F) Write electronic configuration of 4d series elements. 2½
3. (A) Define error. Discuss systematic and random errors. Calculate average and standard deviation of the given set of results obtained by analyst. 32.22, 32.64, 32.52 and 32.46. 5
- (B) (i) Discuss with example acid-base reactions in  $\text{Liq.NH}_3$  and  $\text{Liq.SO}_2$ .
- (ii) Give various steps for rejection of data according to Q-test. 5

OR

(C) Explain the terms :

- (i) Accuracy, and
- (ii) Precision.

2½

(D) Find out the significant figures in the following :

(i)  $1.602 \times 10^{-19}$

(ii) 4.00298

(iii) 96500

(iv) 0.00705

(v)  $6.023 \times 10^{23}$

2½

(E) Define absolute and relative error.

2½

(F) Discuss classification of solvents on the basis of like dissolves like.

2½

4. (A) What is Lanthanide contraction ? Explain its causes and give any two consequences of Lanthanide contraction.

5

(B) (i) Discuss the position of Actinides in the periodic table.

(ii) Discuss solvent extraction method for separation of Lanthanides.

5

OR

(C) Explain complex formation tendency of Lanthanides.

2½

(D) Discuss Lanthanides with reference to their electronic configuration.

2½

(E) (i) Give names of any two ores of Lanthanides.

(ii) Explain  $\text{La}(\text{OH})_3$  is more basic than  $\text{Lu}(\text{OH})_3$ .

2½

(F) Discuss actinides with respect to their oxidation states.

2½

5. Attempt any TEN questions of the following :

(i) Explain why  $\text{He}_2$  molecule does not exist in terms of MOT.

(ii) Draw the structure of  $\text{ICl}_4^-$  ion.

(iii) Write MO configuration of  $\text{O}_2$  molecule.

(iv) Give reason, why Zn does not show variable oxidation states.

(v) Define ferromagnetism.

(vi) Write electronic configuration of MO

(vii) Define median for odd and even set of values.

(viii) Define personal error.

(ix) Name any two compounds acting as acid in liquid  $\text{NH}_3$ .

(x) What is Gadolinium break ?

(xi) What is actinide contraction ?

(xii) What are minimum and maximum oxidation states shown by Lanthanides ?  $1 \times 10 = 10$