

Exam. Code : 107401

Subject Code : 2231

B.Sc. Biotechnology 1st Semester

INORGANIC CHEMISTRY-A

Paper—BT-3

Time Allowed—3 Hours] [Maximum Marks—40

Note :— The question paper shall consist of **three** parts (A, B and C) and instructions to attempt the questions are given separately for each part.

PART—A

Note :— All **eight** very short answer type questions are compulsory. Each question will be of **1** mark.

1. Name the following coordination complexes :
 - (a) $[\text{Pt}(\text{NH}_3)_4(\text{NO}_2)\text{Cl}]\text{SO}_4$
 - (b) $[\text{Co}(\text{en})_2\text{Br}_2]\text{Cl}$
2. The compound $\text{Co}(\text{NH}_3)_5\text{CO}_3 \cdot \text{Cl}$ has two ionization isomers. Write their structural formulae and give the IUPAC names.
3. What is the number of unpaired electrons in tetrahedral $[\text{Ni}(\text{CO})_4]$ complex ?
4. What is hybridization and geometry of $[\text{Ag}(\text{NH}_3)_2]^+$?
5. Give the number of unpaired electrons in a strong field and weak octahedral field for
 - (a) Cr^{3+}
 - (b) Fe^{3+}
6. What is spectrochemical series ?

7. What is the relationship between bond order and bond length ?
8. Hydrogen form diatomic molecules while helium remains monoatomic, why ?

PART—B

Note :— Out of **eight** short answer type questions attempt any **five**. Each question will be of **4** marks.

9. Which type of isomeric behaviour is exhibited in the following compounds :
 - (a) $[\text{Co}(\text{NH}_3)_5(\text{NO}_2)\text{Cl}_2]$ and $[\text{Co}(\text{NH}_3)_5(\text{ONO})\text{Cl}_2]$
 - (b) $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$
 - (c) $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5(\text{SO}_4)]\text{Br}$
 - (d) $[\text{Co}(\text{en})_2(\text{H}_2\text{O})\text{Cl}]\text{Cl}_2$ and $[\text{Co}(\text{en})_2\text{Cl}_2]\text{Cl}\cdot\text{H}_2\text{O}$
10. Draw the geometrical isomers of complex ion: dichlorobis (ethylenediamine) cobalt(III) ion. Indicate which of these exhibits optical isomers.
11. Write down the limitations of Valence Bond Theory.
12. What do you understand by the concept back bonding ? Explain it with suitable example.
13. What is Jahn-Teller distortion effect ? Discuss the stability of Cu(II) complexes on the basis of J-T distortion.
14. Explain, how crystal field splitting occurs in octahedral complexes.
15. Write down the difference between bonding and antibonding molecular orbitals.

16. With the help of MO diagram explain why bond order of N_2^+ ion is less than that in N_2 molecule whereas bond order of O_2^+ ion is greater than O_2 molecule.

PART—C

Note :— Out of **four** descriptive type questions attempt any **two**. Each question will be of **6** marks.

17. What are the postulates of Werner's coordination theory ? Also explain the evidences which support this theory ?
18. Discuss the hybridization, geometry and number of unpaired electrons in following complexes :
- (a) $[Ni(CN)_4]^{2-}$
- (b) $[NiCl_4]^{2-}$
19. Write down all the factors which are responsible for crystal field splitting of coordination complexes ?
20. Draw the MO diagram of ML_4 , a tetrahedral complex.