

M.Sc. (Part-I) Semester—I (CBCS Scheme) Examination
PHARMACEUTICAL CHEMISTRY
(Inorganic Chemistry)
Paper-1SA1

Time : Three Hours]

[Maximum Marks : 80

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

UNIT—I

1. (a) What is improper axis of symmetry ? Explain with suitable example. 4
- (b) Give the condition required for a set of operations to form a group. 4
- (c) Calculate magnetic moment for :
 - (i) Fe^{2+}
 - (ii) Co^{2+}
 - (iii) Cu^{2+}
 - (iv) Zn^{2+} . 4
- (d) What is plane of symmetry ? Explain vertical, dihedral and horizontal plane of symmetry with suitable example. 4

OR

- (p) Discuss high spin and low spin crossover with suitable example. 4
- (q) Explain Cu(I) is diamagnetic whereas Cu(II) is paramagnetic. 4
- (r) Explain axes of symmetry in benzene. 4
- (s) What do you mean by reducible and irreducible representation ? 4

UNIT—II

2. (a) Draw MO representation for CO molecule. 4
- (b) Explain outer orbital hybridization (sp^3d^2) with suitable example. 4
- (c) Draw MO representation for octahedral complex. 4
- (d) On the basis of V.B.T. explain why $[\text{FeF}_6]^{4-}$ is paramagnetic and $[\text{Fe}(\text{CN})_6]^{4-}$ is diamagnetic. 4

OR

- (p) Draw and explain MO representation of NO molecule. 4
- (q) What are the postulates of valence bond theory ? 4
- (r) Explain the structure of NH_3 and H_2O on the basis of valence bond theory. 4
- (s) What are the limitations of valence bond theory ? 4

UNIT—III

3. (a) What is CFSE ? Calculate CFSE for d^1 , d^4 , d^5 and d^6 in octahedral complexes in strong field. 4
- (b) Draw crystal field splitting diagram for square planar complexes. 4
- (c) Calculate term symbol in ground state for : 4
- (i) Cr ($3d^5 4s^1$) and (ii) Ni ($3d^8 4s^2$). 4
- (d) Explain Laporte orbital and spin selection rule for electronic spectra. 4

OR

- (p) Explain electronic spectra for Mn(II) ion in octahedral complexes. 4
- (q) Derive term symbol for d^{16} configuration in ground state. 4
- (r) Draw splitting of 'd' orbital for d^1 and d^9 configuration in tetrahedral field. 4
- (s) Calculate CFSE for following system : 4
- (i) d^4 (high spin tetrahedral)
- (ii) d^5 (high spin tetrahedral)
- (iii) d^7 (high spin octahedral)
- (iv) d^6 (high spin octahedral).

UNIT—IV

4. (a) What are the factors affecting stability of complexes ? 6
- (b) Distinguish between outer sphere and inner sphere electron transfer reaction with suitable example. 5
- (c) What are Iso poly acids and hetero poly acids ? Explain with suitable examples. 6

OR

- (p) What is trans effect ? Discuss polarization theory of trans effect. 5
- (q) Explain the terms : 6
- (i) Stepwise stability constant and
- (ii) Overall stability constant.
- (r) Discuss ligand substitution reaction in six co-ordinated octahedral complexes. 5

UNIT—V

5. (a) Explain role of Na^+ , K^+ , Ca^{2+} and Mg^{2+} in biological system and toxicity. 6
- (b) What is nitrogen fixation ? Explain biological nitrogen fixation. 5
- (c) Explain with mechanism the role of $Co_2(CO)_8$ in hydroformylation of alkene. 5

OR

- (p) Discuss the role of myoglobin and haemoglobin in oxygen transport. 6
- (q) What is Wilkinson catalyst ? How it is useful in hydrogenation of alkene ? Explain with suitable mechanism. 5
- (r) Discuss the role of following metalloenzymes in biological system : 5
- (i) Cytochrome
- (ii) Ferridoxins.