AU–286

M.Sc. (Part—I) Semester—I (C.B.C.S. Scheme) Examination

PHARMACEUTICAL CHEMISTRY

(Inorganic Chemistry)

Paper—1SA1

Time : Three Hours] [Maximum Marks : 80

Note :— All questions are compulsory and carry equal marks.

UNIT—I

1. (a) Construct multiplication table for C_2V point group. 4

(b) Define with suitable example :

(i) Symmetry element

(ii) Symmetry operation. 4

(c) Calculate magnetic moment for :

(i) Sc^{2+}

(ii) Ti^{3+}

(iii) V^{2+}

(iv) Cr^{2+}. 4

(d) Explain which ion should exhibit larger magnetic moment–either Mn^{2+} or V^{2+}. 4

OR

(p) Construct multiplication table for C_3V point group. 4

(q) What are the symmetry elements present in :

(i) HCl

(ii) Cyclopropane ? 4

(r) Explain Cu^{2+} ions are coloured, paramagnetic while Zn^{2+} are colourless and diamagnetic. 4

(s) Explain why does Mn(II) ion show large magnetic moment amongst the divalent ions of first transition series elements. 4

UNIT—II

2. (a) Draw MO energy level diagram for O_2 molecule. 4

(b) Explain the shape of PCl_5 and SF_6 on the basis of hybridization. 4

(c) On the basis of VB theory explain why $[CoF_6]^{3-}$ is outer orbital while $[Co(NH_3)_6]^{3+}$ is inner orbital octahedral complex. 4

(d) Explain MO representation for tetrahedral complex. 4

OR

(p) Explain and draw MO representation for NO molecule. 4

(q) Explain MO representation for octahedral complexes. 4

(r) What are the postulates of valence bond theory ? 4

(s) Explain the structure of $[NiCl_4]^{2-}$ ion on the basis of valence bond theory. 4

UNIT—III

3. (a) What are postulates of crystal field theory ? 4

(b) Draw splitting of 'd' orbital for tetrahedral and octahedral complexes. 4

(c) What is CFSE ? Calculate CFSE for (i) d^1 (ii) d^2 (iii) d^4 in strong field octahedral complexes. 4

(d) Explain electronic spectra for d^1 complexes. 4

OR

(p) Explain electronic spectra for d^7 in octahedral field. 4

(q) Determine term symbol for (i) d^1s^1 (ii) d^7s^1. 4

(r) What are limitations of CFT ? 4

(s) Explain nephelauxetic effect with suitable example. 4

UNIT—IV

4. (a) Discuss photosubstitution reaction of Ruthenium complex. 5

(b) Discuss outer sphere mechanism in for following reaction :

$$[*Co(NH_3)_6]^{2+} + [Co(NH_3)_6]^{3+} \rightarrow [*Co(NH_3)_6]^{3+} + [Co(NH_3)_6]^{2+}$$ 5

(c) Predict product obtained in following reaction with explanation :

(i) $[PtCl_4]^{2-} \xrightarrow{NH_3} ? \xrightarrow{NH_3} ?$

(ii) $[Pt(NH_3)_4]^{2+} \xrightarrow{Cl^-} ? \xrightarrow{Cl^-} ?$ 6

OR

(p) Explain photochemical reaction in chromium complex. 5

(q) Explain the terms :

(i) Stepwise stability constant

(ii) Overall stability constant. 6

(r) Describe fluxionallity of π-allyl metal complexes. 5

UNIT—V

5. (a) What is photosynthesis ? What are electron transport system that are used in photosynthesis ? Explain. 6

(b) Explain the role of $[H\ Co(CO)_4]$ as catalyst in hydroformylation reaction. 5

(c) Explain molecular mechanism of ion transport across the membrane. 5

OR

(p) What are essential trace elements ? How do they work ? 5

(q) Explain the mechanism of $Na^+ - K^+$ pump. 5

(r) Discuss the structure of chlorophyll and explain the mechanism of photosynthesis. 6