Total Pages : 4

End Semester Examination of Semester–II, 2016
Subject : CHEMISTRY (PG)
Paper : CEMPG–202 (Inorg. Spl.)
Full Marks : 40
Time : 2 Hrs

The figures in the margin indicate the marks corresponding to the question

Candidates are requested to give their answers in their own word as far as practicable.

Illustrate the answers whenever necessary

Unit I

Answer **any one** of the following questions: 10X1=10

1. a) Determine the symmetry types of the genuine vibrations in furan by Cartesian coordinate method. Indentify the IR active and Raman active modes. 5

   b) $[V(H_2O)_6]^{3+}$ shows two d–d transitions at 17000 and 24000 cm^{-1} and third one is not observed. Assign the transitions. 3

   c) "$Ti(CP)_4$ is stereochemically nonrigid molecule." Explain from spectroscopic observation. 2

2. a) What are Fischcer and Shrock Carbenes? Give examples of each. 2

   b) Discuss the role of cerulloplasmin in the transport and storage of Cu. 5

c) What are the redox bioactive agents so far used in PS-I phase of photosynthesis? Which reaction is dominating in this phase? 3

Unit II

Answer **any one** of the following questions: 10X1=10

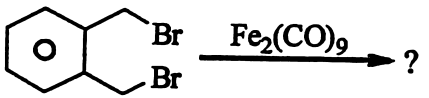
3. a) Construct the SALC formed by combining the 1s atomic orbitals of hydrogen atoms in NH_3 molecules using appropriate projection operator. Use character table of C_{3V} given below: 5

C_{3V}	E	$2C_3$	$3\sigma_v$
A_1	1	1	1
A_2	1	1	–1
E	2	–1	0

b) The observed magnetic moment of Co(III) tetrahedral complexes are higher than spin only value–explain. 2

c) Discuss the functions of PS-II in Photosynthetic activity. 3

4. a) Write the products : 3X2

i) 

ii) $RhCl_3.H_2O \xrightarrow[EtOH/Reflux]{C_2H_4} ?$

iii) $NiCl_2 + 2C_3H_5MgBr \xrightarrow[-10^0C]{Ether} ?$

b) Explain the probable transitions of $[Co(en)_3]^{3+}$ from Tanabe-Sugano diagrams. 4

Unit III

Answer **any one** of the following questions: 10X1=10

5. a) Discuss the structure and biological role of transferrin. 4

b) The slow neutrons cannot effect the nuclear fission in U^{238} but fast neutrons can do the task–Explain. 3

c) Give DCD model of bonding in $K[PtCl_3(C_2H_4)]$.

6. a) Give the principle and applications of this Layer Chromatography?

b) Decompose the direct product Ex Ex E in C_{3V} point group. Use character table of C_{3V} given below:

C_{3V}	E	$2C_3$	$3\sigma_v$
A_1	1	1	1
A_2	1	1	–1
E	2	–1	0

c) What is N_2-fixation? Why is N_2-fixation rare in vitro? 3

Unit IV

Answer **any one** of the following questions: 10X1=10

7. a) What is radioanalytical technique. Cite an example of its application in Analytical Chemistry. 3

   b) Draw MO diagram of $[Co(NH_3)_6]^{3+}$ and hence explain its magnetic property.

   c) Discuss the biofunctions of Ferritin. 4

8. a) Outline the mechanism of Fe-uptake and Fe-release by transferrin. 4

   b) Using PSEPT calculate TEC of the following compound and propose their structure. 2X2=4

      i) $Os_3(CO)_{12}$

      ii) $Ir_4(CO)_{12}$

   c) What are the characteristics features of the nuclear fission? 2