M. Sc. Chemistry Examination, 2018

(4th Semester)

Inorganic Chemistry Special

Paper - XV-I

Time : Two hours Full Marks : 50

(25 Marks for each Unit)

Use a separate answerscript for each unit.

UNIT – I - 4151

Answer question ***no. 1*** and ***any four*** from the rest :

1. Answer ***any five*** : 1×5

   a) Name one hydrolytic enzyme and mention its role.

   b) What is the role of Na^+–K^+–ATPase ? Write down relevant equation.

   c) Why does chlorophyll act as a surfactant in non aqueous medium.

   d) Write down the name of electron carriers in photosystem II.

   e) Draw structural representation of active site of 8Fe-8S Ferredoxin.

   f) Draw Collman's picket fence model.

   g) Give an example of the biominaralisation process.

2. a) Draw the structure of plastocyanin.

   b) Discuss its absorption spectral pattern and structural changes during electron transport.

   c) Describe mode of oxygen binding in hemerythrin. 1+2+2

3. a) Draw the active site structure of Cu, Zn-Superoxide Dismutase.

   b) Mention the role of copper and zinc ion in superoxide dismutase.

   c) Discuss its mechanism of action. Why is it called ping-pong mechanism ? 1+1+3

4. a) Draw the active site structure of Cytochrome oxidase.

   b) Discuss magnetism and EPR spectral pattern of the active site of cytochrome c oxidase at different oxidations. 1+(2+2)

5. a) Explain structural pattern of ferritin.

   b) Discuss synergistic effect of carbonate ion in transferrin.

   $2\frac{1}{2}+2\frac{1}{2}$

6. a) Draw three conformations of DNA double helix and mention four characteristics.

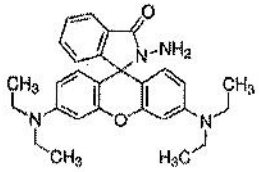
   b) Cis-platin is widely used in cancer treatment-explain. 3+2

7. a) What do you mean by tense form and relax form of hemoglobin.

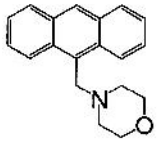
   b) Upon irradiation of light to acidified (0.1N H_2SO_4) solution of Mohr's salt and Methylene blue (MB), colour bleaches while colour reappears when it is placed in dark. Explain with MO approach. $2\frac{1}{2}+2\frac{1}{2}$

14. Explain the following properties (a) the molecule (i) is a chemosensor to H_2O_2 catalysed by Fe(III); (b) the molecule (ii) is a H^+ senson; (c) the molecule (iii) is a sensor for HPO_4^{2-}.

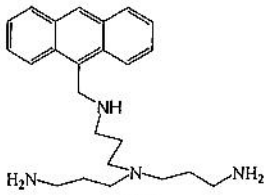
2+1+2



(i)



(ii)



(iii)

b) Discuss effect of 2, 3- bisphospoglycerate on oxygen affinity of hemoglobin.

c) Mention the main criteria for model hemoglobin. 1+3+1

UNIT – I- 4152

Answer Question ***8*** and ***any four*** from the rest.

8. Explain the following : 1×5=5

a) Pyridine is weakly emissive and becomes nonfluorescent on acidification.

b) Very dilute solution of phenol is emissive while concentrate solution is nonemissive.

c) Phenolphthalein is a nonfluorophore but Fluorescein is Fluorescence active although the functional groups are the same.

d) $Eu(acac)_3$ (acac=acetylacetonato) is emissive although Eu (III) is $4f^6$ and paramagnetic.

e) Emmissivity of Coumarin>Naphthalene>Vitamin A although all have five conjugated double bonds.

9. a) What are the possible ways of nonradiative decay of an optically excited molecule ? Briefly describe the mechanism of radiative and nonradiative processes. 5

10. a) Why does pyrene solution show longer wavelength emission at higher concentration ? Design some pyrene appended molecules to accomplish this property for analytical applications.

b) Write a short note on delayed Fluorescence. 3+2

11. a) In a metal complex the metal dominated excited state (M_1) lies in between S_1 and T_1 energy levels and also a metal dominated orbital (M_0) appears closer to S_0 state. Draw the state diagram and comment on the emission spectral feature.

b) Describe the mechanism of Quenching. 3+2

12. What happens when (give chemical reactions)

a) Aqueous solution of $[Cr(NH_3)_6]Cl_3$ is irradiated with UV light. 1

b) Acidified (0.1N H_2SO_4) solution of $K_3[Fe(C_2O_4)_3]$ is exposed in day light. 1

c) Mixture of $K_4[Fe(CN)_6]$ and 2, 2′-bipyridine in aqueous medium is exposed to UV light. 1

d) $[Ru(bpy)_3](PF_6)_2$ in dry MeCN solution is electrochemically reduced (at –1.5V) and ammonium perdisulfate is added. 2

13. a) "Ethidium bromide is nonfluorescent while in DNA environment emission is enhanced." Explain.