12. What happens when (give reasons) $1\times2+1\frac{1}{2}\times2=5$

a) i) Azobenzene is irradiated with UV light for few minutes followed by irradiation with visible light.

ii) 4-N, N-Dimethylbenzonitrile in hexane and in tetrahydrofuran is irradiated with UV light. Draw the corresponding emission spectra.

b) i) $[Ru(bpy)_3](PF_6)_2$ in dry MeCN solution is electrochemically oxidized and sodium oxalate is added. Explain your observation. (Given : Ground state redox potential E^0 ($[Ru(bpy)_3]^{3+}$/ $[Ru(bpy)_3]^{2+}$)=1.26 V ; E^o (CO_2/Oxalate) = –0.49 V).

ii) "Addition of acidified (dil H_2SO_4 sol.) Mohr's salt solution to Methylene Blue (MB) in aqueous medium followed by visible light irradiation causes decolorisation of blue solution and keeping at dark restores the blue colour." – Explain this observation.

13. a) Write a note on Chemosensor (give at least two examples)

b) X-Ray fluorescence spectroscopy and its application. 2+3=5

M. Sc. Chemistry Examination, 2017

(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) What is hemocyanin ? Mention its role in biology.

b) Name three types of ferredoxins.

c) What is the role of calmodulin ?

d) What are the basic criteria for the synthesis of model systems for hemoglobin ?

e) What is the role of catalase and peroxidase in biological system ?

f) Draw a peptide or protein chain and mention its aminopeptidase and carboxypeptidase end.

g) What is antenna chlorophyll ?

h) Mention the basic differences between porphyrin ring system of hemoglobin and chlorin ring system of chlorophyll.

2. a) Describe the active site structure and briefly discuss the mechanism of action of Ascorbic Acid Oxidase (AAO).

b) Justify the colour of AAO in oxidized form.

c) Mention the basic differences between porphyrin ring system of hemoglobin and corrin ring system of $VitB_{12}$.

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

3. a) Describe the active site structure of peroxidase.

b) Discuss the mechanism of the formation of most active intermediate, 'Compound I' form of peroxidase.

c) Describe the active site structure of carboxypeptidase.

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

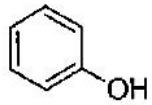
4. a) Show that some tartarato-crown-ether transport monovalent ion at low pH and bivalent ion at higher pH.

b) Why Mg^{2+} is unique in chlorin ring system of chlorophyll ?

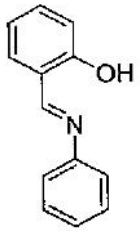
c) Discuss the role of polynuclear Mn(II) protein complex during photosynthesis. $1\frac{1}{2}+2+1\frac{1}{2}$

5. Present a brief account on rubredoxin and ceruloplasmin.

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



(a)



(b)

e) Pyrene and Eosin show abnormal excited state property. Explain.

9. Draw Jablonski diagram and define the meaning of the states. Account on the origin radiative and nonradiative processes. Why absorption energy is higher than fluorescence emission energy ? 2+2+1=5

10. a) Explain the emission characteristics of the molecules (i) with increasing conjugation (*viz.* benzene to naphthalene to anthracene), (ii) substituting electron donating and withdrawing groups and (iii) generating paramagnetic centres.

b) Write notes on Analytical application of Fluorescence technique. 3+2=5

11. $M + h\nu_i \rightarrow M^*$; $M^* \rightarrow M + h\nu_f$; $M^* + Q \rightarrow M + Q + \text{heat}$

From the above scheme derive Stern-Volmer relation and explain K_{SV}. Give plausible mechanism of quenching. What are the factors that influence the quenching process ?

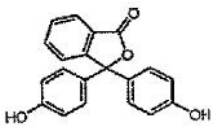
$2+1\frac{1}{2}+1\frac{1}{2}=5$

UNIT – I- 4152

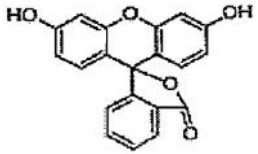
Question ***8*** is compulsory and attempt ***three*** from the rest.

8. Attempt the following questions : 2×5=10

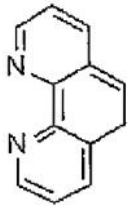
a) What are the emission status of (a) and (b) ; (c) and (d) under identical condition in solution ? Explain your answer.



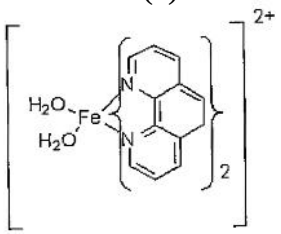
(a)



(b)



(c)



(d)

b) "Photodecomposition sometimes observed at lower energy than that of chemical dissociation energy." Explain with quantum mechanical reasons.

c) Naphthalene is 5 times more fluorescent that Vit A while coumarin is the brightest although all they have five conjugated double bonds. Account this observation.

d) Explain excited state acidity of (a) PhOH and

(b) Ph-N=CH-C_6H_4(OH)

6. Draw a quantitative relationship which proves that cooperativity helps release of oxygen by hemoglobin. 5

7. What are different types of copper proteins ? Explain with one example of each type. 5