

**M.Sc. CHEMISTRY**  
**FOURTH SEMESTER**  
**INORGANIC CHEMISTRY-IV**  
**(BIOINORGANIC CHEMISTRY & PHOTOCHEMISTRY)**  
**MSC-402 B**

(Use separate answer scripts for Objective & Descriptive)

Duration : 3 hrs.

Full Marks : 70

( **PART-A : Objective** )

Time : 20 min.

Marks : 20

*Choose the correct answer from the following:*

*1x20=20*

1. First law of photochemistry is also known as:  
a. Beer-Lambert law  
b. Stark-Einstein law  
c. Grothus-Draper law  
d. Warburg-Bodenstein law
2. Quality and quantity of photoluminescence is characteristic of the:  
a. Temperature  
b. Molecular vibrations  
c. Absorbing medium  
d. Irradiation of photons
3. Which of the following transition is sharp-?  
a. Fluorescence  
b. d-d transition  
c. CTLM  
d. None of these
4. Which type of transition arises within ligand energy levels?  
a. d- $\pi^*$   
b.  $\pi$ - $\pi$   
c. LMCT  
d.  $\pi$ ,  $\pi^*$
5.  $[\text{Co}(\text{CN})_5(\text{NO})]^{3-} + \text{CN}^- \xrightarrow{h\nu} [\text{Co}(\text{CN}^*)_5(\text{NO})]^{3-} + \text{CN}^-$  is an example of:  
a. Linkage photoisomerization  
b. Photoexchange process  
c. Racemization  
d. Ligand rearrangement
6. A well known naturally occurring organometallic compound is:  
a. Vit B12 co-enzyme  
b. Chlorophyll  
c. Cytochrome P450  
d. Myoglobin
7. What is not true about ferredoxins?  
a. Involved in oxidation of  $\text{NH}_3$   
b. Generate  $\text{H}_2$  from acid solution  
c. Reduction potential is from 0 to 0.5  
d. It is Fe-S protein
8. Nitrogenase enzyme contains:  
a. Fe-S protein  
b. Mo-Fe-S protein  
c. Both (a) and (b)  
d. None of these
9. Carboxypeptidase contains:  
a. Fe  
b. Mn  
c. Zn  
d. Cu
10. In biological system, the metal ions involved in electron transport are:  
a.  $\text{Na}^+$  and  $\text{K}^+$   
b.  $\text{Zn}^{2+}$  and  $\text{Mg}^{2+}$   
c.  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$   
d.  $\text{Cu}^{2+}$  and  $\text{Fe}^{2+}$

11. Cytochrome act as:  
 a. Two electron transfer agent  
 b. One electron transfer agent  
 c. Multielectron transfer agent  
 d. None of the above
12. Ferritin and transferrin are:  
 a. Hydrolases  
 b. Metal storage and structural protein  
 c. Electron carriers  
 d. Metal sensors
13. Which of the following metal is involved in Wilson's disease?  
 a. Cu  
 b. Mn  
 c. Zn  
 d. Co
14. The preferred binding site of cisplatin:  
 a. N-7 position of guanine  
 b. N-7 position of cytosine  
 c. Both (a) and (b)  
 d. None of these
15. Which of the following metal atom used as antiarthritic drug?  
 a. Co  
 b. Au  
 c. Zn  
 d. Mn
16. The oxidation state of iron in siderophores:  
 a. +2  
 b. +1  
 c. +3  
 d. +4
17. Vitamin B12 is:  
 a. Electron transport  
 b. Oxygen transport  
 c. Iron storage  
 d. Organometallic enzyme
18. Nitrogenase contains:  
 a. Zn, Fe  
 b. Mg, Fe  
 c. Fe, Zn  
 d. Fe, Cu
19. Which of the following metal atom is used for the treatment of gastritis?  
 a. Bi  
 b. Ni  
 c. Co  
 d. Mn
20. When reduced cytochrome transfers an electron from its Fe(II) to the bound O<sub>2</sub>:  
 a. Bond order of O<sub>2</sub> reduced by one and  $\nu_{O_2}$  decreases.  
 b. A metal bound superoxide is formed and  $\nu_{O_2}$  decreases.  
 c. A metal bound superoxide is formed and  $\nu_{O_2}$  increases.  
 d. None of these.

( PART-B : Descriptive )

Time : 2 hrs. 40 min.

Marks : 50

[ Answer question no.1 & any four (4) from the rest ]

1. a. Briefly state all the transitions in transition metal complexes. 3+5+2=10  
 b. Write the general remarks for the toxicity of metal ions.  
 c. What are the roles of cis-platin?
2. a. Discuss photoredox reactions with reference to first row transition metal complexes. 5+5=10  
 b. Explain the photosensitization chemistry in photosynthesis.
3. a. Discuss all the laws of photochemistry. 6+4=10  
 b. Explain the principles of Fluorescence and Phosphorescence.
4. Write short notes on the following: 5x2=10  
 i. Siderophores  
 ii. Ionophores
5. Explain the absorption, transport and metabolic function of vitamin B<sub>12</sub>. 10
6. Write the mechanism with examples of the following: 5+5=10  
 i. Carboxypeptidase  
 ii. Carbonic anhydrase
7. What is called Antiarthritic drug? Explain gold and copper in its complexes. 2+4+4=10
8. a. What are the classifications of cytochromes? Explain. 5+5=10  
 b. Explain Iron- Sulphur protein with examples.

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