

Code No. : 5423

Sub. Code : ZCHM 42

M.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2024.

Fourth Semester

Chemistry — Core

BIOINORGANIC, SPECTRAL METHODS – II AND
PHOTOCHEMISTRY

(For those who joined in July 2021–2022)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

- What is the biological role of Haemoglobin and myoglobin?
 - Iron storage
 - Electron transfer
 - Enzyme action
 - Oxygen transport

- The electrons which contribute to isomer shift in Moss Bauer spectroscopy are
 - S – electrons
 - p – electrons
 - d – electrons
 - f – electrons

- The number of EPR lines expected for a metal ion with 3 unpaired electrons and a nuclear spin I of $\frac{7}{2}$ is
 - 24
 - 8
 - 32
 - 36

- Among the following the NMR inactive nucleus is _____
 - N_7^{14}
 - P_{15}^{31}
 - Mg_{12}^{24}
 - Si_{14}^{29}

- The wavelength of ultraviolet and visible regions of electromagnetic spectrum is _____
 - Less than 2000 Å
 - More than 8000 Å
 - 2000 to 8000 Å
 - None of these

- Spin multiplicity value for triplet state is _____
 - 1
 - 2
 - 0
 - 3

- Carboxy peptidase contains
 - Zn (II) and hydrolysis CO_2
 - Zn (II) and hydrolysis peptide bonds
 - Mg (II) and hydrolysis CO_2
 - Mg (II) and hydrolysis peptide bonds

- Plastocyanin is a _____ containing protein
 - Cu
 - Zn
 - Mg
 - Fe

- _____ is the electron carrier of cytochromes
 - Cu
 - Zn
 - Mg
 - Fe

- The Moss Bauer spectrum of $K_3[Fe(CN)_6]$ consists of _____
 - Only one doublet
 - Single sharp peak
 - Two peaks
 - Broad resonance line

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

- Write short notes on metallo enzymes

Or

 - Write down the important structural features of vitamin B_{12}
- Explain the mechanism of action of ascorbic oxidase.

Or

 - Write short notes on metal complexes as probes of nucleic acids.
- Write short notes on Quadrapole splitting.

Or

 - Write down the basic principle of Moss bauer spectroscopy.

14. (a) Explain the ^{31}P nmr spectra of P_4S_3 .

Or

- (b) Predict and explain the number of signals and multiplicity of the EPR spectra of the compound Bis (Salicylaldimine) Copper II complex.

15. (a) Explain the photochemistry of Co II complexes with suitable example.

Or

- (b) Explain the photochemical properties of $[\text{Ru}(\text{bpy})_3]^{2+}$ complex.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) List and explain the functions of nonmetals in the biological system.

Or

- (b) Discuss in detail about the structural features of Haemoglobin.

Page 5

Code No. : 5423

17. (a) Discuss the mechanism of action of metal complexes as anticancer agents. With suitable examples.

Or

- (b) Write short notes on the following :

- (i) Blue copper proteins.
(ii) Carbonic anhydrase and superoxide dismutase.

18. (a) Explain the Mossbauer spectrum of the following compounds

- (i) $\text{Fe}_3(\text{Co})_{12}$
(ii) $\text{Fe}(\text{Co})_5$

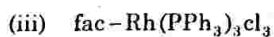
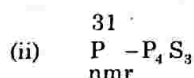
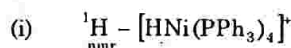
Or

- (b) Discuss the applications of MB spectra to study Tin compounds.

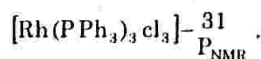
Page 6

Code No. : 5423

19. (a) Discuss the number of signals and multiplicity of the ^1H and ^{31}P NMR spectra of following compounds.

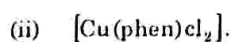
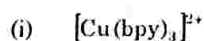


- (iv) Meridional isomer of



Or

- (b) Explain the number of signals in the EPR spectra of the following compounds.



20. (a) Discuss the applications of photochemistry.

Or

- (b) Explain the photochemistry of Cr III complexes with suitable example.

Page 7

Code No. : 5423