

(6 pages)

Reg. No. :

Code No. : 5060 Sub. Code : ZCHM 42

M.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Chemistry – Core

BIO INORGANIC, SPECTRAL METHODS II AND
PHOTOCHEMISTRY

(For those who joined in July 2021–2022 only)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. What is the biological role of myoglobin?
(a) Oxygen transport
(b) Electron transport
(c) Iron transport
(d) Iron storage

2. Vitamin B₁₂ the cobalt in it exists as _____.
(a) Co II (b) Co I
(c) Co IV (d) Co III
3. Azurin is _____ containing protein.
(a) Zn (b) Cu
(c) Fe (d) Mg
4. Super oxide dismutase contains
(a) Zn II and Ni II (b) Cu II and Fe II
(c) Ni II and Co II (d) Cu II and Zn II
5. Mossbauer and NQR spectra are observed in _____.
(a) The gaseous state
(b) Solid state
(c) Liquid state
(d) None of the above
6. The Mossbauer spectrum of [Fe(CN)₆]⁴⁻ shows a _____ resonance absorption.
(a) Single (b) Pair
(c) 3 (d) 4

Page 2 Code No. : 5060

7. ^{31}P NMR of H_3PO_3 is reported to be _____.
- (a) Singlet (b) Multilet
(c) Doublet (d) All the above
8. ^1H NMR spectra of $[\text{HNi}(\text{PPh}_3)_4]^+$ complete gives _____
- (a) 3 (b) 4
(c) 5 (d) 6
9. Which region of light radiations of the visible ultraviolet lying between - wave length are chiefly concerned in bringing about photochemical reactions?
- (a) 1000A° and 2000A°
(b) 1500A° and 1000A°
(c) 8000A° and 2000A°
(d) 19000A° and 12000A°
10. In photochemical reactions the absorption of light takes place in?
- (a) Primary process only
(b) Secondary process only
(c) Either primary or secondary process
(d) Both primary or secondary process

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write short notes on Ferredoxin and rubredoxins.
Or
(b) Write short notes on Siderophores.
12. (a) Write a short notes on the following.
(i) Plastocyanin
(ii) Azurin
Or
(b) Explain the mechanism of action of ascorbic oxidase.
13. (a) Low and High Spin Complexes can be distinguished by Mossbauer Spectroscopy; Explain this statement.
Or
(b) Write a short notes on Isomer shift.
14. (a) Predict and explain the number of signals in the EPR Spectra of the following compounds.
(i) $[\text{Cu}(\text{bpy})_3]^{2+}$
(ii) $[\text{Cu}(\text{Phen})\text{Cl}_2]$
Or
(b) Explain the ^{31}P NMR Spectra of P_4S_3 .

15. (a) Write notes on photochemistry of Co(III) complexes.

Or

- (b) Write a note on photochemistry of photo isomerisation and substitutional processes.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b)
Each answer should not exceed 600 words.

16. (a) Draw the structure of Chlorophyll and explain its role in photosynthesis.

Or

- (b) List and explain the functions of toxicity and deficiency of any five trace elements.

17. (a) Write a short note on the following :

- (i) Anticancer agents
(ii) Antiarthritic agents

Or

- (b) Write a note on the following Carbonic anhydrase and superoxide dismutase.

18. (a) Explain the account on spin state cross over determination.

Or

- (b) Discuss in detail about the applications of Mossbauer spectroscopy to study the Iron compounds.

19. (a) Write briefly about Zero field splitting and Kramer's degeneracy.

Or

- (b) Explain the NMR spectra of following compounds

- (i) TlF_4 (ii) PF_5

20. (a) Discuss the photochemical conversion and storage of Solar energy.

Or

- (b) Discuss the photophysical and photochemical properties of $[Cr(bpy)_3]^{3+}$ Complex.