

(FOR THE CANDIDATES ADMITTED
DURING THE ACADEMIC YEAR 2024 ONLY)

SUB CODE **22UCY507**

REG.NO. :

N.G.M. COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS: NOV-2024

B.Sc CHEMISTRY

MAXIMUM MARKS: 50

SEMESTER V

TIME: 3 HOURS

PART - III

22UCY507– COORDINATION AND BIOINORGANIC CHEMISTRY

SECTION – A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS

(K1)

1. Which of the following is a chelating ligand?
A) H₂O B) Cl⁻ C) EDTA D) CN⁻
2. Electronic interpretation of coordination compounds is based on which concept?
A) Covalent Bonding B) Ionic Bonding C) Coordinate Covalent Bonding D) Metallic Bonding
3. Which factor primarily affects crystal field splitting in a coordination complex?
A) Temperature B) Type of ligand C) Type of metal ion D) Both b and c
4. Which ligand is used in the quantitative analysis of nickel?
A) EDTA B) DMG C) Ammonia D) Thiocyanate
5. What is the role of the sodium-potassium ion pump in cells?
A) To produce ATP B) To maintain cell shape C) To regulate ion balance D) To store energy

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. Give an example of a double salt
7. What are high-spin and low-spin complexes?
8. Define crystal field stabilization energy (CFSE)
9. How does the nature of a ligand affect the stability of a complex?
10. What is the 18-electron rule in organometallic chemistry?

SECTION – B

(5 X 3 = 15 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS (K3)

11. a) Distinguish between double salts and complex compounds
(OR)
b) Outline the chelate effect influence the stability of coordination complexes
12. a) Examine the concept of Crystal Field Splitting in Octahedral Complexes
(OR)
b) Summarize the Valence Bond Theory in explaining coordination compounds.

(CONTD 2)

13. a) Explain Jahn-Teller Distortion and provide an example
(OR)
b) Categorizes the origin of color in transition metal complexes
14. a) Compare SN1 and SN2 mechanisms in ligand substitution reactions
(OR)
b) List the use of DMG in the determination of nickel
15. a) Infer the structure and function of sodium-potassium ion pump
(OR)
b) List the importance of metalloenzymes in biological systems

SECTION – C**(5 X 5 = 25 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K4 (Or) K5)**

16. a) Examine the factors affecting the stability of chelate complexes and their applications
(OR)
b) Interpret the geometrical isomerism in Octahedral complexes
17. a) Inspect the crystal field splitting of octahedral and tetrahedral complexes
(OR)
b) Distinguish between outer orbital and inner orbital complexes with examples
18. a) Analyze the calculation of crystal field stabilization energy (CFSE) and its uses in understanding transition metal complexes
(OR)
b) Relationship between the color of transition metal complexes and their crystal field splitting energy. Provide an example
19. a) Inspect the factors affecting the stability of coordination complexes and how stability constants are determined using Job's method
(OR)
b) Explain the trans effect and its application in synthesis
20. a) Discuss the biological roles of hemoglobin and myoglobin and how their structures are related to their functions
(OR)
b) Explain the synthesis and structure of metal carbonyls such as Ni (CO)₄, Fe (CO)₅ and Fe₂(CO)₉
