Reg. No……. Name……

BA, B SC, BCOM DEGREE END SEMESTER EXAMINATION – OCTOBER 2025

UGP (HONS.) SEMESTER - 3: DISCIPLINE SPECIFIC COURSE

COURSE: 24UCHEDSC201 – INORGANIC CHEMISTRY - I

(For Regular 2024 Admission)

Time: 1.5 Hours Max. Marks: 50

PART A (One Word Questions)

Answer all questions. Each question carries 1 Mark)

1. What is inorganic benzene? Draw the structure (R CO 1)
2. What are interhalogen compounds? Give an example (U CO 1)
3. What is the meaning of a Hermitian operator? (U CO2)
4. Define the terms eigenvalue and eigenfunction. (U CO2)
5. Discuss the term resolution and elution in chromatography (U CO 3)
6. Describe the principle of adsorption chromatography (U CO 3)
7. Among TLC, column chromatography and GPC which one will be more suitable for separation of polymers? Justify the answer. (U CO3)
8. In a TLC experiment, the solvent front and one component spot moves 5.8 cm and 3.6 cm respectively from the baseline, calculate the *Rf* value of the component (U CO 3)

(1 x 8 = 8)

PART B (Short Answer Questions)

Answer any five questions. Each question carries 3 Marks

9. What is macrocyclic effect? Illustrate with example. (U CO1)
10. What are cryptands? How do they differ structurally from crown ethers? (U CO1)
11. Explain orthogonality of wave functions with an example. (A CO2)
12. Explain the quantum mechanical postulate regarding the probability interpretation of ψ (U CO2)
13. Discuss the components of a gel permeation chromatography. (U CO3)
14. What do you mean by paper chromatography. Discuss its applications. (U CO 3)
15. Discuss how temperature programming affects GC separations. (U CO3)
16. What are the factors that influence elution of different fractions from a column chromatography. (U CO3)

(3 x 5 = 15)

PART C

Short Essay Questions

Answer any two questions. Each question carries 6 Marks

17. Write a detailed note on the oxoacids of halogens. (U CO1)

18. Derive the allowed energy levels for a particle in a one-dimensional box. (R CO2)

19. A mixture contains three components A, B and C. The affinity of A towards the mobile phase is the highest, followed by C and then B. In which order the three components will come out of the column. Explain your answer. (U CO3)

20. What are the components of a typical TLC system? How is the stationary phase in TLC different from that in paper chromatography? (U CO3)

(6 x 2 = 12)

PART D

Long Essay Questions

Answer any one question. Each question carries 15 Marks

21. Compare the structure, bonding and chemical reactions of boranes such as B_2H_6, B_4H_{10}, B_5H_9 with a typical *closo*-carborane $C_2B_{10}H_{12}$. (U CO1)

22. i. What is a well-behaved wave function? State its mathematical conditions. (U CO3)

    ii. State Hund's rule of maximum multiplicity. Use this to explain the magnetic behavior of Cr^{2+}. (U CO3)

    iii. What are spherical coordinates, and how they are related to cartesian coordinates? If a point in space has Cartesian coordinates $(x, y, z) = (2, -2, 1)$, find its spherical polar coordinates. (U CO3)

(15 x 1 = 15)