25U119 (Pages: 2) Name : .....

Reg. No : .....

FIRST SEMESTER UG DEGREE EXAMINATION, NOVEMBER 2025

(FYUGP)

(Regular/Supplementary/Improvement)

CC24UCHE1MN101 - BASIC INORGANIC AND NANOCHEMISTRY

(Chemistry - Minor Course)

(2024 Admission onwards)

Time: 2.0 Hours Maximum: 70 Marks

Credit: 4

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 3 marks.

1. Discuss the time-independent Schrödinger wave equation. Define each term in the equation. [Level:2] [CO1]
2. Using Hund's Rule, explain the electronic configuration of the nitrogen atom (Z=7). [Level:2] [CO1]
3. Explain the spin quantum number and its significance in describing the spin of an electron in an orbital. [Level:2] [CO1]
4. Explain how electron pair repulsions influences the shape of molecule. Give an example. [Level:2] [CO2]
5. Explain why noble gases have very low electron affinities compared to other elements. [Level:2] [CO3]
6. Describe molecular mass? Calculate the molecular mass of water (H_2O). [Level:2] [CO4]
7. Briefly describe the procedure for performing a titration using the double burette method. [Level:2] [CO4]
8. Describe a redox titration with example. [Level:2] [CO4]
9. Explain 2D nanomaterials and give an example. [Level:2] [CO5]
10. Explain any three use of nanomaterials in the field of science. [Level:2] [CO5]

(Ceiling: 24 Marks)

Part B (Paragraph questions/Problem)

Answer ***all*** questions. Each question carries 6 marks.

11. For the molecular ion O^{2-} describe its electronic configuration and calculate the bond order. How does this ion's bond order compare to that of neutral O_2? [Level:2] [CO2]

12. Describe Valence Bond Theory, and how does it explain the formation of covalent bonds? Provide a brief overview of its key principles. [Level:2] [CO2]

13. Discuss the merits and demerits of the Bohr model of the atom. [Level:2] [CO1]

14. Discuss the significance of groups in the periodic table? Explain why elements in the same group have similar chemical properties. [Level:2] [CO3]

15. Explain how solubility rules are applied to selectively precipitate cations and provide an example to illustrate your explanation. [Level:2] [CO4]

16. Explain molality and how it differs from molarity. Calculate the molality of a solution containing 5 moles of solute in 2 kg of solvent. [Level:2] [CO4]

17. Describe carbon nanotubes (CNTs) and explain their significance in nanotechnology. [Level:2] [CO5]

18. Explain how laser ablation differ from electric arc discharge in terms of the synthesis process for carbon nanotubes. [Level:2] [CO5]

(Ceiling: 36 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

19. Discuss the concept of lattice energy in ionic compounds. Explain Born-Haber cyle using Sodium Chloride (NaCl). [Level:2] [CO2]

20. Describe accuracy and precision in the context of analytical measurements. Explain their importance in ensuring the reliability of scientific data. [Level:2] [CO4]

(1 × 10 = 10 Marks)

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