

B. Sc. DEGREE END SEMESTER EXAMINATION – JULY 2021
SEMESTER – 2: CHEMISTRY (CORE COURSE)
COURSE: 15U2CRCHE2, THEORETICAL AND INORGANIC CHEMISTRY - II
(Common for supplementary 2018/2017/2016/2015 admissions)

Time: Three Hours

Max. Marks: 60

SECTION A

Answer all questions. Each question carries 1 mark

1. In the halogen family has the highest electron affinity.
2. What is ionization enthalpy?
3. The most polar molecule among HI, HCl, HBr and HF is -----
4. The bond order of He₂ molecule is
5. In the gravimetric estimation of iron, it is precipitated as
6. The state of hybridisation of S in SF₆ is
7. What is NP ratio?
8. If 2 g of a radioisotope decays to 1g in 7 days , 1g of the sample will become 0.25g in -----days (1 x 8 = 8)

SECTION B

Answer any six questions, each question carries 2 marks

9. Distinguish between the terms 'atomic radius' and 'covalent radius'.
10. Give the Born-Landé equation and explain the terms involved.
11. Which has higher boiling point, o-nitro phenol or p-nitrophenol? Explain the reason.
12. Differentiate between 'bonding' and antibonding' molecular orbitals.
13. What are dipole-induced dipole forces?
14. State and explain Gieger - Nuttal Rule
15. Explain packing fraction.
16. Define 'R_f value'. How is it useful in identification of a compound? (2 x 6 = 12)

SECTION C

Answer any four questions, each question carries 5 marks

17. Discuss the applications of solubility product in the separation of cations into analytical groups.
18. Based on MO theory predict which of the following are paramagnetic
a) He₂⁺ b) NO c) NO⁺ d) N₂⁺ e) B₂⁺ f) B₂⁻
19. Discuss sp² and sp³d hybridisations with suitable examples.
20. Explain briefly the construction of MO's by LCAO treatment of the H₂⁺ ion.

21. State the Slater rules for calculating the shielding constant. How is the effective nuclear charge related to screening constant?
22. Explain the basic principle of TLC? What are the advantages and disadvantages of TLC?

(5 x 4 = 20)

SECTION D

Answer any Two questions. Each question carries 10 marks

23. Predict the shape and bond angles of the following molecule based on VSEPR theory.
- a) SF₄ b) ClF₃ c) XeF₂ d) IF₅ e) Xe F₄
24. a) State and explain Fajan's rules
b) Explain the valence bond theory and Band theory of metallic bonding.
25. a) Explain Born-Haber cycle taking NaCl as example.
b) The enthalpy of formation of NaCl, enthalpy of sublimation of Na, ionization of Na, first ionization energy of Cl₂ and electron affinity of chlorine are respectively – 410, 109, 495, 240 and -349 kJmol⁻¹. Calculate the lattice energy of sodium chloride using Born-Haber Cycle.
26. Explain in detail the Principle and Procedure for the gravimetric estimation of Barium as BaSO₄
- (10 x 2 = 20)
