SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
B.Sc.PBPBT - END SEMESTER EXAMINATIONS - APRIL 2025
SEMESTER -
20UPBAT3003 - Allied Chemistry - I

Total Duration : 2 Hrs.30 Mins. Total Marks : 60

Section B

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Explain the concept of bonding, anti-bonding, and non-bonding molecular orbitals with suitable examples.
2. Determine the molecular orbital configuration and bond order of the O_2 molecule.
3. Explain the electrolytic refining process of metals with a labeled diagram. Illustrate with a suitable example.
4. Distinguish Van Arkel and Zone refining methods in terms of principle, process, and types of metals purified by each.
5. Differentiate intensive and extensive properties with suitable examples. How do these properties help in understanding the behavior of thermodynamic systems?
6. Analyze the differences between reversible and irreversible processes in thermodynamics. Why are reversible processes considered ideal, and how do they relate to maximum work done?
7. Describe the principle and procedure of paper chromatography. How can this technique be used to separate and identify components in a mixture of amino acids?
8. Evaluate the hybridization and molecular geometry of CH_4, C_2H_4, and C_2H_2 based on orbital overlap theory.

Section C

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Discuss the preparation, hybridization, geometry, and chemical properties of BrF_3 and IF_5.
10. Analyze the role of carbon content and heat treatment in determining the mechanical properties of steel. How do different heat treatments (annealing, quenching, tempering) alter the structure and performance of steel?

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11. Discuss Carnot's cycle, derive the expression for the efficiency of a heat engine, and explain the role of entropy in determining the direction of spontaneous processes.
12. Distinguish column chromatography, paper chromatography, and thin layer chromatography (TLC) based on their principles, techniques, stationary and mobile phases, and applications. Discuss the advantages and limitations of each method.
13. Analyze the concept of optical and geometrical isomerism using lactic acid, maleic acid, and fumaric acid as examples. Discuss the cause of optical activity, the process of racemization and resolution, and evaluate the structural factors that contribute to the existence of these isomers.

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