| PRN: | | Course Code : | U21PC101 |
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First Year **B. Sc.** (Sem-I) Semester End Examination Winter 2024

# Chemistry-I

000615

Day and Date: Wed - 4 DEC 2024 Max Marks: **50**

Time : 10:30AM To 12:30PM Duration: **02** hrs

**Instructions:**

i) All questions are compulsory.
ii) Use of log table and scientific calculator is allowed.
iii) Draw neat and systematic diagrams where ever necessary.

| | | | Marks | Bloom's Level | CO |
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| Q.1 | | **Attempt the following** | **10** | | |
| | a) | Write de Broglie's equation of dual nature of matter and radiation. | 02 | L1 | CO1 |
| | b) | Define lattice energy and polarizing power. | 02 | L1 | CO2 |
| | c) | Draw molecular orbital diagram of $He_2$ molecule. | 02 | L3 | CO2 |
| | d) | Give characteristic properties of transition elements. | 02 | L1 | CO3 |
| | e) | Define coordination number and ligand. | 02 | L1 | CO3 |
| Q.2 | | **Attempt any two from the following** | **10** | | |
| | a) | Explain de Broglie's hypothesis of dual nature of matter and radiation with significance. | 05 | L2 | CO1 |
| | b) | State and explain Bohr's theory with their limitations. | 05 | L1 | CO1 |
| | c) | What is standard solution? Compare primary standard substances and secondary standard substances with suitable examples. | 05 | L4 | CO1 |
| Q.3 | | **Attempt any two from the following** | **10** | | |
| | a) | Discuss the Born-Haber cycle for calculating the lattice energy of sodium chloride. | 05 | L2 | CO2 |
| | b) | Define the following terms<br>i) Polarizing power<br>ii) Polarizability<br>iii) Lattice energy | 05 | L1 | CO2 |
| | c) | Illustrate the characteristics of ionic compounds. | 05 | L2 | CO2 |

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| Q.4 | **Attempt any two from the following** | **10** | | |
| a) | Discuss the hybridization, geometry and shape of the following molecules.<br>i) $PF_5$<br>ii) $SiCl_4$ | 05 | L3 | CO2 |
| b) | Draw the MO diagram for $O_2$ molecule and calculate their bond order. | 05 | L3 | CO2 |
| c) | Explain in detail crystal field splitting of d-orbitals in case of octahedral complexes with example. | 05 | L2 | CO3 |
| Q.5 | **Attempt any two from the following** | **10** | | |
| a) | Write the electronic configuration of Lanthanides. | 05 | L1 | CO3 |
| b) | Illustrate the catalytic properties of transition elements. | 05 | L2 | CO3 |
| c) | Calculate the hybridization, magnetic moment and spin multiplicity of following complex ions.<br>i) $[Co(CN)_6]^{3-}$<br>ii) $[Cr\ (NH_3)_6]^{3+}$ | 05 | L3 | CO3 |

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