**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**
**(MID SEMESTER EXAMINATION)**

**CLASS: BTECH** **SEMESTER : I**
**BRANCH: CSE/AIML/ECE/EEE** **SESSION : MO/2024**

**SUBJECT: CH24101 CHEMISTRY**

**TIME:02 HOURS** **FULL MARKS: 25**

**INSTRUCTIONS:**
**1. The question paper contains 5 questions each of 5 marks and total 25 marks.**
**2. Attempt all questions.**
**3. The missing data, if any, may be assumed suitably.**
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

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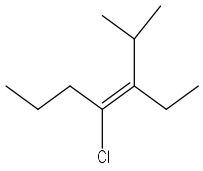
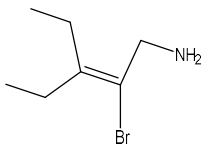
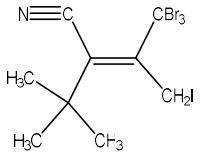
| | | | CO | BL |
|---|---|---|---|---|
| Q.1(a) | Write the structure of $CoCl_3.6NH_3$, $CoCl_3.5NH_3$, $CoCl_3.4NH_3$, $CoCl_3.3NH_3$ according to Werner's theory. | [2] | CO1 | 2 |
| Q.1(b) | Discuss the structure of spinel. Identify the type of spinel with reason for the following:<br>(i) $MgFe_2O_4$ (ii) $Co_3O_4$ (iii) $Mn_3O_4$ (iv) $Fe_3O_4$ | [3] | CO1 | 2 |
| Q.2(a) | Calculate magnetic moment for the following:(show steps)<br>(i) $[Mn(CN)_6]^{-4}$ (ii) $[Fe(H_2O)_6]^{+3}$ | [2] | CO1 | 5 |
| Q.2(b) | With the help of energy level diagram explain the splitting of d orbitals in square planar complexes. Why square planar complexes are generally diamagnetic? | [3] | CO1 | 2 |
| Q.3(a) | Explain the acidity of monocarboxylic acid using the concept of resonance. | [2] | CO2 | 2 |
| Q.3(b) | Assign E and Z to the following: | [3] | CO2 | 2 |

(i) 

(ii) 

(iii) 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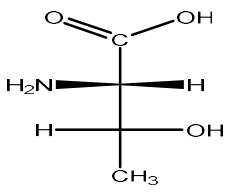
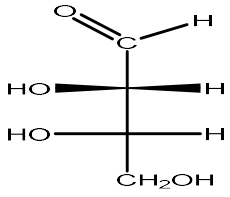
|---|---|---|---|---|
| Q.4(a) | Explain tautomerism. Give the tautomer of phenol. | [2] | CO2 | 3 |
| Q.4(b) | Assign R and S to all the chiral centres in the following: | [3] | CO2 | 3 |

(i) 

(ii) 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| Q.5(a) | When do we expect MLCT and LLCT bands in metal complexes? | [2] | CO1 | 2 |
| Q.5(b) | Differentiate between conformation and configuration. How factors such as steric hindrance and torsional strain affect the stability of different conformers? | [3] | CO2 | 4 |

**:::::23/10/2024 E:::::**