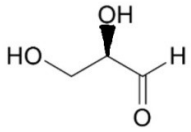
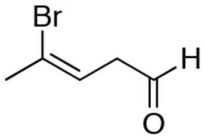
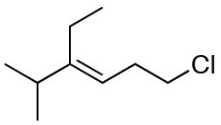
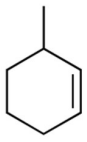
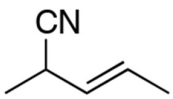
BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BTECH **SEMESTER : I**
BRANCH: CSE/AIML/ECE/EEE **SESSION : MO/2025**

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**

			CO	BL
Q.1(a)	Calculate the spin only magnetic moment value for $[Mn(Br)_4]^{2-}$. Also predict the geometry of the complex ion.	[1+1]	1	3
Q.1(b)	Explain the splitting of d-orbital in a tetrahedral crystal field with the help of diagram. How does it differ from octahedral splitting?	[2+1]	1	2
Q.2(a)	What are 'spin forbidden' and 'spin allowed' transitions?	[2]	1	2
Q.2(b)	State the Jahn-Teller theorem. Which of the following complexes is expected to exhibit strong Jahn–Teller distortion and justify your reasoning using their d-electronic configurations. (a) $[Ti(H_2O)_6]^{3+}$ (b) $[Cr(H_2O)_6]^{3+}$ (c) $[Mn(H_2O)_6]^{2+}$ (d) $[Cu(H_2O)_6]^{2+}$	[1+2]	1	1
Q.3(a)	Why are d–d transitions in octahedral complexes often weak in intensity? Why do lower oxidation states of metals show stronger MLCT bands?	[1+1]	1	2
Q.3(b)	Draw the various conformations of n-butane and compare their relative stability.	[3]	2	4
Q.4(a)	Determine the R/S stereochemical configuration of the chiral center of the molecule below. Show the steps. 	[2]	2	5
Q.4(b)	Briefly explain the following types of structural isomerism, giving one suitable example of each: (a) Functional isomerism (b) Metamerism	[1.5+1.5]	2	2
Q.5(a)	Assign E-Z configuration to the following molecules: i)  ii)  iii)  iv) 	[2]	2	2
Q.5(b)	Presence of chiral carbons in an organic molecule does not guarantee optical activity. Elaborate with suitable example.	[3]	2	2

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