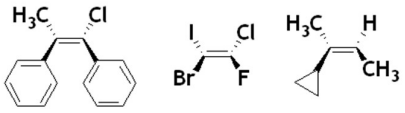
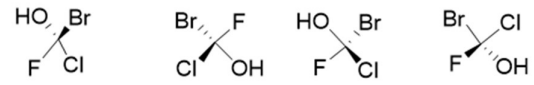
BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BSC **SEMESTER : II**
BRANCH: CHEMISTRY **SESSION : SP/2025**

SUBJECT: CH124 BASIC CHEMISTRY II

TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**

			CO	BL
Q.1(a)	What do you mean by 'adiabatic flame temperature'? What are its two types? Which of them is of higher temperature and why?	[5]	1	3
Q.1(b)	Derive Kirchoff's relation (variation of enthalpy of a reaction with temperature) for a generalized reaction when $\Delta_r C_p$ is (a) independent of temperature (b) temperature dependent.	[5]	1	2
Q.2(a)	Determine the E/Z configurations (a) (b) (c)  Determine the R/S configurations of the following molecules and find the relationship among them. (a) (b) (c) (d) 	[5]	2	3
Q.2(b)	Explain the following term with suitable examples. Enantiomer, diastereomer, threo, meso, erythro	[5]	2	2
Q.3(a)	What is radius ratio rule? Derive the limiting radius ratio to observe coordination number 8.	[5]	3	2
Q.3(b)	What is Born-Haber Cycle? Determine the lattice energy of NaCl using Born-Haber cycle from the following data: Electron Affinity (Cl) = -85.8 kcal/mole, Ionization Energy (Na)= 117.9 kcal/mole, sublimation energy (Na)= 26 kcal/mole, dissociation energy (Cl_2) = 57.6 kcal/mole, heat of formation (NaCl)= -98.3 kcal/mole	[5]	3	3
Q.4(a)	What are the drawbacks of 1st law of thermodynamics? $\Delta_r U$ and $\Delta_r H$ of a reaction cannot be the criteria for spontaneity. Elaborate with suitable examples.	[5]	4	3
Q.4(b)	Derive the expression for the efficiency of a Carnot cycle involving ideal gas as working substance. Hence, deduce the Kelvin-Plank statement of 2nd law of thermodynamics.	[5]	4	3
Q.5(a)	What is Bent's rule? Elaborate with the example of SP^3d hybrid orbitals.	[5]	5	3
Q.5(b)	What is Fajan's rule? Taking suitable examples, apply Fajan's rule to discuss the covalent character of an ionic bond.	[5]	5	3

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