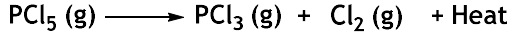
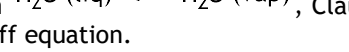
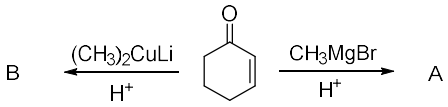
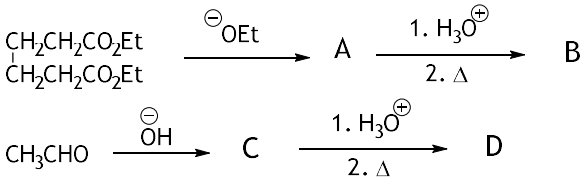
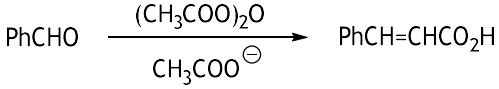
BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

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

SUBJECT: CH226 BASIC CHEMISTRY VI

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.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	What is Le Chateliers principle? Explain the effect of temperature and pressure on the equilibrium constant of the following reaction. 	[5]	1	3
Q.1(b)	Show that for the equilibrium  , Clausius-Clapeyron equation is equivalent to that of Vant-Hoff equation. Prove that mixing of gases is a spontaneous process.	[5]	1	3
Q.2(a)	Draw the Grignard Reaction Mechanism (stepwise) using ketone substrate as an example. If ester is the substrate, what could be the course of a reaction?	[5]	2	2
Q.2(b)	Draw the preparation of methyl lithium and dimethyllithium cuprate (Gilman Reagent). Identify the products A and B in the following reaction. Explain with a mechanism. 	[5]	2	3
Q.3(a)	+3 is the normal oxidation state of lanthanides but Eu/Yb exist in the +2 state. Explain the reason for this observation.	[5]	3	1
Q.3(b)	Solutions containing Ce^{+3} and Tb^{+3} are colorless whereas solution containing Ce^{+4} is yellow colored. Explain the reason for this.	[5]	3	2
Q.4(a)	Identify the product (A-D) with plausible mechanism. 	[5]	3	3
Q.4(b)	Explain the product formation with suitable mechanism. 	[5]	3	2
Q.5(a)	Draw the phase diagram for water encompassing solid, liquid and gas phases. Calculate the degree of freedom for the triple point.	[5]	5	2
Q.5(b)	Derive an expression for the Gibbs-Duhem equation. Discuss the effect of pressure of an impurity on the vapor pressure of a liquid-gas system by taking help from appropriate thermodynamic formalism.	[2+3]	5	3

:::::28/04/2025 M:::::