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

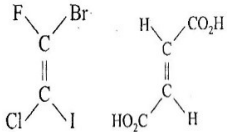
CLASS: BTech **SEMESTER : II**
BRANCH: BT/CHEMICAL/CIVIL/MECH/PIE **SESSION : SP/2023**

SUBJECT: CH101 CHEMISTRY

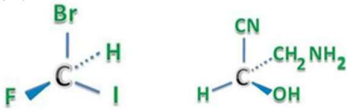
TIME: 3 Hours **FULL MARKS: 50**

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)	Draw Born-Haber cycle for the formation of KCl. What are the applications of Born-Haber cycle?	[3+2]	1	2
Q.1(b)	(i) For $[CoCl_6]^{3-}$, Predict whether this compound is high or low spin. Briefly explain your answer. (ii) Why do d^3 complexes not show Jahn-Teller distortions?	[3+2]	1	3
Q.2(a)	Draw the molecular energy level diagram for Carbon monoxide (CO) and predict the bond order of CO.	[5]	2	2
Q.2(b)	(i) Predict whether the following compounds are E or Z isomer?	[2+3]	2	3



(ii) Predict whether the following compounds are R or S isomer?



Q.3(a)	Discuss the collision theory of bimolecular reactions. What are the limitations of collision theory?	[3+2]	3	2
Q.3(b)	What is the Michaelis-Menten kinetic scheme and equation? How Michaelis-Menten constant (K_m) can be determined?	[3+2]	3	2
Q.4(a)	What is Lambert-Beer's law? What are the limitations of Lambert-Beer's law?	[3+2]	4	2
Q.4(b)	What do you mean by the term 'chemical shrift' in NMR spectrum? Discuss the proton NMR signals for the $CH_3CH_2CH_2$ Br.	[2+3]	4	3
Q.5(a)	What is phase rule? Calculate the number of degrees of freedom in the following systems: (i) $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$ (ii) An aqueous solution of sodium chloride	[3+2]	5	3
Q.5(b)	Draw a neat phase diagram of water system, Discuss the behavior of various equilibrium involved in the system with varying pressure and temperature.	[5]	5	2

:::::18/07/2023:::::