BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

CLASS: IMSc **SEMESTER: 1st**
BRANCH: MATHEMATICS **SESSION: MO/2024**

SUBJECT: CH111 CHEMISTRY-I

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)	Briefly describe wave and particle relationship of a sub atomic particle by Heisenberg's uncertainty Principle.	[2]	1	1
Q.1(b)	Corelate Bohr's quantum restriction with de Broglie matter wave concept	[3]	1	2
Q.2(a)	Show that position operator, x and momentum operator, p_x do not commute, whereas position operator, y and momentum operator, p_x do commute.	[2]	1	2
Q.2(b)	Derive Schrodinger wave equation for subatomic particle.	[3]	1	2
Q.3(a)	Explain the nuclear spin isomerism in H_2 molecule	[2]	2	1
Q.3(b)	Draw the Born Haber type cycle for H_nX (where X = halogen or alkali metal, n= an integer) to show its acidity and basicity, Write the thermochemical equations for the heat of formation of both the processes.	[3]	2	2
Q.4(a)	Instead of having highest ionization energy among alkali metals, Li has lowest reduction potential- Explain.	[2]	2	1
Q.4(b)	In $CuSO_4.5H_2O$, 4 molecules of water leave the crystal on heating at ~100 °C, but 5^{th} molecule leaves crystal at much higher temperature-Explain	[3]	2	2
Q.5(a)	Compare the stability of following carbanions (I) $^{-}CCl_3$ vs. $^{-}CF_3$ (II) $CH_2 = CH—CH_2^-$ vs. $CH_2 = CH^-$	[2]	3	3
Q.5(b)	Explain the stereochemistry of carbene addition across the carbon-carbon double bond in cis-2-butene.	[3]	3	2

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