CLASS: IMSc   **SEMESTER: I**
BRANCH: MATHEMATICS   **SESSION: MO/2024**

SUBJECT: CH111 CHEMISTRY-I

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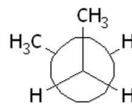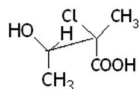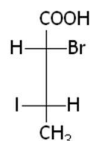
INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.

			CO	BL
Q.1(a)	Prove Heisenberg uncertainty principle from Compton Effect	[5]	1	2
Q.1(b)	What is atomic orbital? What is radial probability? Draw the radial probability distribution curves for 2s and 2p orbitals.	[5]	1	2
Q.2(a)	With suitable example, discuss Inert Pair Effect	[5]	2	3
Q.2(b)	Draw the structure of diborane and discuss the bonding.	[5]	2	3
Q.3(a)	Explain the relative reaction rate (Kr) of the following S_N2 reaction.	[5]	3	3

$$R\text{-}Br + Cl^- \longrightarrow R\text{-}Cl + Br^-$$

$R =$ I) CH_3 II) CH_2CH_3 III) $\overset{}{\underset{}{>}}CH$ IV) $-\overset{|}{\underset{|}{C}}-Br$

$K_r =$ 30   1   0.25   0.03

Explain the stereochemistry of the product formation in S_N1 and S_N2 reactions.

| Q.3(b) | Explain anti-Markownikov addition of HBr in 1-propene. | [5] | 3 | 2 |

Explain Saytzev and Hofmann elimination reactions with suitable examples.

Q.4(a)	For the crystalline solids, find the minimum radius ratio to attain *fcc* and *bcc* lattice	[5]	4	2
Q.4(b)	Draw the Born Haber cycle to show the acidity of HCl. Write the equation corresponding to the heat of dissociation of HCl.	[5]	4	3
Q.5(a)	Explain the optical activity of the following molecules	[5]	5	3

Carry out the following conversion
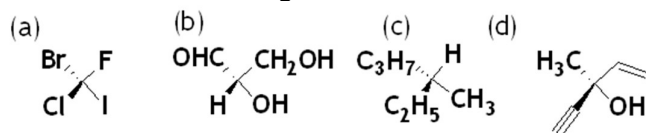(a) Fischer to Sawhorse   (b) Sawhorse to Newman   (c) Newman to Fischer

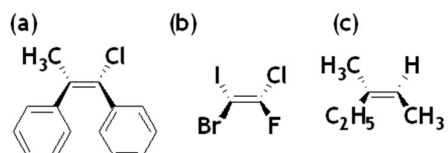Q.5(b)   Determine the R/S configurations   [5]   5   3

(a)   (b)   (c)   (d)

Br,, F   OHC, CH$_2$OH   C$_3$H$_7$,, H   H$_3$C,,

Cl   I   H   OH   C$_2$H$_5$ CH$_3$ OH

Determine the E/Z configurations

(a)   (b)   (c)

H$_3$C   Cl   H$_3$C   H

                    I   Cl

                 Br   F   C$_2$H$_5$ CH$_3$

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