

2015

( 1st Semester )

CHEMISTRY

FIRST PAPER (CHEM-111)

( Organic Chemistry—I )

Full Marks : 55

Time : 2½ hours

( PART : B—DESCRIPTIVE )

( Marks : 35 )

*The figures in the margin indicate full marks  
for the questions*

1. (a) Define hybridization. Draw the orbital structure for the hybridization of ethylene molecule and mention the geometry of the molecule. 1+3=4

(b) Define inductive effect. Explain its affect in substituted aliphatic carboxylic acid. 3

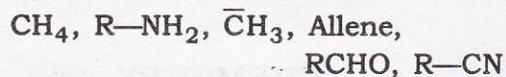
OR

2. (a) Explain how hybridization affect bond length and bond angle of a molecule. 2

G16/23a

( Turn Over )

- (b) Predict the geometry of the following molecules :  $\frac{1}{2} \times 6 = 3$

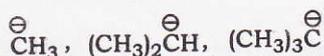


- (c) Explain intermolecular and intramolecular H—bond with suitable example. 2
3. (a) Define hyperconjugation. Draw the hyperconjugation structure of propylene molecule. 1+1=2
- (b) State Hückel's rule of aromaticity. Are the following molecules aromatic or not? Justify your answer : 1+2=3
- (i) Cyclopropenyl cation
- (ii) Cycloheptatrienyl cation
- (c) "Chloroacetic is a stronger acid than acetic acid." Explain. 2

OR

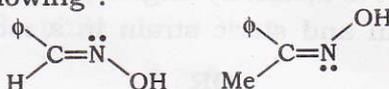
4. (a) Explain homolytic and heterolytic cleavages of a chemical bond. 2
- (b) "The electrophilic substitution of toluene occurs at *ortho*- and *para*-position of the benzene ring." Explain. 2

- (c) What are carbanions? Arrange the following carbanions in their increasing order of stability with proper explanation : 1+2=3



5. (a) Write a note on any one : 2  
 (i) Regioselectivity  
 (ii) Chemoselectivity

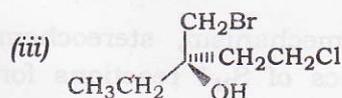
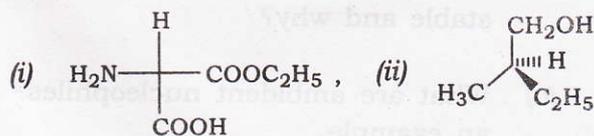
- (b) Assign syn- or anti-nomenclature of the following : 2



- (c) Explain the following with suitable example : 1½×2=3  
 (i) Chirality centre  
 (ii) Enantiomers

**OR**

6. (a) Designate *R*- or *S*-configuration for the following : 1×3=3



G16/23a

( Turn Over )

- (b) Explain 'plane of symmetry' with suitable example. 2
- (c) What is meso-compound? Give an example. 1+1=2
7. (a) Draw the Newman and sawhorse formula for the different conformational isomers of ethane. Explain their stability. 2+2=4
- (b) What is meant by angle strain, torsional strain and steric strain in a molecule? 3
- OR**
8. (a) Draw the Newman projection formula for the two chair conformers of methyl cyclohexane and explain their stability. 2+2=4
- (b) Draw the boat and chair form of cyclohexane indicating all the hydrogens. Which one of them is more stable and why? 3
9. (a) What are ambident nucleophiles? Give an example. 2
- (b) Give the mechanism, stereochemistry and kinetics of  $S_N1$  reactions for the hydrolysis of tertiary butyl bromide. 3

- (c) Give at least two points to differentiate between  $E1$  and  $E2$  reactions. 2

OR

10. (a) Explain the role of substrates in  $S_N2$  reactions. 2
- (b) Explain the transition state involved in Hofmann and Saytzeff rule in  $E2$  reaction. 3
- (c) Write two points to differentiate between nucleophile and a base. 2

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2015

( 1st Semester )

**CHEMISTRY**

FIRST PAPER (CHEM-111)

**( Organic Chemistry—I )**

( PART : A—OBJECTIVE )

( Marks : 20 )

*The figures in the margin indicate full marks for the questions*

## SECTION—I

( Marks : 5 )

Put a Tick (✓) mark against the correct answer in the brackets provided for it : 1×5=5

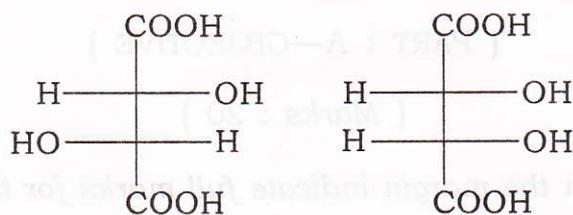
1. A molecule with central atom involving one lone pair and three bond pairs will adopt a geometry of

- (a) angular ( )
- (b) tetrahedral ( )
- (c) square planar ( )
- (d) trigonal pyramidal ( )

2. The most stable among the following carbocation is

- (a) primary carbocation ( )  
 (b) secondary carbocation ( )  
 (c) tertiary carbocation ( )  
 (d) All of the above ( )

3. The two isomers given below



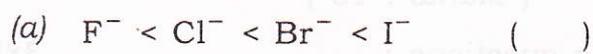
are

- (a) enantiomers ( )  
 (b) diastereomers ( )  
 (c) mesomers ( )  
 (d) position isomers ( )

4. The most stable conformation of cyclohexane is

- (a) boat form ( )  
 (b) half-chair form ( )  
 (c) chair form ( )  
 (d) twisted form ( )

5. The increasing order of nucleophilicity for the halide ion is



( 4 )

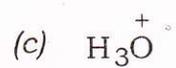
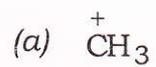
SECTION—II

( Marks : 15 )

Answer the following questions :

3×5=15

1. Based on VSEPR theory, predict the geometry of



2. Define hydrogen bond. "Alcohols are soluble in water while alkanes are not." Explain.

3. Why is racemic mixture optically inactive? Explain with suitable example.

4. Differentiate between conformation and configuration.

CHEMISTRY

FIRST PAPER (M.P. 2014-15)

[ Organic Chemistry - I ]

[ PART - B - OBJECTIVE ]

( Marks : 20 )

The figures in the margin indicate full marks for the questions

SECTION - I

( Marks : 5 )

Put a tick (✓) mark against the correct answer in the brackets provided for it

1. A molecule with central atom involving one lone pair and three bond pairs will adopt a geometry of

- (A) square planar
- (B) tetrahedral
- (C) square pyramidal
- (D) trigonal pyramidal \*\*\*

5. Explain an *E2* reaction with its regioselectivity by giving suitable example.

- (a) primary carbocation
- (b) secondary carbocation
- (c) tertiary carbocation
- (d) All of the above

3. The two isomers given below



- (a) enantiomers
- (b) diastereomers
- (c) mesomers
- (d) positional isomers

4. The most stable conformation of cyclohexane is

- (a) boat form
- (b) half-chair form
- (c) chair form
- (d) twisted form

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