

2017

(1st Semester)

CHEMISTRY

FIRST PAPER (CHEM-111)

(Organic Chemistry—I)

Full Marks : 55

Time : 2½ hours

(PART : B—DESCRIPTIVE)

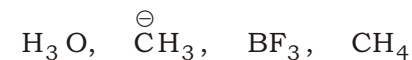
(Marks : 35)

The figures in the margin indicate full marks
for the questions

1. (a) Define hybridization. Draw the orbital diagram of acetylene (C_2H_2) molecule. Mention the type of hybridization involved and indicate the geometry of the molecule. 1+3=4
- (b) Arrange the following in order of their increasing acidity and explain : 1+2=3
- CH_3COOH , $ClCH_2COOH$,
 $Cl_2CHCOOH$, Cl_3CCOOH

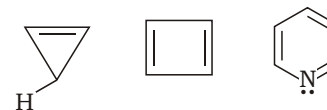
OR

2. (a) Using VSEPR theory, predict the geometry of the following molecules : 1×4=4



- (b) What are inter-molecular and intra-molecular hydrogen bonds? Give examples. 3

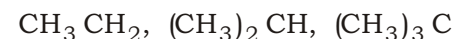
3. (a) State Hückel's rule of aromaticity. Are the following molecules aromatic or not? Justify your answer : 1+3=4



- (b) Write short notes on : 1½×2=3
- (i) Carbene
- (ii) Free radicals

OR

4. (a) What are carbocations? Arrange the following in order of their increasing stability and explain : 1+3=4



(3)

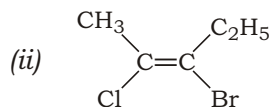
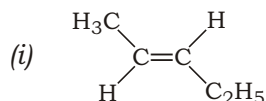
- (b) Define hyperconjugation. Draw the hyperconjugation structure of toluene. 3

5. (a) Explain the following with suitable examples : $1\frac{1}{2} \times 2 = 3$

(i) Stereogenic centre

(ii) Diastereomers

- (b) Designate *E*- or *Z*-configuration of the following : $1 \times 2 = 2$



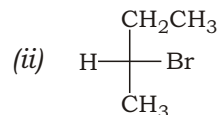
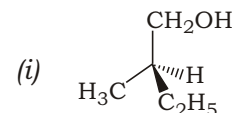
- (c) Explain the term 'plane of symmetry' with suitable example. 2

OR

6. (a) Draw the possible stereoisomers of butane-2,3-diol and indicate enantiomers, diastereomers and *meso*-compound. 4

(4)

- (b) Designate *R*- or *S*-configuration of the following : $1 \times 2 = 2$



- (c) What is the essential condition for a compound to be optically active? 1

7. (a) Draw the conformations of ethane (with energy diagram) and deduce the most stable and the least stable thereof. $2+1+1=4$

- (b) Write the two chair conformations of methyl cyclohexane and comment on their stability. 3

OR

8. (a) What is meant by conformational analysis? 1

- (b) Draw chair conformation of cyclohexane and show clearly all the axial and equatorial hydrogens. Which is the most stable conformation among all the conformers? $1+2=3$

(5)

(c) Explain the following : $1 \times 3 = 3$

- (i) Steric strain
- (ii) Torsional strain
- (iii) Angle strain

9. (a) Give the mechanism, stereochemistry and kinetics of S_N1 reaction for the hydrolysis of 3°-alkyl halide. 4

(b) Differentiate between nucleophile and a base. 3

OR

10. (a) Compare S_N1 and S_N2 reactions on the basis of the following : $1 \times 4 = 4$

- (i) Nature of alkyl halides
- (ii) Nature of nucleophiles
- (iii) Molecularity
- (iv) Nature of leaving group

(b) Explain Saytzeff rule in the regio-selectivity of an elimination reaction taking suitable example. 3

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Subject Code : CHEM/I/01

Booklet No. A

Date Stamp

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To be filled in by the Candidate

DEGREE 1st Semester
(Arts / Science / Commerce /
.....) Exam., **2017**

Subject

Paper

INSTRUCTIONS TO CANDIDATES

1. The Booklet No. of this script should be quoted in the answer script meant for descriptive type questions and vice versa.
2. This paper should be **ANSWERED FIRST** and submitted within 45 minutes of the commencement of the Examination.
3. While answering the questions of this booklet, any cutting, erasing, over-writing or furnishing more than one answer is prohibited. Any rough work, if required, should be done only on the main Answer Book. Instructions given in each question should be followed for answering that question only.

To be filled in by the Candidate

DEGREE 1st Semester
(Arts / Science / Commerce /
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Roll No.

Regn. No.

Subject

Paper

Descriptive Type

Booklet No. B

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Scrutiniser(s)*

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(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 : 1×5=5

1. The bond energy of ethane (I), ethene (II) and ethyne (III) follows the order

(a) I II III ()

(b) III II I ()

(c) II III I ()

(d) III I II ()

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(2)

2. For a concerted exothermic reaction, the activation energy (E) is such that

(a) $E_{\text{product}} - E_{\text{reactant}}$ ()

(b) $E_{\text{product}} + E_{\text{reactant}}$ ()

(c) $E_{\text{reactant}} - E_{\text{product}}$ ()

(d) $E_{\text{reactant}} - E_{\text{product}} - H_f$ ()

3. The process of separation of racemic mixture in to d - and l -form is called

(a) resolution ()

(b) racemization ()

(c) conformation ()

(d) configuration ()

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(3)

4. The most stable conformer of *n*-butane is

(a) eclipsed ()

(b) gauche ()

(c) anti ()

(d) fully eclipsed ()

5. The most reactive of alkyl halide in *E*2 reaction is

(a) 3°-alkyl halide ()

(b) 2°-alkyl halide ()

(c) 1°-alkyl halide ()

(d) methyl halide ()

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(4)

SECTION—II

(Marks : 15)

Answer the following questions :

3×5=15

1. Define homolytic and heterolytic bond cleavages. Explain with proper arrow notation.

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(5)

2. "Alcohols have higher boiling points than their corresponding alkanes." Explain.

(6)

3. Explain inversion and retention of configuration with suitable examples.

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(7)

4. Differentiate between conformations and configurations.

(8)

5. Explain S_Ni mechanism with suitable example.

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