I/CHEM (i)

2016

(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)* Explain how hybridization affects the concept of bond length and bond energy taking suitable examples. 4

(b) Draw the orbital structure of—

(i) alkene;

(ii) ketone. 1½×2=3

OR

2. *(a)* Discuss the shape of the following molecules from VSEPR theory : 1×4=4

(i) BF_3

(ii) Acetylene

(iii) CH_3

(iv) R—CN

(b) Explain how H-bonding affects the boiling point and solubility of organic compounds. 1½×2=3

3. *(a)* Explain the following : 1×4=4

(i) Electromeric effect

(ii) Hyperconjugation

(iii) Carbenes

(iv) Aromaticity

(b) Explain why free radicals are very reactive. Give examples. 3

OR

4. *(a)* *(i)* Discuss the role of inductive effect in the acidity of chloroacetic acid. 1½

(ii) What do you understand by electrophiles? Give two examples. 1½

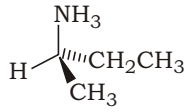
(b) Discuss the concept of Hückel $4n$ 2 rule for aromaticity. 4

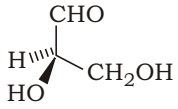
5. *(a)* Discuss the concept of homo- and hetero-topocity. 1½×2=3

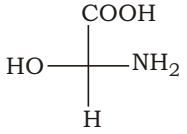
(b) Discuss the geometrical isomerism of oxime and alicyclic compound. 2×2=4

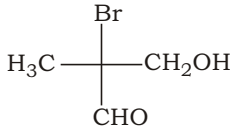
OR

6. *(a)* Assign *R*- or *S*-configuration for the following : 1×4=4

(i) 

(ii) 

(iii) 

(iv) 

(b) Explain the following in brief : 1×3=3

(i) Racemization

(ii) Prostereoisomerism

(iii) Relative configuration

7. *(a)* What is called 1,3-Diaxial interaction? Compare the stability of boat form and chair form of cyclohexane. 1+3=4

(b) Discuss the conformational isomerism of *n*-butane with energy diagram. 3

OR

8. *(a)* Explain the difference between configuration and conformation. 2

(b) Draw Sawhorse and Newman projection formula for ethane. 2

(c) Discuss the conformational isomers of cyclohexane with energy profile. 3

9. *(a)* Explain Saytzeff's rule with example. 3

(b) Explain the influence of the following on the substitution reaction : 2×2=4

(i) Structure of substrate

(ii) Nature of nucleophile

OR

10. *(a)* Explain the concept of S_N1 type of reaction. 3

(b) Explain the concept of regioselectivity in elimination reaction using Hoffman's rule. Take suitable example. 4

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Subject Code : I/CHEM (i)

Booklet No. A

Date Stamp .....

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To be filled in by the Candidate

DEGREE 1st Semester
(Arts / Science / Commerce / .....) Exam., **2016**

Subject .....
Paper .....

To be filled in by the Candidate

DEGREE 1st Semester
(Arts / Science / Commerce / .....) Exam., **2016**

Roll No. .....
Regn. No. .....

Subject .....
Paper .....

Descriptive Type
Booklet No. B .....

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.**

Signature of Scrutiniser(s) *Signature of Examiner(s)* *Signature of Invigilator(s)*

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2016

(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. From VSEPR theory, the shape of CH_3 is

(a) tetrahedral ( )

(b) trigonal planar ( )

(c) pyramidal ( )

(d) linear ( )

2. Homolytic bond cleavage will lead to

(a) radical species ( )

(b) ionic species ( )

(c) neutral species ( )

(d) None of the above ( )

3. Meso compounds are optically inactive because

(a) the molecule has point or plane of symmetry ( )

(b) of racemic mixture ( )

(c) the molecule can rotate freely ( )

(d) None of the above ( )

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

(a) completely eclipsed ( )

(b) staggered (anti) ( )

(c) partially eclipsed ( )

(d) partially staggered (gauche) ( )

5. In S_N2 reaction, the stereochemistry of the product molecule will result in

(a) retention of configuration ( )

(b) racemic mixture ( )

(c) inversion of configuration ( )

(d) None of the above ( )

SECTION—II

(*Marks* : 15)

Answer the following questions : 3×5=15

1. Explain why alcohol is soluble in water but kerosene is insoluble.

2. Explain with example, the difference between intra- and inter-molecular hydrogen bonding.

3. Explain in brief, the concept of chemoselectivity.

4. Explain in brief, the concept of flag pole-flag pole interaction.

5. Explain with examples, the difference between a nucleophile and a base.

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