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(CBCS)

(6th Semester)

CHEMISTRY

TWELFTH (B) PAPER

(Natural Products)

Full Marks : 75

Time : 3 hours

(PART : A—OBJECTIVE)

(*Marks* : 25)

The figures in the margin indicate full marks for the questions

SECTION—A

(*Marks* : 10)

Tick (✓) the correct answer in the brackets provided : 1×10=10

1. The most common tetraterpenoid is

(a) pinene ( )

(b) carotenoid ( )

(c) limonene ( )

(d) -geraniol ( )

2. An alkaloid used in ophthalmic practice to dilate the pupil of eye is

(a) camphor ( )

(b) tropine ( )

(c) pinene ( )

(d) atropine ( )

3. A classical method used for determining the number of —OCH_3 groups in an organic compound is

(a) Ziesel's method ( )

(b) Herzig-Meyer method ( )

(c) Dragendorff's method ( )

(d) None of the above ( )

4. - * transition is found in

(a) alkanes ( )

(b) alkenes ( )

(c) alcohols ( )

(d) None of the above ( )

5. Rotenoids are

(a) complex isoquinolines ( )

(b) complex flavones ( )

(c) complex anthocyanidins ( )

(d) complex isoflavonoids ( )

6. Menthol is a

(a) diterpenoid ( )

(b) monoterpenoid ( )

(c) triterpene ( )

(d) flavonoid ( )

7. Chemical communication between plants and insects can be

(a) both benign and antagonistic ( )

(b) benign only ( )

(c) antagonistic only ( )

(d) None of the above ( )

8. Nametkin rearrangement involves

(a) hydroxyl group transfer ( )

(b) ethyl group transfer ( )

(c) methyl group transfer ( )

(d) —COOH transfer ( )

9. Semiochemicals are responsible for communication between members of

(a) different species ( )

(b) same species ( )

(c) all species ( )

(d) None of the above ( )

10. The first step in the synthesis of paraconic acid involves

(a) Diels-Alder reaction ( )

(b) Hofmann degradation ( )

(c) retro-Diels-Alder reaction ( )

(d) None of the above ( )

SECTION—B

(*Marks* : 15)

Answer the following questions : 3×5=15

1. What are 'pseudoalkaloids'? Give one example with structure.

OR

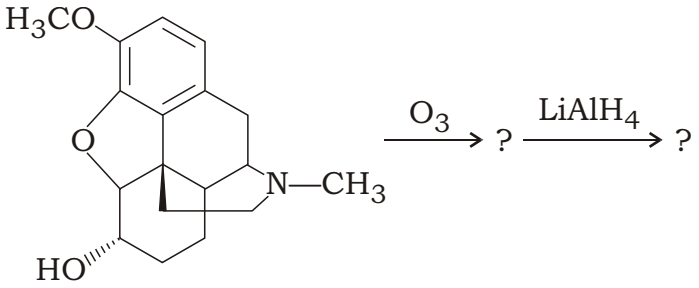
2. Write a brief note on sesquiterpenes.

3. What do you understand by 'metastable ion' in mass spectra?

OR

4. Describe in brief the basic principle of ^{13}C-NMR spectroscopy.

5. Complete the following reaction (mechanism not required) :



OR

6. What are 'germacranolides'?

7. Explain 'Nametkin rearrangement' with suitable example.

OR

8. Write a short note on the stereochemistry of abietic acid.

9. What are insect pheromones? Give one example.

OR

10. Write a short note on the biosynthesis of benzyl isoquinoline alkaloids.

(PART : B—DESCRIPTIVE)

(*Marks* : 50)

The figures in the margin indicate full marks for the questions

1. *(a)* What are diterpenes? Mention their medicinal properties. 3

(b) What are pyridine alkaloids? Give one example. 2

(c) Discuss the isolation of alkaloids. Mention the use of UV spectroscopy in their detection. 3+2

OR

2. *(a)* How many isoprene units are there in sesquiterpenes? What is the general molecular formula of sesquiterpenes? 2

(b) Mention the important biological functions of carotenoids. 3

(c) What is Hofmann degradation of alkaloids? Illustrate with a suitable example. 2+3

3. *(a)* Mention two advantages of spectroscopic technique over classical technique in structure determination of compounds. 2

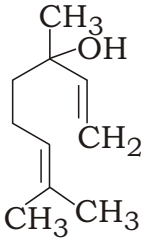
(b) What do you understand by 'multiplicity of signals' in the ^{1}H-NMR spectra of organic compounds? 3

(c) Discuss the application of IR spectra in critical analysis of —C=O stretching frequencies. 5

OR

4. *(a)* What are 'chemical shifts'? How are they measured? 3

(b) The mass spectrum of linalool (shown below) gives m/z values at 154, 136 and 93. How will you account for this? 5



(c) Using IR spectroscopy, how will you distinguish between ketone and alcohol? 2

5. *(a)* What are benzyl isoquinoline alkaloids? Give one example. 3

(b) What are rotenoids? Mention their medicinal uses. 3

(c) What are the four types of biochemical *trans*-to-*cis* conformations of naturally occurring germacranolides? 4

OR

6. *(a)* How many optically active isomers are possible in menthol? Name them. 4

(b) Write the structure of (–)abietic acid. How many chiral centers does it have? Identify them. 4

(c) Mention the medicinal use of vinblastine. 2

7. *(a)* Discuss in brief the plant-insect interaction. 3

(b) Discuss rearrangement reaction of morphine. 3

(c) Explain molecular yoga with example. 4

OR

8. *(a)* Explain Wesley-Moser rearrangement. 2

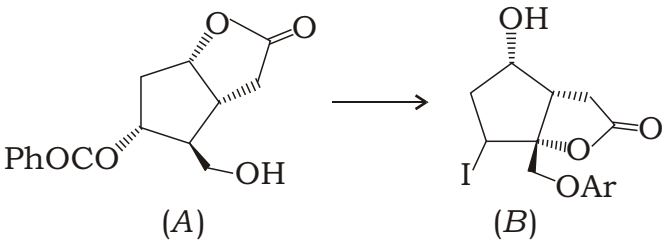
(b) Explain why chemical secretions are important for the very survival of the species. 3

(c) Write the structure of morphine. How many chiral centers does it possess? Identify them. 5

9. *(a)* Name one chiral marine natural product. 2

(b) What is reserpine? Write its structure. 3

(c) Starting with Corey lactone benzoate (*A*), write the mechanism for the synthesis of iodolactone (*B*) : 5



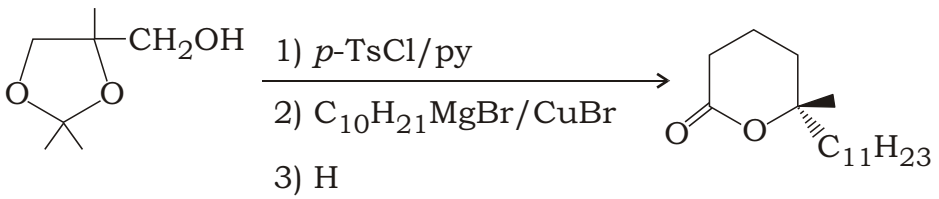
(*A*) (*B*)

OR

10. *(a)* Mention the first step in the biosynthesis of morphine from (*S*)-reticuline. 2

(b) What are phytoalexins? Give one example with structure. 3

(c) Complete the following reaction : 5



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