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(6th Semester)

CHEMISTRY

TWELFTH (B) PAPER (CHEM-364)

(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 terpenes form a large group of secondary metabolites, chiefly from

- (a) animal origin () (b) plant origin ()
(c) marine flora and fauna () (d) insects ()

2. Alkaloids are

- (a) acid-like () (b) water-like ()
(c) alkali-like () (d) gas-like ()

3. In classical methods for the determination of structure, the first step is determination of

- (a) functional group () (b) acid or base ()
(c) temperature () (d) None of the above ()

4. Molecular fragmentation is found in

- (a) UV-visible spectroscopy () (b) IR-spectroscopy ()
(c) NMR-spectroscopy () (d) mass spectroscopy ()

- 5.** Peptide bond is a backbone of
 (a) proteins () (b) carbohydrates ()
 (c) mineral acids () (d) all organic compounds ()
- 6.** Carbohydrates have the general formula
 (a) $[\text{CH}_2\text{O}]_n$ () (b) $[\text{CHO}]_n$ ()
 (c) $[\text{CH}_{2n}]_n$ () (d) None of the above ()
- 7.** The Nametkin rearrangement is closely related to
 (a) Hofmann rearrangement ()
 (b) Wagner-Meerwein rearrangement ()
 (c) rearrangement of morphine ()
 (d) Friedel-Crafts rearrangement ()
- 8.** The most well-known rearrangement of morphine is
 (a) acid catalyzed () (b) base catalyzed ()
 (c) enzyme catalyzed () (d) All of the above ()
- 9.** Pheromones are classified (as sex pheromones or attractants, alarm, aggregating and trail-making pheromones) depending on the type of
 (a) environment () (b) behaviour ()
 (c) food chain () (d) None of the above ()
- 10.** Enzymes are
 (a) amino acids () (b) proteins ()
 (c) carbohydrates () (d) terpenes ()

SECTION—B

(Marks : 15)

Answer the following questions :

3×5=15

1. Write in brief about atropine.
2. How is IR spectroscopy more useful than UV spectroscopy? Give example.
3. What is amino acid? What is their importance?
4. Write a brief note on plant-insect interaction.
5. What is enzyme? Give one example of hydrolytic enzyme.

(PART : B—DESCRIPTIVE)

(Marks : 50)

The figures in the margin indicate full marks for the questions

1. (a) Discuss the Hofmann degradation with suitable example. 4
(b) What are the acyclic and monocyclic monoterpenes? Give one example each. 3
(c) Write in brief about nicotine. 3

OR

2. (a) Draw the structure of the following compounds and indicate how many isoprene units they contain : $1\frac{1}{2} \times 2 = 3$
(i) Camphore
(ii) -pinene
(b) Write in brief about indole alkaloids. 3
(c) What are the classifications of terpene? Write their numbers of carbon and isoprene units they contain with example. 4
3. (a) Write a note on ultraviolet-visible spectroscopy. 4
(b) Write the basic principle of mass spectrometry. 4
(c) What are the advantages of spectroscopic methods over classical methods for determining the structure of a compound? 2

OR

4. (a) How many NMR signals are observed in the spectrum of the following? $2 \times 2 = 4$
(i) $\text{CH}_3\text{—CH}_2\text{—OH}$
(ii) $\begin{array}{c} \text{H}_3\text{C} \\ \diagdown \\ \text{CH—C}\equiv\text{N} \\ \diagup \\ \text{H}_3\text{C} \end{array}$
(b) In IR spectrum, formaldehyde (HCHO) absorbs at higher wave number (1750 cm^{-1}) than acetaldehyde (CH_3CHO) i.e., 1745 cm^{-1} . Explain. 4
(c) What is bathochromic shift in NMR spectroscopy? 2

5. (a) Describe the synthesis of a dipeptide, Ala-Gly. 3
 (b) Draw the Haworth projection formula of α -D-glucose and β -D-fructose. $1\frac{1}{2}+1\frac{1}{2}=3$
 (c) What are peptide linkages? 2
 (d) What are carbohydrates? 2

OR

6. (a) Write the conversion of D-glucose to D-mannose. 5
 (b) Write a short note on isoelectric point of amino acids. 3
 (c) Define peptide bond. Give suitable example. 2
7. (a) Explain Wessely-Moser rearrangement. 3
 (b) What is semiochemical? Explain with suitable example. 3
 (c) Discuss with mechanism, the rearrangement of morphine in the acid catalyzed reactions resulting in the formation of apomorphine. 4

OR

8. (a) Discuss briefly the chemical defenses in insects with suitable example. 3
 (b) Write Nametkin rearrangement with suitable examples. 3
 (c) Discuss the reactions of papaverine. 4
9. (a) How does enzyme catalyst differ from chemical catalyst? 2
 (b) Explain reversible enzyme inhibition. 4
 (c) Explain hydrolytic enzyme synthesis with suitable example. 4

OR

10. (a) What is allosteric enzyme? 2
 (b) Discuss the enzyme catalysis with energy-profile diagram. 4
 (c) Explain oxidoreductase enzyme synthesis with suitable example. 4

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