

This question paper contains 7 printed pages.]

Your Roll No.

1261

B.Sc. (Hons.) / III **A**
CHEMISTRY – Paper XV
(Organic Chemistry – III)

Time : 3 Hours

Maximum Marks : 38

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt **six** questions in all.

Question No. 1 is compulsory.

1. (a) Draw Haworth structure of D-sucrose.
Write its systematic name. 2
- (b) What is the structure of D-Maltose ?
Discuss. 1
- (c) Write the Fischer structures of aldaric acids
obtained by the oxidation of D-glucose and
D-gulose. How are these aldaric acids
related ? 2

(d) Why is β -D-glucopyranose, the most abundant naturally occurring aldohexose? Justify the statement. 1

(e) Given the following specific rotations for glucose anomers, α isomer = $+112^\circ$, β isomer = $+19^\circ$ and for equilibrium mixture = $+52.7^\circ$. Calculate the percentage composition of the anomers in the equilibrium mixture. 2

2. (a) Sketch a suitable mechanistic scheme for the following transformation :

citral $\xrightarrow{\text{KHSO}_4}$ p-cymene 2

(b) Citral forms two semi-carbazones. Explain. 1

(c) How are the following conversions brought about?

(i) α -terpineol \longrightarrow dipentene

(ii) limonene \longrightarrow carvoxime 2

(d) Name two essential oils from which limonene can be isolated. 1

3. (a) How are cellulose and starch structurally different? Give two points of difference. 1

(b) Methyl - α -D- glucofuranoside

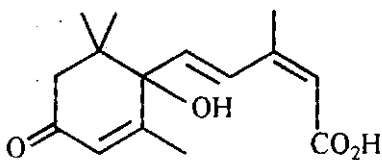
(i) HIO_4

(ii) Br_2 - water

(iii) $\text{H}_2\text{O}, \text{H}^+$ Products 2.5

Write the structures of the products of the above sequence of reactions.

(c) Indicate the isoprene units in the following terpene and name the class to which it belongs. 1.5



Abscisic acid

(d) Distinguish chemically between D - 2 - deoxyglucose and D - 3 - deoxyglucose. 1

4. (a) Write steps for the synthesis of tyrosine by Erlenmeyer azlactone method. 2
- (b) What are the structures of lysine at pH = 1.5, 3.2, 9.74 and 12 ? To which electrode does lysine migrate at each pH ? 2
- (c) Angiotensin – I is a decapeptide that causes an increase in the blood pressure of animals. Total hydrolysis gives : arg, asp, his₂, ile, leu, phe, pro, tyr, val C-terminus analysis cleaves off leucine and Edman degradation gives aspartic acid. Hydrolysis with chymotrypsin followed by Edman degradation gives three fragments :

(i) asp-arg-val-tyr

(ii) ileu-his-pro-phe

(iii) his-leu

What is the sequence of the decapeptide ?
How many different sequences of this decapeptide are possible ? 2

5. (a) Calculate the isoelectric point of arginine, given :

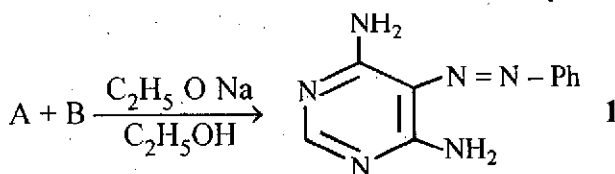
$$pK_a(\text{COOH}) = 2.17, pK_a(\text{NH}_3^+) = 9.04,$$

$$pK_a(\text{side chain}) = 12.48$$
1

(b) Show equations for the synthesis of the tripeptide : val – leu – ala by Merrified solid state peptide synthesis. 3

(c) What is Ninhydrin ? How does it lead to a purple colour with amino acids ? 2

6. (a) Write the structures of A & B in the following reaction :

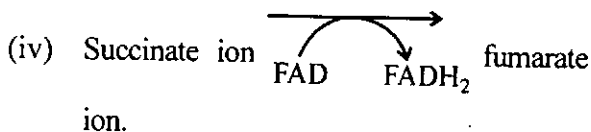
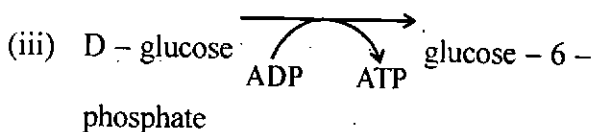
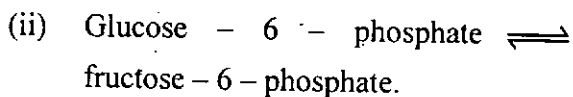
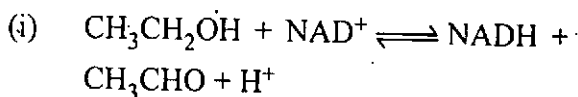


(b) Discuss Traube's method for the synthesis of guanine. 2

(c) The silver salt of oxycaffeine on reaction with methyl iodide gave a mixture of tetramethyl uric acid and methoxycaffeine. What is the significance of this observation in establishing the structure of caffeine ? 1.5

(d) Calculate iodine number of trinolein (mol.wt. = 878). Classify it as drying oil or semi-drying oil or non-drying oil. 1.5

7. (a) Write the names of enzymes which catalyse the following reactions :



(b) Write the structure of ATP. Why is it termed as energy rich molecule ? 1.5

(c) Write three important conclusions of glycolysis. 1.5

(d) Name three irreversible steps in the TCA cycle. 1

8. (a) Write the structure of glycolipid derived from one molecule each of sphingosine, palmitic acid and β - D - glucose. 2

- (b) Is linolenic acid an essential or non-essential fatty acid ? Write its structure and ω -(omega) designation. 2
- (c) (i) Give the synthesis of ABS detergent. 2
- (ii) Write the structure of a detergent used for dish-washing.
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