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(May/June)

CHEMISTRY

(Honours)

(**Part—B : Organic Chemistry**)

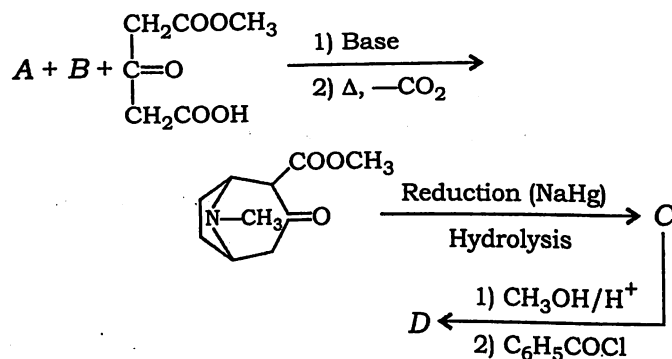(Chem–H–601)

Marks : 38

Time : 2 hours

*The figures in the margin indicate full marks
for the questions*

1. *(a)* How will you differentiate structurally between starch and cellulose?   3

   (b) Sucrose is a non-reducing sugar. Justify giving structure.   2

   (c) What is isoprene rule? How are the isoprene units linked in citral?   2½

   *(d)* How will you convert citral to geraniol? Give equations.   2

OR

2. (a) What is invert sugar? Why is it so called? 2½

(b) Write short notes on (i) cellophane and (ii) cellulose acetate. 3

(c) Give the structures of A, B, C and D in the following reaction : 4

$$A + B + \underset{\underset{CH_2COOH}{|}}{\overset{\overset{CH_2COOCH_3}{|}}{C}}=O \quad \xrightarrow[\text{2) } \Delta, -CO_2]{\text{1) Base}}$$

$$\xrightarrow[\text{Hydrolysis}]{\text{Reduction (NaHg)}} C$$

$$D \xleftarrow[\text{2) } C_6H_5COCl]{\text{1) } CH_3OH/H^+}$$

3. (a) What are α-helix and pleated structure of protein molecules? 2½

(b) How will you synthesize the following dipeptide? 2

$$H_2N-CH_2-\overset{\overset{O}{\|}}{C}-NH-\overset{\overset{CH_3}{|}}{CH}-\overset{\overset{O}{\|}}{C}-OH$$
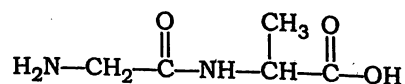
(c) Explain the specific base pairing in a double helix structure of a DNA molecule with diagram. 3

(d) What are nucleotides and nucleosides? 2

OR

4. (a) Write a note on the tertiary structure of proteins. 2½

(b) What is Vit-C? Give its structure and biological importance. 3

(c) What is the role of ADP in conversion of phosphoenol pyruvic acid into pyruvic acid? 2

(d) Draw the structure of (i) adenine and (ii) thymine. 2

5. (a) With the help of Jablonski diagram, illustrate the electronic states of a molecule and the transition between them. 3

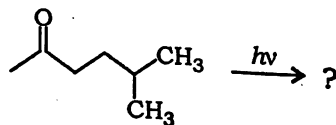(b) Predict the product(s) of the following reaction giving appropriate mechanism : 2½

$$\underset{As}{\overset{\overset{O}{\|}}{C}}\diagdown_{H} \quad + \quad \underset{CH-CH_3}{\overset{\overset{C(CH_3)_2}{\|}}{}} \quad \xrightarrow{h\nu} \quad ?$$
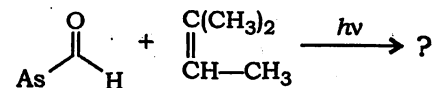
(c) Give the products of the following reactions :   2×2=4

(i) + $\xrightarrow[\text{Temperature}]{\text{Room}}$?
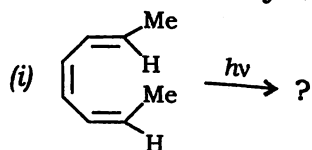
(ii) + $\xrightarrow{\Delta}$?
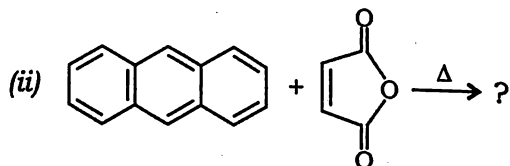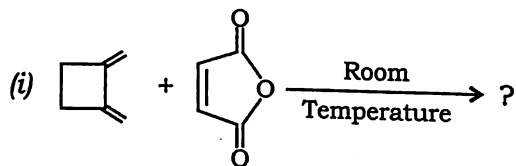
OR

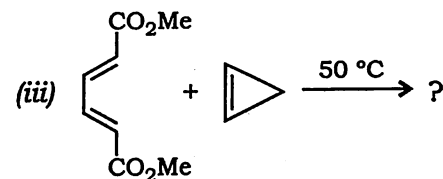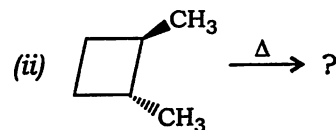6. (a) How will you differentiate between phosphorescence and fluorescence?   3

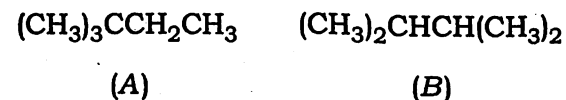(b) Predict the product of the following reaction with mechanism :   2½

 $\xrightarrow{hv}$?

(c) Predict the product(s) of the following reactions with proper stereochemistry wherever necessary :   4

(i) $\xrightarrow{hv}$?

(ii) $\xrightarrow{\Delta}$?
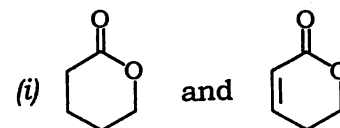
(iii) + $\xrightarrow{50\ °C}$?

(iv) $\xrightarrow{\Delta}$?
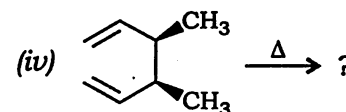
7. (a) Which of the following compounds is most likely to have its base peak at $m/z = 43$? Justify your answer :   2½

$(CH_3)_3CCH_2CH_3$ $(CH_3)_2CHCH(CH_3)_2$

(A)   (B)

(b) How will you distinguish the following pairs of compounds on the basis of IR spectroscopy?   1½×2=3

(i) and

(ii) Ethanol and dimethyl ether

(c) "Increase in polarity of the solvent shifts $\pi \to \pi^*$ band to longer wavelength but $n \to \pi^*$ band to shorter wavelength." Explain with diagram. 2

(d) Predict how many ^1H NMR signals will the following molecule have. Roughly sketch the spectra of the same : 2
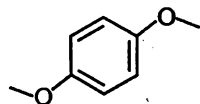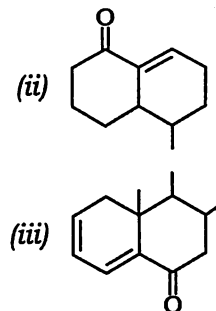

OR

8. (a) Write a short note on McLafferty rearrangement. 2½

(b) Explain the effect of the ring size on $\nu_{C=O}$ absorption band of cyclo-butanone and cyclohexanone. 2

(c) Using the Woodward-Fieser rule, calculate the λ_{max} for each of the following compounds : 1×3=3

(i)

(*Continued*)

(ii)

(iii)
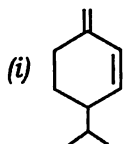
(d) An organic compound having molecular formula $C_{10}H_{12}O_2$ gives the following data :

IR : $\nu_{C=O}$ 1740 cm^{-1}

^1H NMR : δ 1·2 (3H, triplet), 3·5 (2H, singlet), 4·2 (2H, quartet), 7·3 (5H, multiplet)

Predict the structure of the compound. 2

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