### **ORGANIC CHEMISTRY**

## **CARBOXYLIC ACID & THEIR DERIVATIVE**

1. The total number of sp<sup>2</sup> hybridised carbon atoms in the major product **P** (a non-heterocyclic compound) of the following reaction is \_\_\_\_\_\_. [JEE(Advanced) 2023]

$$NC$$
 $CN$ 
 $CN$ 
 $(i)$  LiAlH<sub>4</sub> (excess), then H<sub>2</sub>O
 $(ii)$  Acetophenone (excess)

2. In the following reaction, compound  $\mathbf{Q}$  is obtained from compound  $\mathbf{P}$  via an ionic intermediate

$$C_6H_5$$
 $C_6H_5$ 
 $C_6H_5$ 

What is the degree of unsaturation of  $\mathbf{Q}$ ?

[JEE(Advanced) 2020]

3. Answer the following by appropriately matching the lists based on the information given in the paragraph.

List-I includess starting materials and reagents of selected chemical reactions. List-II gives structures of compounds that may be formed as intermediate products and/or final products from the reactions of List-I.

List-II List-II

(III) 
$$Cl$$
  $i)$   $KCN$   $ii)$   $H_3O, \Delta$   $\Delta$   $iii)$   $LiAlH_4$   $iv)$  conc.  $H_2SO_4$ 

$$(\mathbf{R})$$

$$(S)$$
  $CO_2H$ 

$$(T)$$
  $CO_2H$   $CO_2H$ 

Which of the following options has correct combination considering List-I and List-II?

[JEE(Advanced) 2019]

(A) (III), (S), (R)

(B) (IV), (Q), (R)

(C) (III), (T), (U)

(D) (IV), (Q), (U)

# 4. Answer the following by appropriately matching the lists based on the information given in the paragraph

List-I includes starting materials and reagents of selected chemical reactions. List-II gives structures of compounds that may be formed as intermediate products and/or final products from the reactions of List-I.

List-I

List-II

(II) 
$$\begin{array}{c} \text{i) } O_3 \\ \text{ii) } Zn, H_2O \\ \text{iii) } NaBH_4 \\ \text{iv) conc. } H_2SO_4 \end{array}$$

$$(Q)$$
  $OH$ 

(III) 
$$Cl$$
  $i)$   $KCN$   $ii)$   $H_3O, \Delta$   $\Delta$   $iii)$   $LiAlH_4$   $iv)$  conc.  $H_2SO_4$ 

(T) 
$$CO_2H$$

Which of the following options has correct combination considering List-I and List-II?

[JEE(Advanced) 2019]

D) 
$$(I)$$
,  $(S)$ ,  $(Q)$ ,  $(R)$ 

5. Different possible <u>thermal</u> decomposition pathways for peroxyesters are shown below. Match each pathway from List-I with an appropriate structure from List-II and select the correct answer using the code given below the lists.
[JEE(Advanced) 2014]

List-I

List-II

$$C_6H_5$$
  $C_6H_5$   $C_6H_5$ 

$$(4) \quad C_6H_5 \qquad O \qquad \begin{array}{c} CH_3 \\ C_6H_5 \end{array}$$

#### Code:

- (A) 1 3 4 2
- (B) 2 4 3 1
- (C) 4 1 2 3
- (D) 3 2 1 4

## **SOLUTIONS**

## 1. Ans. (28)

Sol.

$$N \equiv C$$

$$C \equiv N$$

$$N \equiv C$$

$$C \equiv N$$

$$H_2N - CH_2$$

$$CH_2 - NH_2$$

$$CH_2 - NH_2$$

$$CH_2 - NH_2$$

$$CH_3 - C - Ph$$

$$CH_3$$

Total number of  $sp^2$  hybridised C-atom in P = 28

## 2. Ans. (18.00)

Sol.

3. Ans. (B)

III, T, Q, R

$$\begin{array}{c} \text{CO}_2\text{Me} \\ \text{CO}_2\text{Me} \end{array} \xrightarrow{\text{LiAlH}_4} \begin{array}{c} \text{OH} \\ \text{CH}_2\text{OH} \end{array}$$

IV, Q, R

4. Ans. (B)

Sol.

$$\begin{array}{c} CN \\ O \\ \hline \\ O \\ \hline \end{array} \begin{array}{c} DiBALH \\ dil\ HCl \\ \hline \\ CH = O \\ \hline \\ NaBH_4 \\ \hline \\ CH_2OH \\ \hline \\ Conc.H_2SO_4 \\ \hline \\ \end{array}$$

I, Q, R

$$CH_{2}-CH = O$$

$$CO_{2}H$$

$$CO_{2}H$$

$$CH_{2}-OH$$

$$CH_{2}-OH$$

$$CO_{2}H$$

$$CO_{2}H$$

$$CO_{2}H$$

$$CO_{2}H$$

$$CO_{2}H$$

$$CO_{3}H$$

$$CO_{4}D$$

$$CO_{5}H$$

$$CO_{6}D$$

$$CO_{7}D$$

$$CO_{8}D$$

$$CO_{8}D$$

$$CO_{8}D$$

**II**, **P**, **S**, **U** 

5. Ans. (A)

Sol. (1) 
$$Ph - CH_2 - C$$

$$O \longrightarrow CH_3 \longrightarrow Ph - CH_2 + CO_2 + CH_3O$$

$$(R) \qquad (R'O)$$

 $(1) \longrightarrow Pathway (P)$ 

(2) 
$$Ph - C - O - O - CH_3 \xrightarrow{\Delta} Ph - C - O^{\bullet} + CH_3O^{\bullet}$$

$$\downarrow \Delta \qquad (R'O^{\bullet})$$

$$Ph^{\bullet} + CO_2 \qquad (R^{\bullet})$$

(2) 
$$\longrightarrow$$
 Pathway (S)

(3)  $Ph - CH_2 - C$ 

O

C

CH<sub>3</sub>

CH<sub>3</sub>

CH<sub>3</sub>

CH<sub>2</sub>

Ph -  $\dot{C}H_2 + CO_2 + \dot{O} - C$ 

CH<sub>3</sub>

CH<sub>2</sub>

CH<sub>3</sub>

CH<sub>2</sub>

CH<sub>3</sub>

CH<sub>2</sub>

Ph (R'O')

O = C

CH<sub>3</sub>

CH<sub>2</sub>

CH<sub>3</sub>

CH<sub>2</sub>

Ph (R'O')

 $(3) \longrightarrow Pathway (Q)$ 

(4) 
$$Ph - C$$

$$O$$

$$CH_3$$

$$Dh - C$$

$$CH_3$$

$$Ph - C$$

$$O$$

$$CH_3$$

$$Ph \cdot CO_2$$

$$O = C$$

$$CH_3$$

$$Ph \cdot CO_2$$

$$O = C$$

$$CH_3$$

$$Ph \cdot CO_2$$

$$O = C$$

$$Ph \cdot CO_2$$

$$O = C$$

 $(4) \longrightarrow Pathway (R)$