Additional Problems for Self Practice (APSP)

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

PART - I : PRACTICE TEST-1 (IIT-JEE (MAIN Pattern))

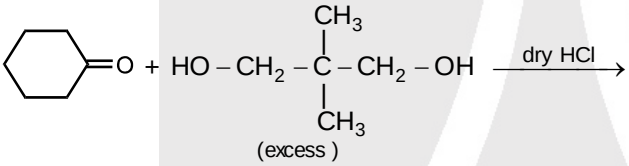
Max. Time : 1 Hr. **Max. Marks : 120**

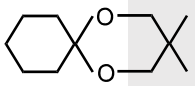
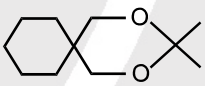
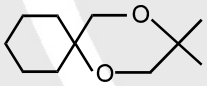
Important Instructions

1. The test is of **1 hour** duration.
2. The Test Booklet consists of **30** questions. The maximum marks are **120.**
3. Each question is allotted **4 (four)** marks for correct response.
4. Candidates will be awarded marks as stated above in Instructions No. 3 for correct response of each question. **¼ (one fourth)** marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 4 above.

1. Among the given compounds, the most susceptible to nucleophilic attack at the carbonyl carbon is :
(1) MeCOCl (2) MeCHO (3) MeCOOMe (4) MeCOOCOMe

2. Which of the following will be product of following reaction ?



(1)  (2)  (3)  (4) 

3. Under Wolf Kishner reduction conditions, the conversion which may be brought about is ?
(1) Benzaldehyde into Benzyl alcohol (2) Cyclohexanol into Cyclohexane
(3) Cyclohexanone into Cyclohexanol (4) Benzophenone into Diphenylmethane

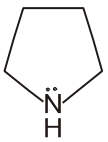
4. An organic compound C_3H_6O does not give a precipitate with 2,4-dinitrophenyl hydrazine reagent and also does not react with metallic sodium it could be :
(1) $CH_3–CH_2–CHO$ (2) $CH_3–COCH_3$
(3) $CH_2=CH–CH_2–OH$ (4) $CH_2=CH–OCH_3$

5. In the given reaction sequence

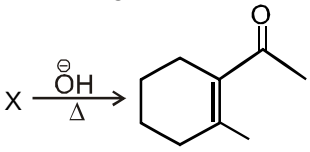
$$Ph–CH_2–CHO \xrightarrow{NaOH} \xrightarrow{\Delta} \xrightarrow{H_2/Ni} (X)$$

Product (X) will be :
(1) $Ph–CH_2–\underset{\displaystyle OH}{\underset{|}{CH}}–\underset{\displaystyle CHO}{\underset{|}{CH}}–Ph$ (2) $Ph–CH_2–CH_2–\underset{\displaystyle CH_2OH}{\underset{|}{CH}}–Ph$
(3) $Ph–CH_2–CH_2–\underset{\displaystyle CHO}{\underset{|}{CH}}–Ph$ (4) $Ph–CH_2–CH_2–\underset{\displaystyle CH_3}{\underset{|}{CH}}–Ph$

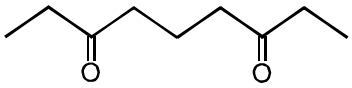
6. Among the following compounds which one will react with acetone to give a product that contains carbon-nitrogen double bond ?

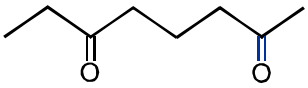
(1) $C_6H_5\ddot{N}HC_6H_5$ (2) $(CH_3)_3\ddot{N}$ (3)  (4) $C_6H_5\ddot{N}H\ddot{N}H_2$

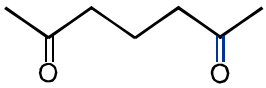
7. Consider following intramolecular aldol condensation reaction.

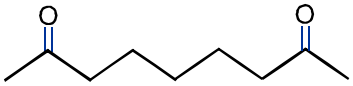


X can be :

(1) 

(2) 

(3) 

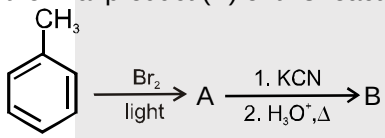
(4) 

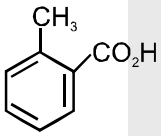
8. An organic compound X (C_3H_8O) on treatment with acidified $K_2Cr_2O_7$ gives compound Y which reacts with I_2 and sodium carbonate to form Triiodomethane. The compound X can be :

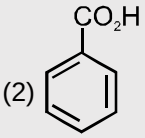
(1) $CH_3–CH_2–CH_2–OH$ (2) $CH_3–CH_2–O–CH_3$

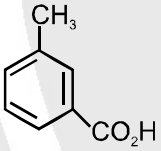
(3) $CH_3–CH_2–CH=O$ (4) $CH_3CH(OH)CH_3$.

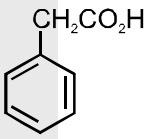
9. What is the final product (B) of this reaction sequence ?



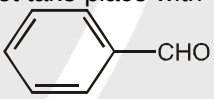
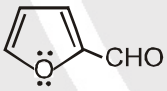
(1) 

(2) 

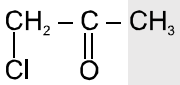
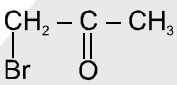
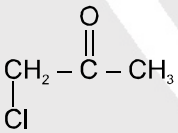
(3) 

(4) 

10. Cannizzaro reaction does not take place with

(1) $(CH_3)_3CCHO$ (2)  (3)  (4) CH_3CHO.

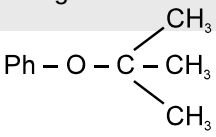
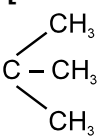
11. Which of the following does not give haloform reaction :

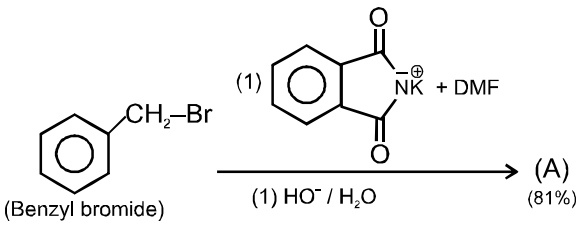
(1)  (2)  (3)  (4) 

12. Synthesis of an ester involves the reaction of alcohols with

(1) a ketone (2) an amide (3) CH_3MgBr (4) RCOCl

13. Phenyl magnesium bromide reacting with t-Butyl alcohol gives **[JEE-2005, 3/60]**

(1) Ph – OH (2) Ph – H (3)  (4) 

14. 

(Benzyl bromide)

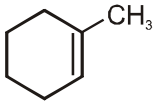
Product (A) of the above reaction is :

(1) $Ph–NH_2$ (2) $Ph–CH_2–NH_2$ (3) $Ph–CH_2–NH–CO_2H$ (4) $Ph–CH_2–NH–CHO$

15. In the reaction sequence

$$CH_3-\overset{O}{\overset{\|}{C}}-H \xrightarrow[\ominus OH]{HCN} (A) \xrightarrow[\Delta]{H_2O/\overset{\oplus}{H}} \text{Product}$$ is/are :

(1) Diasteromers
(2) Racemic mixture of hydroxy acid
(3) Product is racemic mixture of cyanohydrin
(4) Product is optically inactive

16.  On reductive ozonolysis yields

(1) 6-oxoheptanal
(2) 6-oxoheptanoic acid
(3) 6-hydroxyheptanal
(4) 3-hydroxypentanal

17. The cyanohydrin of a carbonyl compound on hydrolysis gives lactic acid. The carbonyl compound is
(1) HCHO (2) CH_3CHO (3) CH_3COCH_3 (4) $CH_3COCH_2CH_3$

18. Which of the following will not undergo aldol condensation ?
(1) CH_3CHO (2) CH_3CH_2CHO (3) CD_3CHO (4) PhCHO

19. $PhCHO + (CH_3CO)_2O \xrightarrow[(2)\text{ hydrolysis, }\Delta]{(1)\ CH_3COONa} A \xrightarrow{HBr} B$ B

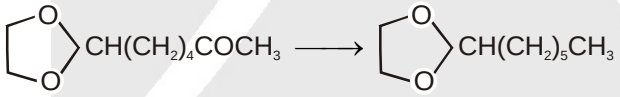
The product B is :
(1) $PhCH = CHCH_2Br$
(2) $PhCH(Br) - CH_2 - COOH$
(3) $PhCH_2\ CH(Br)\ COOH$
(4) $PhCH = CH - COBr$

20. What will be the product of the following reaction

$$Ph-\underset{Me}{\underset{|}{CH}}-\overset{O}{\overset{\|}{C}}-Me \xrightarrow{RCO_3H} ?$$

(1) $Ph-\underset{Me}{\underset{|}{CH}}-O-\overset{O}{\overset{\|}{C}}-Me$
(2) Ph—CH
(3) PhCH(Me)OCOOMe
(4) None of these

21. In the following conversion



Which of the following regents is suitable ?
(1) NH_2NH_2,KOH, DMSO
(2) $NaBH_4$
(3) Zn-Hg, concentrated H_2SO_4
(4) $LiAlH_4$

22. The major product formed in the reaction.

$$C_6H_5CHO + CH_3NO_2 \xrightarrow[\text{heat}]{NaOH} (X)$$

(1) $C_6H_5-\underset{O}{\underset{\diagdown\ \diagup}{CH-CH}}-NO_2$
(2) $C_6H_5\underset{OH}{\underset{|}{CH}}CH_2NO_2$
(3) $C_6H_5CH = CH - NO_2$
(4) $C_6H_5CH(CH_2NO_2)_2$.

23. For the following acids the rate of decarboxylation on heating would be :

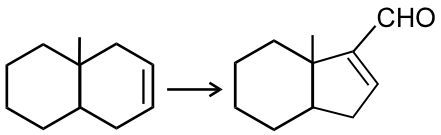
I. $C_6H_5-\overset{O}{\overset{\|}{C}}-CH_2-COOH$
II. $C_6H_5-\overset{O}{\overset{\|}{C}}-COOH$
III. CH_3-CH_2-COOH
IV. $HOOC-CH_2-COOH$
(1) III > I > IV > II (2) I > III > IV > II (3) III > IV > I > II (4) I > IV > II > III

24. $R-\overset{\overset{O}{\|}}{C}-Cl \xrightarrow{NH_3} NH_4Cl + (X) \xrightarrow[\Delta]{P_4O_{10}} (Y) \xrightarrow[(ii)H_2O]{(i)\ DIBAL-H} (Z)$

The compound (Z) is :

(1) R–COOH (2) $R-CH_2-OH$ (3) $R-C\equiv N$ (4) RCHO

25.



(1) $\xrightarrow[(1)]{O_3/Zn,H_2O} \xrightarrow[(2)]{OH^{\ominus}} \xrightarrow[(3)]{\Delta}$

(2) $\xrightarrow[(1)]{CrO_3} \xrightarrow[(2)]{H^{\oplus}}$

(3) $\xrightarrow[(1)]{N_2H_4} \xrightarrow[(2)]{OH^{\ominus}} \xrightarrow[(3)]{\Delta}$

(4) $\xrightarrow[(1)]{KMnO_4/H^+} \xrightarrow[(2)]{OH^{\ominus}}$

26. Starting from propanoic acid, the following reactions were carried out

Propanoic acid $\xrightarrow{SOCl_2}$ X $\xrightarrow{NH_3}$ Y $\xrightarrow{Br_2 + KOH}$ Z

What is the compound Z

(1) CH_3-CH_2-Br (2) $CH_3-CH_2-NH_2$

(3) $CH_3-CH_2-C(=O)-Br$ (4) $CH_3-CH_2-CH_2-NH_2$

27. Which of the following acids remains unaffected on heating

(1) Malonic acid (2) Malic acid (3) Fumaric acid (4) Succinic acid

28. m-chlorobenzaldehyde on reaction with conc. KOH at room temperature gives : **[JEE 91]**

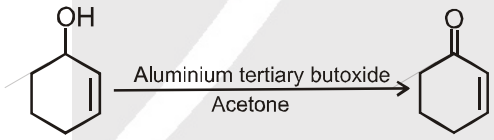
(1) Potassium m-chlorobenzoate and m-hydroxybenzaldehyde

(2) m-hydroxybenzaldehyde and m-chlorobenzyl alcohol

(3) m-chlorobenzyl and m-hydroxybenzyl alcohol

(4) Potassium m-chlorobenzoate and m-chlorobenzyl alcohol.

29. The given reaction



is known as :

(1) Kolbe reaction (2) Tischenko reaction

(3) MPV reaction (4) Oppeneur oxidation

30. In which of the following reactions Benzaldehyde is the final major product ?

(i) $Ph-CH_3 + CrO_3 + (CH_3CO)_2O \xrightarrow{273-283\ K} \xrightarrow[\Delta]{H_3O^+}$

(ii) $Ph-CH_3 \xrightarrow[h\nu]{Cl_2} Ph-CHCl_2 \xrightarrow[100°C]{H_2O}$

(iii) $C_6H_6 \xrightarrow[AlCl_3]{CO + HCl}$

(iv) $Ph-COCl + (CH_3)_2Cd \longrightarrow$

(1) i & ii only (2) ii & iii only

(3) iii & iv only (4) i, ii & iii only

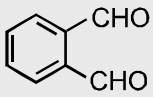
Practice Test-1 (IIT-JEE (Main Pattern))

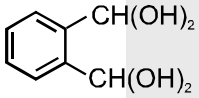
OBJECTIVE RESPONSE SHEET (ORS)

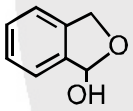
Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

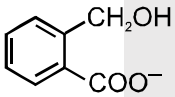
PART - II : NATIONAL STANDARD EXAMINATION IN CHEMISTRY (NSEC) STAGE-I

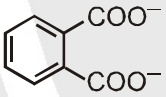
ALDEHYDES & KETONES

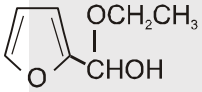
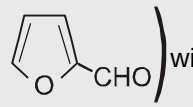
1. The treatment of  with concentrated NaOH gives **[NSEC-2003]**

(A) 

(B) 

(C) 

(D) 

2. Compound  formed by the reaction of furfural  with ethanol is :

[NSEC-2003]

(A) an aldol (B) an acetal (C) a hemiacetal (D) a ketal.

3. Industrial production of acetaldehyde is done by **[NSEC-2005]**

(A) oxidation of ethanol (B) reduction of acetic acid

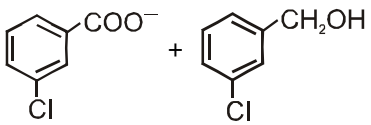
(C) oxidation of ethylene (D) hydration of acetylene

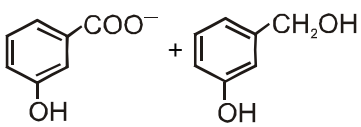
4. Acetaldehyde reacts with a mixture of KCN and NH_4Cl to give a product X which upon hydrolysis yields alanine. The product X is **[NSEC-2005]**

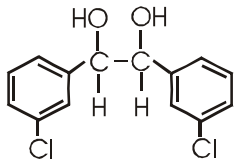
(A) an aminonitrile (B) a cyanohydrin

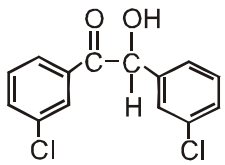
(C) an aminoalcohol (D) a chlorohydrin

5. When meta chlorobenzaldehyde is treated with 50% KOH, the product obtained is **[NSEC-2006]**

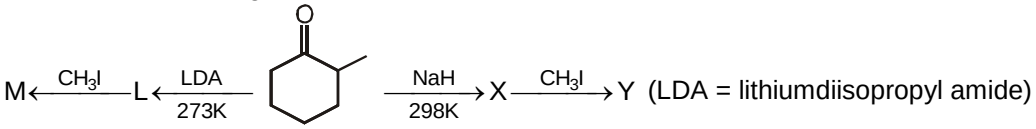
(A) 

(B) 

(C) 

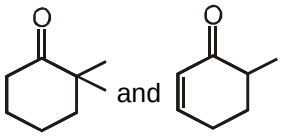
(D) 

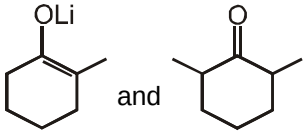
6. Consider the following reactions :

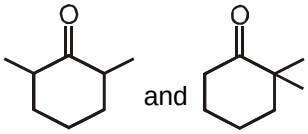


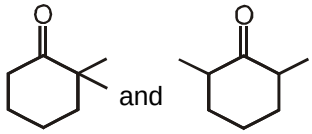
(LDA = lithiumdiisopropyl amide)

The product M and Y respectively are : **[NSEC-2007]**

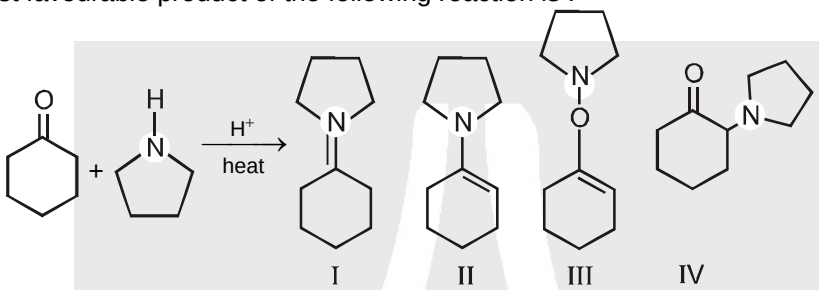
(A)  and

(B)  and

(C)  and

(D)  and

7. The most favourable product of the following reaction is : **[NSEC-2009]**



(A) I (B) II (C) III (D) IV

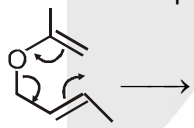
8. The compound that would undergo hydration very easily is : **[NSEC-2010]**

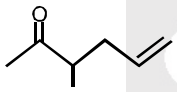
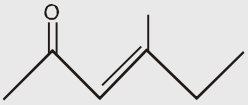
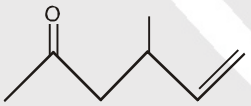
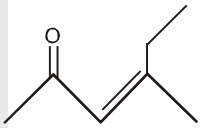
(A) CH_3COCH_2Cl (B) CH_3CH_2CHO (C) $Cl_3C–CHO$ (D) $Cl_3CCH_2COCH_3$

9. Cyclohexanone oxime is converted into ε-caprolactam by treatment with **[NSEC-2010]**

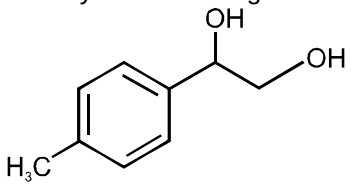
(A) dil HCl (B) $NaOC_2H_5$ (C) ammonia (D) conc. H_2SO_4

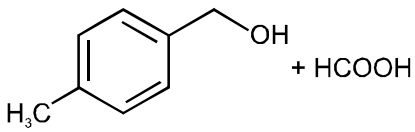
10. Curved arrows are used in Organic Chemistry to show the movements of electrons in the mechanism of a reaction. The correct product of the following reaction is **[NSEC-2011]**

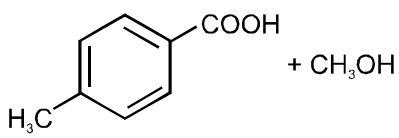


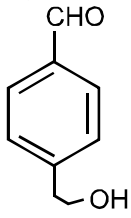
(A)  (B)  (C)  (D) 

11. The reaction of 50% aq KOH on an equimolar mixture of 4-methylbenzaldehyde and formaldehyde followed by acidification gives - **[NSEC-2011]**

(A) 

(B) 

(C) 

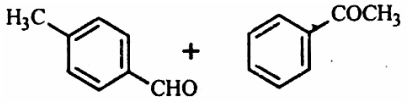
(D) 

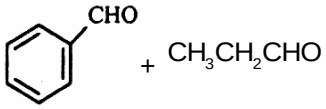
12. Which of the following reaction mechanism does not involve carbocation as an intermediate ? **[NSEC-2012]**

(A) Baeyer-Villiger Oxidation
(B) Beckman rearrangement
(C) Fries Rearrangement
(D) Diels-Alder Reaction

13. The pair of equimolar compounds that would be give a **single** condensation product when treated with an alkali is **[NSEC-2014]**

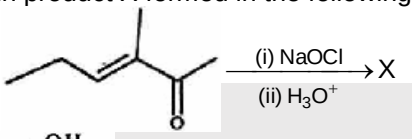
(A) $CH_3 - CHO + CH_3CH_2CHO$

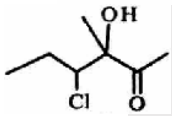
(B) 

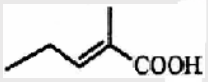
(C) 

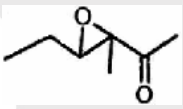
(D) $CH_3CHO + HCHO$

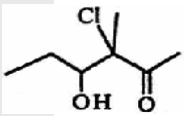
14. The main product X formed in the following reactions is **[NSEC-2014]**



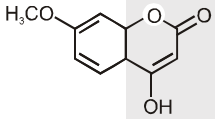
(A) 

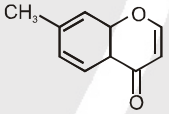
(B) 

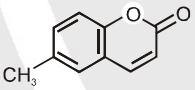
(C) 

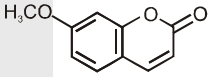
(D) 

15. An organic compound ("X") is a disubstituted benzene containing 77.8% carbon and 7.4% hydrogen. Heating an alkaline solution of "X" with chloroform gives a steam volatile compound "Y". Heating "Y" with acetic anhydride and sodium acetate gives a sweet smelling crystalline solid "Z". "Z" is **[NSEC-2015]**

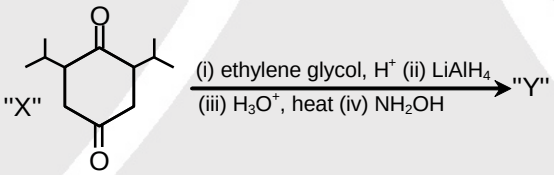
(A) 

(B) 

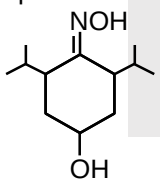
(C) 

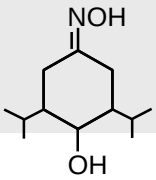
(D) 

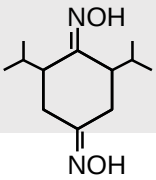
16. Compound "X" undergoes the following sequence of reactions to form "Y". **[NSEC-2015]**

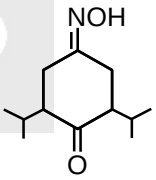


Compound "Y" is-

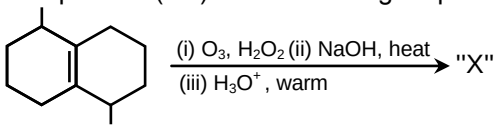
(A) 

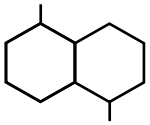
(B) 

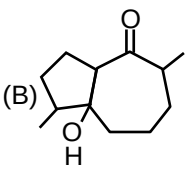
(C) 

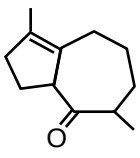
(D) 

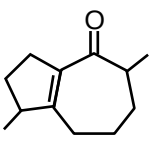
17. The product ("X") of the following sequence of reactions is **[NSEC-2015]**



(A) 

(B) 

(C) 

(D) 

18. Three isomeric compounds M, N, and P ($C_5H_{10}O$) give the following tests: **[NSEC-2015]**

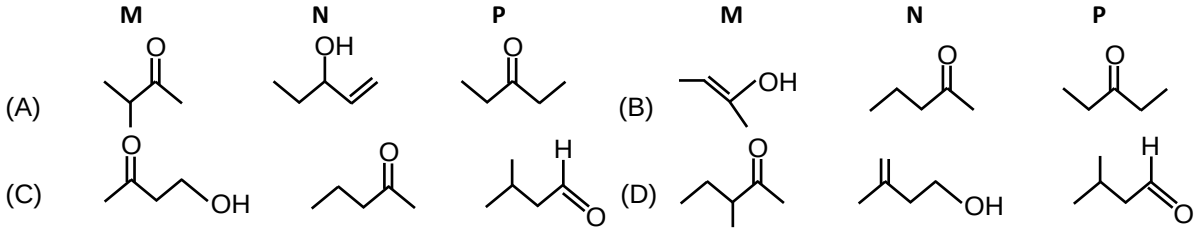
(i) M and P react with sodium bisulfite to form an adduct J

(ii) N consumes l mol of bromine and also gives turbidity with conc. HCI/anhydrous $ZnCl_2$ after prolong heating'

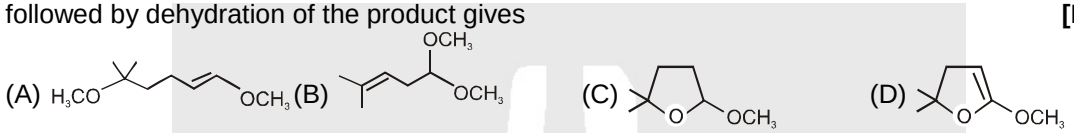
(iii) M reacts with excess of iodine in alkaline solution to give yellow crystalline compound with a characteristic smell.

(iv) p-Rosaniline treated with sulphur dioxide develops pink colour on shaking with **P**

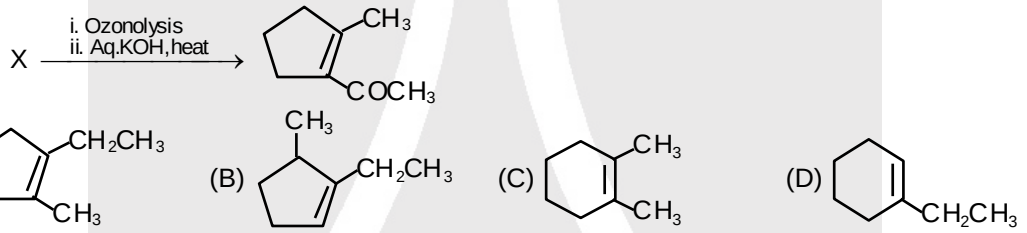
The structure of M,N, and P, respectively are



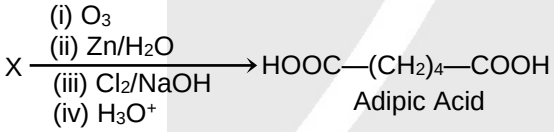
19. 4-Hydroxy-4-methylpentanal on heating with excess of methanol in the presence of an acid catalyst followed by dehydration of the product gives **[NSEC-2015]**

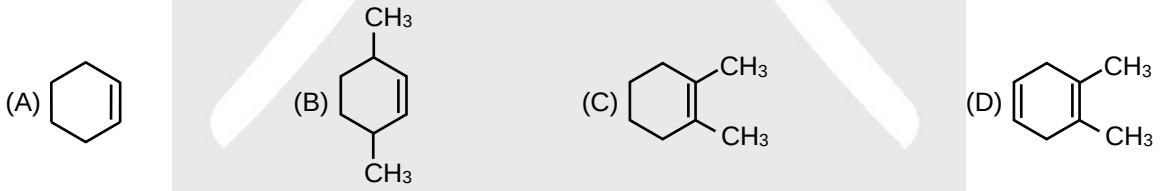


20. Compound 'X' in the following reaction is **[NSEC-2016]**

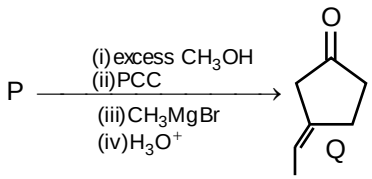


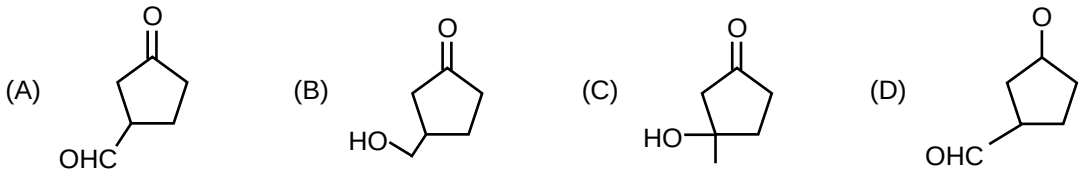
21. Compound 'X' in the following reaction is **[NSEC-2018]**



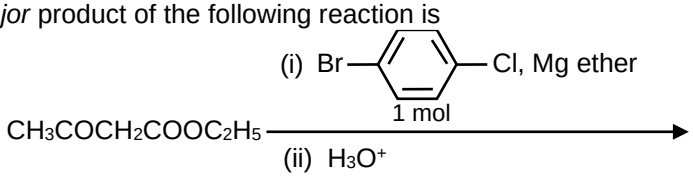


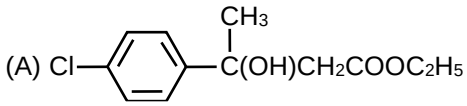
22. Compound 'P' that undergoes the sequence of reactions given below to give the product Q is **[NSEC-2018]**

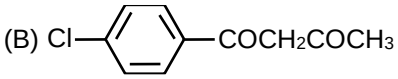


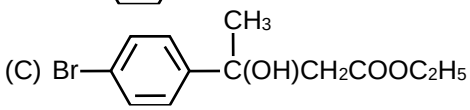


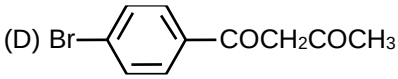
23. The *major* product of the following reaction is **[NSEC-2018]**



(A) 

(B) 

(C) 

(D) 

CARBOXYLIC ACID & DERIVATIVES

21. The reaction $RCH_2CH_2COOH \xrightarrow[Br_2]{\text{Red P}} RCH_2-\underset{\displaystyle Br}{\underset{|}{C}}HCOOH$ is called as : **[NSEC-2001]**

(A) Cannizzaro reaction (B) Hell Volhared Zelinsky reaction
(C) Reimer Teimann reaction (D) Sandmeyer reaction

22. Formic acid and acetic acid differ in **[NSEC-2002]**
(A) turning blue litmus red (B) forming an ester with methanol
(C) replacement of hydrogen atom by sodium (D) reduction of Fehling's solution.

23. The electrolysis of the disodium salt of pentanedioic acid gives **[NSEC-2002]**
(A) pentane (B) butane (C) Cyclopropane (D) ethane.

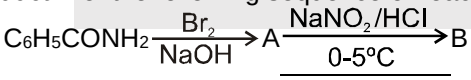
24. The compound that gives a lactone on heating is **[NSEC-2003]**
(A) pentanedioic acid (B) 4-hydroxypentanoic acid
(C) 4-aminopentanoic acid (D) 2-hydroxypentanoic acid.

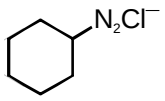
25. The compound that readily undergoes decarboxylation is **[NSEC-2003]**
(A) $HOOC–(CH_2)_4–COOH$ (B) $C_6H_5–COOH$
(C) $HOOC–CH_2–COOH$ (D) $CH_3CH_2CH_2COOH$.

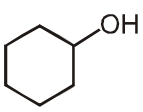
26. The most unstable compound is **[NSEC-2003]**
(A) 2-oxobutanoic acid (B) 3-oxobutanoic acid
(C) 3-amino-2-butanone (D) 2-hydroxybutanal.

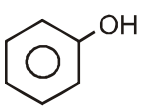
27. The product obtained when propanamide is distilled with phosphorus pentoxide is **[NSEC-2004]**
(A) $(CH_3CH_2CO)_2O$ (B) CH_3CH_2CN
(C) $CH_3CH_2COOCH_2CH_3$ (D) $(CH_3CH_2COO)_3PO$.

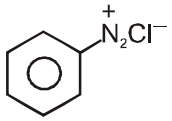
28. The product B of the following sequence of reactions is **[NSEC-2004]**



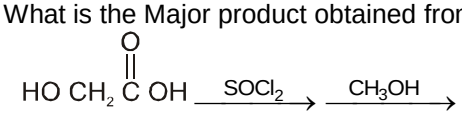
(A) 

(B) 

(C) 

(D) 

29. What is the Major product obtained from the following reaction ? **[NSEC-2007]**

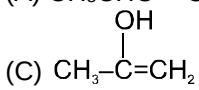
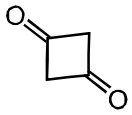


(A) $HOCH_2COOCH_3$ (B) $CH_3OCH_2COOCH_3$
(C) $ClCH_2COOCH_3$ (D) CH_3OCH_2COOH

30. What is the major product obtained from the following reaction ? **[NSEC-2007]**

$CH_3COCH_2COOH \xrightarrow{heat}$ Product

(A) $CH_3CHO + CH_3COOH$ (B) CH_3COCH_3

(C)  (D) 

31. A nitrile X is treated with $LiAlH_4$ to obtain compound Y(C_2H_7N). In a separate reaction X is hydrolyzed in an acid medium to obtain Z. The product obtained after mixing Y and Z will be : **[NSEC-2014]**

(A) $CH_3CONHCH_2CH_3$ (B) $CH_3CH_2CONHCH_2CH_3$

(C) $\left(CH_3COO^-\right)\left(CH_3CH_2NH_3^+\right)$ (D) $\left(CH_3CH_2COO^-\right)\left(CH_3NH_3^+\right)$

32. $CH_3CH_2CH(OH)CH(CH_3)_2 + CH_3COCl \xrightarrow{base} CH_3CH_2CH(OCOCH_3)CH(CH_3)_2 + HCl$

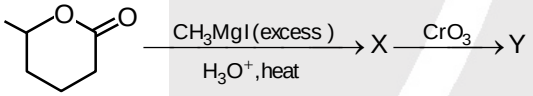
In the above reaction, if the reactant alcohol is pure R-isomers, the product would. **[NSEC-2014]**

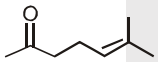
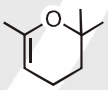
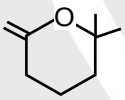
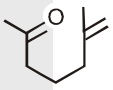
(A) have configuration inverted at the chiral atom
(B) be a racemic mixture
(C) have the same configuration at the chiral atom
(D) be optically inactive

33. Compound P on treatment with CH_2N_2 (diazomethane) produces compound Q. Compound Q on reaction with HI produces two alkyl iodides R and S. Alkyl iodide S with higher number of carbon atoms on reaction with KCN followed by hydrolysis gives 3-methylbutanoic acid. The compound P is : **[NSEC-2015]**

(A) 2-butanol (B) 1-butanol
(C) 2-methyl-2-propanol (D) 2-methyl-1-propanol

34. The major product(Y) of the following reaction is – **[NSEC-2015]**



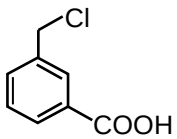
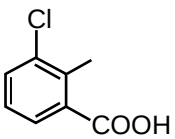
(A)  (B)  (C)  (D) 

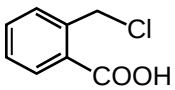
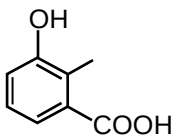
35. 4-amino-3-methylbutanoic acid is treated with thionyl chloride followed by ammonia to obtain compound "X". "X" on reaction with bromine in an alkaline medium gave compound "Y". For estimation, "Y" was titrated with perchloric acid. The volume of 0.1_M perchloric acid needed to react with 0.22 g of "Y" is **[NSEC-2015]**

(A) 50 mL (B) 80 mL (C) 120 mL (D) 200 mL

39. The compound 'X' undergoing the following reaction is **[NSEC-2018]**

$$X \xrightarrow[\text{(iii) acid } K_2Cr_2O_7 \text{ (iv) Heat}]{\text{(i) dil aq NaOH (ii) } H^+} C_8H_4O_3$$

(A)  (B) 

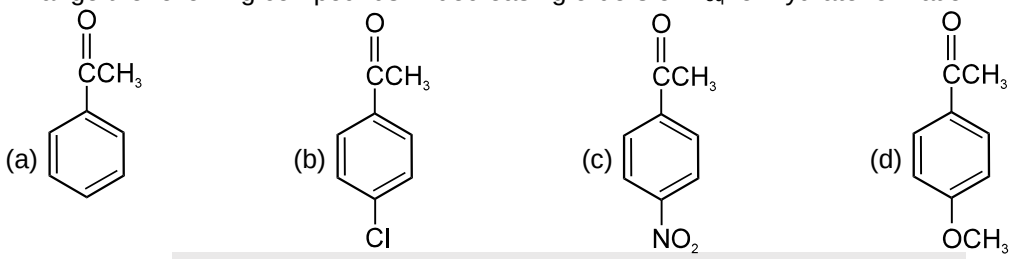
(C)  (D) 

PART - III : HIGH LEVEL PROBLEMS (HLP)

SUBJECTIVE QUESTIONS

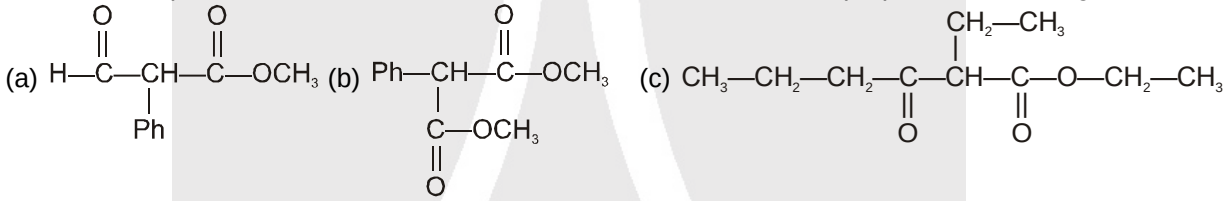
1. When semicarbazide reacts with a ketone (or aldehyde) to form semicarbazone. Only one nitrogen atom of semicarbazide acts as a nucleophile and attack the carbonyl carbon of the ketone. The product of the reaction consequently is $R_2C=N-NH-CONH_2$ rather than $R_2C=NCONH-NH_2$. What factor account for the fact that two nitrogen atoms of semicarbazide are relatively non nucleophilic ?

2. Arrange the following compounds in decreasing orders of K_{eq} for hydrate formation.

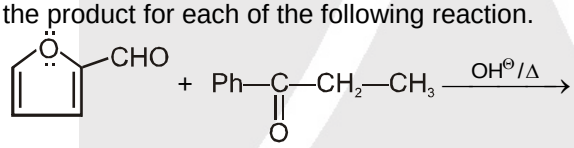


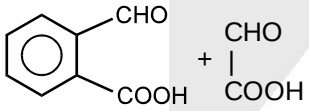
3. When acetone is treated with excess of benzaldehyde in the presence of base, the crossed condensation add two equivalents of benzaldehyde and expels two equivalent of water and forms [X]. Identify the structure of [X] when [X] reacts with NH_2OH how many stereoisomers are formed.

4. Write the components which on claisen condensation could be used to prepare the following esters.



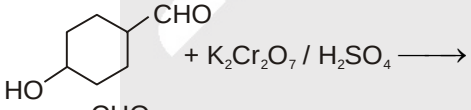
5. Predict the product for each of the following reaction.

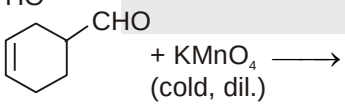


6. 

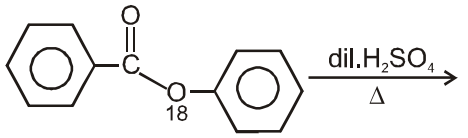
Product is :

7. Write the product of following reaction :

(a) 

(b) 

8. An organic compound A, $C_4H_4O_3$, in dry benzene in the presence of anhydrous $AlCl_3$ gives compound B. The compound B on treatment with PCl_5, followed by reaction with $H_2/Pd(BaSO_4)$ gives compound C, which on reaction with hydrazine gives a cyclised compound D ($C_{10}H_{10}N_2$). Identify A, B, C and D. Explain the formation of D from C.

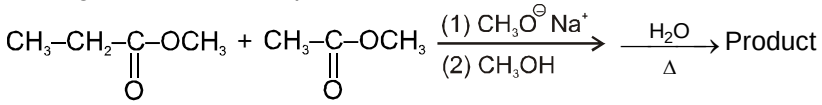
9. 

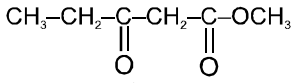
A + B, find A and B.

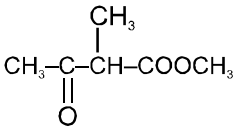
10. $C_6H_{12}O_2$ (X) $\xrightarrow{H_3O^+}$ $C_2H_5CO_2H + C_3H_7OH$, X is :

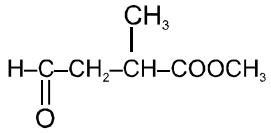
ONLY ONE OPTION CORRECT TYPE

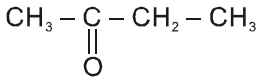
11. In the given reaction the product is :



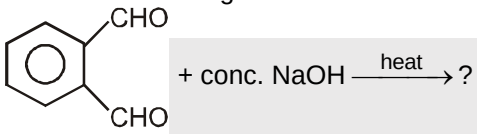
(A) 

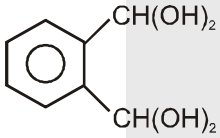
(B) 

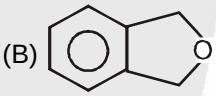
(C) 

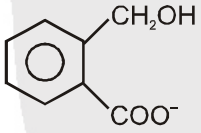
(D) 

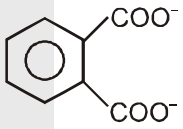
12. Product of following reaction is



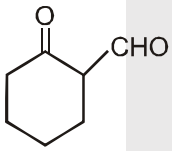
(A) 

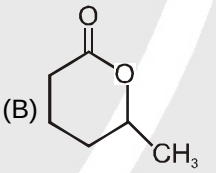
(B) 

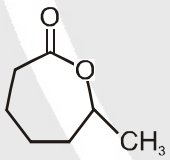
(C) 

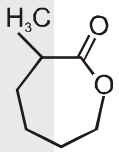
(D) 

13. 2-Methyhlcyclohexanone is allowed to react with metachloroperbenzoic acid. The major product in the reaction is

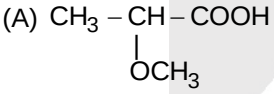
(A) 

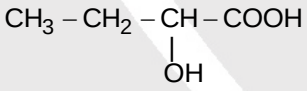
(B) 

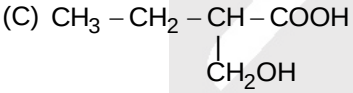
(C) 

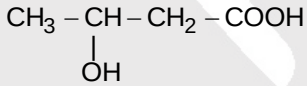
(D) 

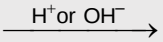
14. Which optically active compound on reduction with $LiAlH_4$ will give optically inactive compound?

(A) 

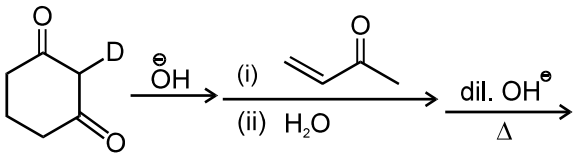
(B) 

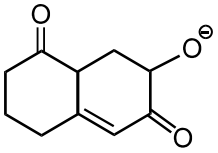
(C) 

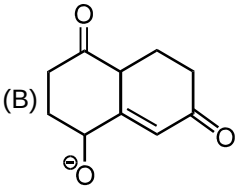
(D) 

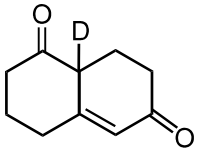
15. The reaction, RCOOR′ + R′′OH (excess)  RCOOR′′ + R′ OH is called.

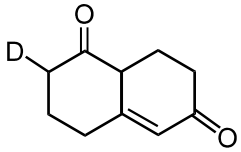
(A) Esterification
(B) Trans-esterification
(C) Saponification
(D) Hydrolysis

16.  (X) Identify.

(A) 

(B) 

(C) 

(D) 

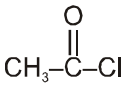
MATCH THE COLUMN

17. Match the product of **Column- II** with the reaction given in **Column- I.**

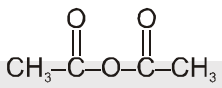
Column- I	**Column- II**
(A) RMgI + Acetonitrile ($CH_3C \equiv N$)	(p) Alkanone
(B) RMgI + Carbon disulphide	(q) Ester
(C) RMgI.(1eq) + Ethyl chloroformate	(r) 1° Alcohol
(D) RMgI + Oxirane	(s) Dithionic acid

SINGLE AND DOUBLE VALUE INTEGER TYPE

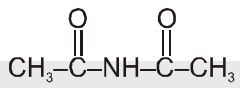
18. How many compounds out of the following are more reactive than ethyl acetate towards hydrolysis.



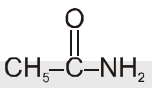
(I)



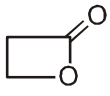
(II)



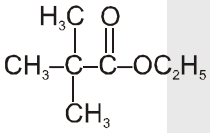
(III)



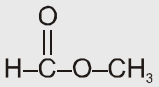
(IV)



(V)

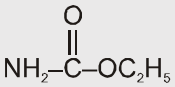


(VI)

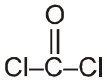


(VII)

(VIII)

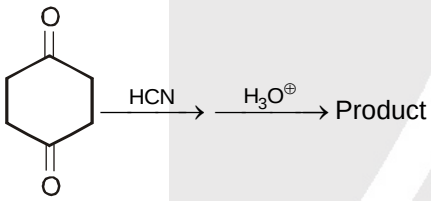


(IX)



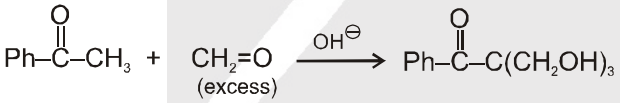
(X)

19.



The product of the following reactions is optically inactive and exist in Y diasteromeric forms, report your answer as 10 × Y

20.

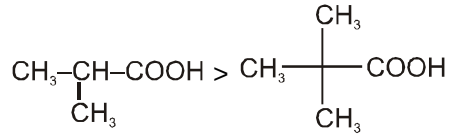


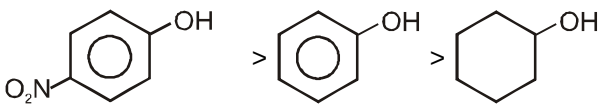
In the above reaction how many times of aldol reaction takes place ?

ONE OR MORE THAN ONE OPTIONS CORRECT TYPE

21. Which are correct against property mentioned ?

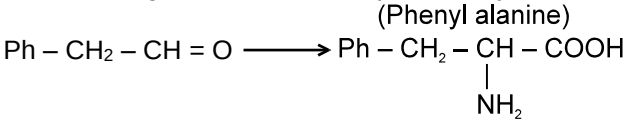
(A) $CH_3COCl > (CH_3CO)_2O > CH_3COOEt > CH_3CONH_2$ (Rate of hydrolysis)

(B) $CH_3–CH_2–COOH >$  (Rate of esterification)

(C)  (Rate of esterification)

(D)  (Rate of decarboxylation)

22. The following conversion is/are possible by



(A) $\xrightarrow{KCN\ /\ H_2O}$ $\xrightarrow{NH_3,\ \Delta}$ $\xrightarrow{H_3O^{\oplus},\ \Delta}$

(B) $\xrightarrow{KCN\ /\ NH_4Cl}$ $\xrightarrow{H_3O^{\oplus}\ ,\ \Delta}$

(C) $\xrightarrow{HCN\ /\ NaOH}$ $\xrightarrow{SOCl_2}$ $\xrightarrow{NH_3}$ $\xrightarrow{H_3O^{\oplus},\ \Delta}$

(D) $\xrightarrow{Br_2\ /\ CH_3COOH}$ $\xrightarrow{NH_3}$ $\xrightarrow{CrO_3\ /\ H^{\oplus}}$

COMPREHENSION

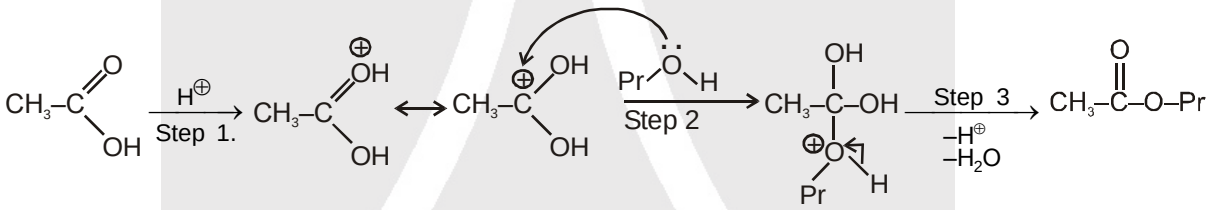
Read the following passage carefully and answer the questions.

Comprehension # 1

Observe the esterification mechanisms for primary and tertiary alcohols.

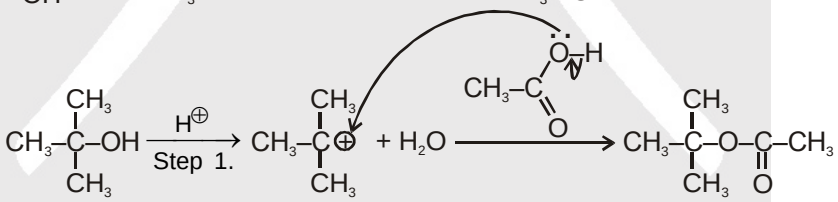
Type.1 $CH_3–COOH + \underbrace{CH_3–CH_2–CH_2–OH}_{\text{Propyl = Pr}} \xrightarrow{\text{Conc. } H_2SO_4} CH_3–\overset{O}{\overset{\|}{C}}–O–Pr$

Mechanism



Type. 2 $CH_3–C(=O)–OH + CH_3–C(CH_3)_2–OH \xrightarrow{\text{Conc. } H_2SO_4} CH_3–C(CH_3)_2–O–C(=O)–CH_3$

Mechanism



23. $CH_3–COOH + C_2H_5\overset{18}{O}H \xrightarrow{\text{Conc. } H_2SO_4}$ (P)

$CH_3–COOH + (CH_3)_3C–\overset{18}{O}H \xrightarrow{\text{Conc. } H_2SO_4}$ (Q)

In the above reaction (P) and (Q) are respectively :

(A) $CH_3–\overset{O}{\overset{\|}{C}}–O–C_2H_5$, $CH_3–\overset{O}{\overset{\|}{C}}–\overset{18}{O}–\overset{CH_3}{\overset{|}{C}}–CH_3$ $\quad$ (B) $CH_3–\overset{O}{\overset{\|}{C}}–\overset{18}{O}–C_2H_5$, $CH_3–\overset{O}{\overset{\|}{C}}–O–\overset{CH_3}{\overset{|}{C}}–CH_3$

(C) $C_2H_5–\overset{O}{\overset{\|}{C}}–\overset{18}{O}–CH_3$, $CH_3–\overset{O}{\overset{\|}{C}}–O–\overset{CH_3}{\overset{|}{C}}–CH_3$ $\quad$ (D) $CH_3–\overset{O}{\overset{\|}{C}}–\overset{18}{O}–C_2H_5$, $CH_3–\overset{O}{\overset{\|}{C}}–\overset{18}{O}–\overset{CH_3}{\overset{|}{C}}–CH_3$

24. $CH_3COOH + D(H)(CH_3)(OH) \xrightarrow{\text{Conc. } H_2SO_4} (X)$

$CH_3{-}COOH + Ph{-}C(CH_3)(C_2H_5){-}OH \xrightarrow{\text{Conc. } H_2SO_4} (Y)$

(A) (X) is optically active while (Y) is optically inactive.
(B) Both (X) and (Y) are optically active.
(C) Both (X) and (Y) are optically inactive.
(D) (X) is optically inactive while (Y) is optically active.

25. (+) Octan-2-ol esterifies with Acetic acid to give optically inactive racemised product. It must have gone by
(A) Type I mechanism
(B) Type II mechanism
(C) Mix type I and type II mechanism
(D) More by type I and less by type II mechanism

Comprehension # 2

Observe the following sequence of reaction and answer the questions based on it

Phenylacetylene $\xrightarrow[-CH_4]{CH_3MgBr}$ x $\xrightarrow[ii)\ H^{\oplus}]{i)\ CO_2}$ y $\xrightarrow[HgSO_4]{H_2O/H_2SO_4}$ z $\xrightarrow{\Delta}$ w

26. Compound z is :

(A) $Ph - CH_2 - C(=O) - COOH$
(B) $Ph - CH(COOH)_2$
(C) $Ph - C(=O) - CH_2 - COOH$
(D) $Ph - CH_2 - COOH$

27. Which of the following statement is not correct
(A) y decolourises Br_2/H_2O solution
(B) z on heating liberates CO_2 gas
(C) w on reaction with NaOI gives yellow ppt
(D) x liberates H_2 gas with Na metal

28. Which of the following compound give benzoic acid on $KMnO_4$ oxidation
(A) w (B) y (C) z (D) all.

Comprehension # 3

Ester having α-hydrogen on treatment with a strong base eg. C_2H_5ONa undergoes self condensation to produce β-keto esters.This is called claisen condensation.

$C_2H_5O^- + H - CH_2COOC_2H_5 \rightleftharpoons C_2H_5OH + \ominus\!\!:CH_2 - COOC_2H_5$

$CH_3 - C(=O)(OEt) + \ominus\!\!:CH_2 - COOC_2H_5 \rightleftharpoons CH_3 - C(=O^{\ominus})(OEt) - CH_2 - C(=O) - OEt \longrightarrow CH_3 - C(=O) - CH_2 - C(=O) - OEt + C_2H_5O^-$

29. $C_6H_5 - C(=O) - OC_2H_5 + CH_3 - C(=O) - OC_2H_5 \xrightarrow[(2)\ H^{\oplus}]{(1)\ C_2H_5O^{\ominus}Na^{\oplus}}$

(A) $C_6H_5 - C(=O) - CH_2 - C(=O) - OC_2H_5 + C_2H_5OH$
(B) $C_6H_5 - C(=O) - O - CH_2 - C(=O) - OC_2H_5 + C_2H_5OH$
(C) $C_6H_5 - C(=O) - O - C(=O) - OC_2H_5 + C_2H_5OH$
(D) None of these

30. $EtO-\overset{\overset{O}{\|}}{C}-OEt + Ph-CH_2-\overset{\overset{O}{\|}}{C}-OC_2H_5 \xrightarrow[(2)\ H_2O,\ \Delta]{(1)\ C_2H_5ONa}$ product is

(A) $CH_3-\underset{\underset{Ph}{|}}{CH}-COOH$

(B) $Ph-\underset{\underset{COOH}{|}}{\overset{\overset{CH_3}{|}}{C}}-COOH$

(C) $Ph-\underset{\underset{O}{\|}}{\overset{\overset{O}{\|}}{C}}-OEt$

(D) $Ph-CH_2-COOH$

31. $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-\underset{\underset{O}{\|}}{C}-OEt \xrightarrow[(2)\ CH_3-I]{(1)\ C_2H_5ONa} \xrightarrow[(2)\ \Delta]{(1)\ H_2O^-}$

(A) $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CH_3$

(B) $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-CH_2-CH_3$

(C) $CH_3-\underset{\underset{O}{\|}}{C}-CH_3$

(D) $CH_3-\underset{\underset{O}{\|}}{C}-CH_2-COOH$

PART - IV : PRACTICE TEST-2 (IIT-JEE (ADVANCED Pattern))

Max. Time : 1 Hr. **Max. Marks : 69**

Important Instructions

A. General :

1. The test is of 1 hour duration.
2. The Test Booklet consists of 23 questions. The maximum marks are 69.

B. Question Paper Format

3. Each part consists of five sections.
4. Section 1 contains 11 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE is correct.
5. Section 2 contains 4 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE OR MORE THAN ONE are correct.
6. Section 3 contains 1 questions. The answer to each of the questions is a single-digit integer, ranging from 0 to 9 (both inclusive).
7. Section 4 contains 2 paragraphs each describing theory, experiment and data etc. 3 questions relate to paragraph. Each question pertaining to a partcular passage should have only one correct answer among the four given choices (A), (B), (C) and (D).
8. Section 5 contains 1 multiple choice questions. Question has two lists (list-1 : P, Q, R and S; List-2 : 1, 2, 3 and 4). The options for the correct match are provided as (A), (B), (C) and (D) out of which ONLY ONE is correct.

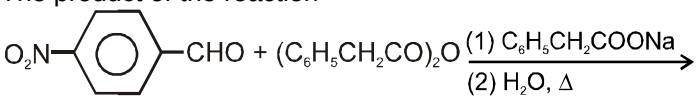
C. Marking Scheme

9. For each question in Section 1, 4 and 5 you will be awarded 3 marks if you darken the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (– 1) mark will be awarded.
10. For each question in Section 2, you will be awarded 3 marks. If you darken all the bubble(s) corresponding to the correct answer(s) and zero mark. If no bubbles are darkened. No negative marks will be answered for incorrect answer in this section.
11. For each question in Section 3, you will be awarded 3 marks if you darken only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. No negative marks will be awarded for incorrect answer in this section.

SECTION-1 : (Only One option correct Type)

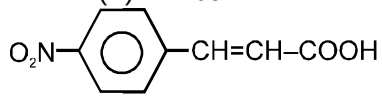
This section contains 10 multiple choice questions. Each questions has four choices (A), (B), (C) and (D) out of which Only ONE option is correct.

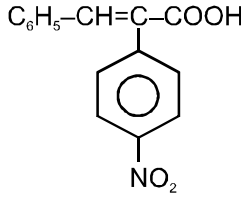
1. The product of the reaction

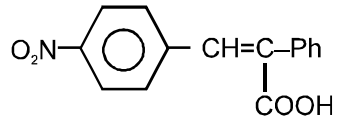


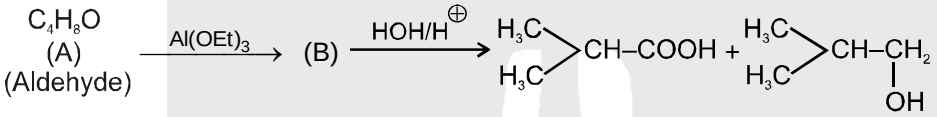
(X) will be :

(A) $C_6H_5CH=CH-COOH$

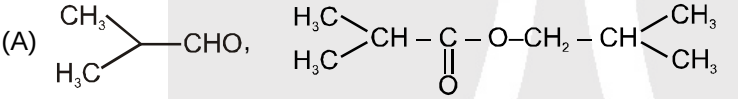
(B) 

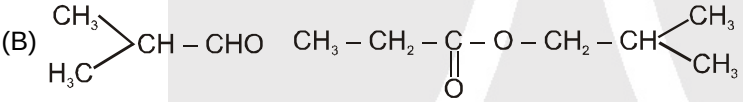
(C) 

(D) 

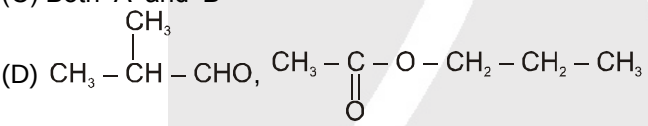
2. 

A and B are :

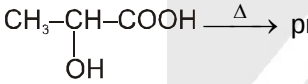
(A) 

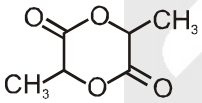
(B) 

(C) Both 'A' and 'B'

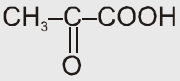
(D) 

3. Identify final product in the following reaction



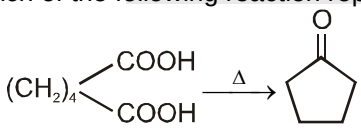
(A) 

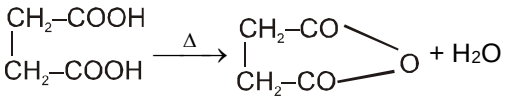
(B) CH_2= CH–COOH

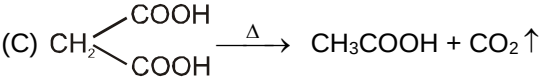
(C) 

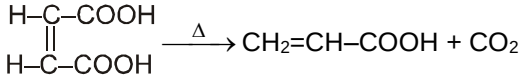
(D) CH_3–CH_2–OH

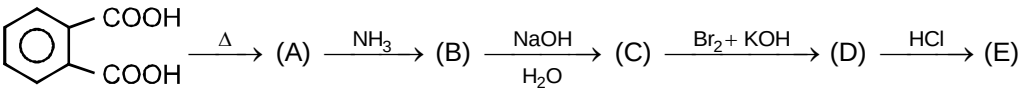
4. Which of the following reaction represents **incorrect** product.

(A) 

(B) 

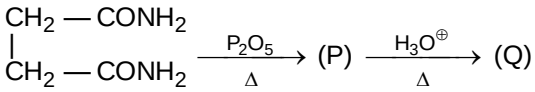
(C) 

(D) 

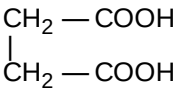
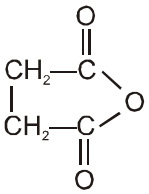
5. 

In this reaction the product (E) is :

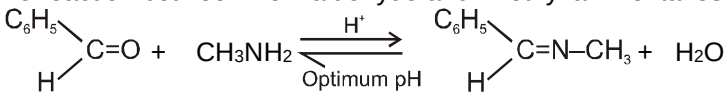
(A) o-nitrobenzoic acid (B) Salicylic acid (C) anthranilic acid (D) Crotonic acid

6. 

The product (Q) is

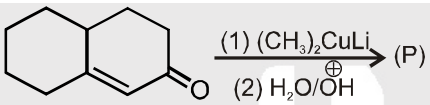
(A) $CH_3–CH_2–COOH$ (B)  (C)  (D) $CH_3–COOH$

7. The reaction between Benzaldehyde and methyl amine takes place in a very narrow pH range.

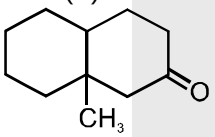
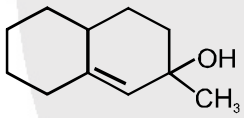


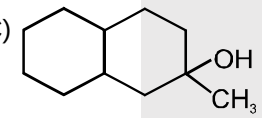
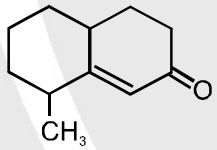
For the above reaction optimum pH is :

(A) 2 to 3 (B) 4 to 5 (C) 5 to 9 (D) 12 to 13

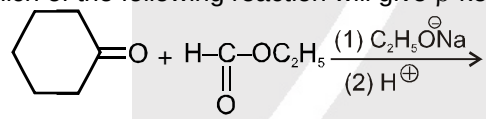
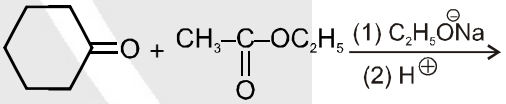
8. In the given reaction 

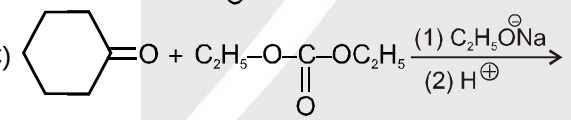
Product (P) will be :

(A)  (B) 

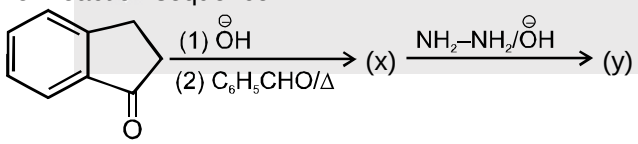
(C)  (D) 

9. Which of the following reaction will give β-keto aldehyde as the final product ?

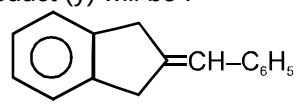
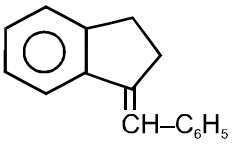
(A)  (B) 

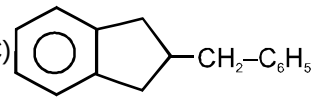
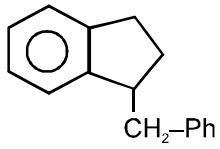
(C)  (D) All of these

10. In the given reaction sequence



Product (y) will be :

(A)  (B) 

(C)  (D) 

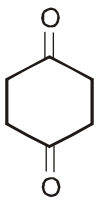
11. Compound (X) $C_9H_{10}O$ gives yellow coloured ppt with 2,4 DNP but does not give red coloured ppt with Fehling's solution. (X) on treatment with NH_2OH/H^+ gives compound (Y) $C_9H_{11}NO$. (Y) when treated with PCl_5 gives isomeric compound (Z). (Z) on hydrolysis gives propanoic acid and aniline. What will be the correct structure of (X), (Y) and (Z) ?

	(X)	(Y)	(Z)
(A)	$C_6H_5-\overset{\overset{O}{\|\|}}{C}-C_2H_5$;	$C_6H_5-\overset{\overset{OH-N}{\|\|}}{C}-C_2H_5$;	$C_6H_5-\overset{\overset{O}{\|\|}}{C}-NH-C_2H_5$
(B)	$C_6H_5-\overset{\overset{O}{\|\|}}{C}-C_2H_5$;	$C_6H_5-\overset{\overset{N-OH}{\|\|}}{C}-C_2H_5$;	$C_2H_5-\overset{\overset{O}{\|\|}}{C}-NH-C_6H_5$
(C)	$C_6H_5-CH_2-\overset{\overset{O}{\|\|}}{C}-CH_3$;	$C_6H_5-CH_2-\overset{\overset{N-OH}{\|\|}}{C}-CH_3$;	$CH_3-\overset{\overset{O}{\|\|}}{C}-CH_2-NH-C_6H_5$
(D)	$C_6H_5-\overset{\overset{O}{\|\|}}{C}-C_2H_5$;	$C_6H_5-\overset{\overset{N-OH}{\|\|}}{C}-C_2H_5$;	$C_6H_5-\overset{\overset{O}{\|\|}}{C}-NH-C_2H_5$

Section-2 : (One or More than one options correct Type)

This section contains 4 multipole choice questions. Each questions has four choices (A), (B), (C) and (D) out of which ONE or MORE THAN ONE are correct.

12.



$\xrightarrow{HCN}$ $\xrightarrow{H_3O^{\oplus}}$ Product

The correct statements about products is/are

(A) The product are optical inactive

(B) The product is meso compound

(C) The product is mixture of two enantiomers

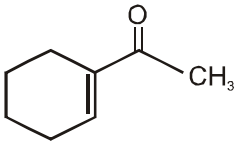
(D) Product exist in two diastereomeric forms

13. Which of the following aldol reaction product is correctly mention :

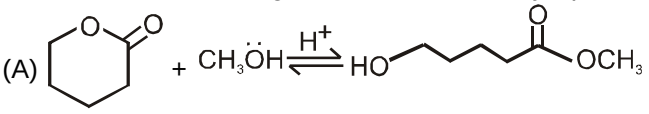
(A) $CH_3-CH_2-\overset{\overset{O}{\|\|}}{C}-H + CH_3-CH_2-CHO \xrightarrow[\Delta]{\overset{\ominus}{OH}} CH_3-CH_2-CH=\underset{\underset{CH_3}{|}}{C}-CHO$

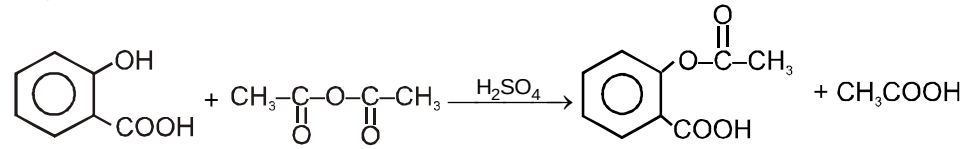
(B) $PhCHO + Ph-\overset{\overset{O}{\|\|}}{C}-CH_2-CH_3 \xrightarrow[\Delta]{\overset{\ominus}{OH}} Ph-CH=\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{\|\|}}{C}-Ph$

(C) $PhCHO + CH_3COCH_3 \xrightarrow{\Delta} Ph-CH=CH-\overset{\overset{O}{\|\|}}{C}-CH_3$

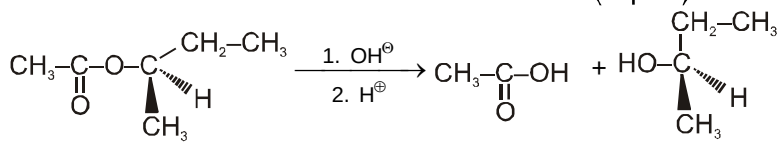
(D) $CH_3-\overset{\overset{O}{\|\|}}{C}-(CH_2)_4-\overset{\overset{O}{\|\|}}{C}-H \xrightarrow[\Delta]{\overset{\ominus}{OH}}$ 

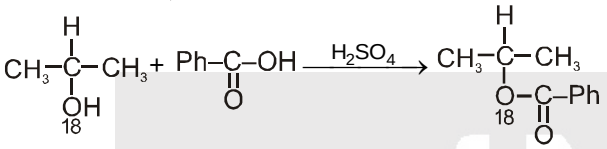
14. In which of the following reactions correct major product is mentioned ?

(A) 

(B) 

(aspirin)

(C) 

(D) 

15. Which of the following methods would serve to prepare 1-phenylpropan-2-ol.
(A) Addition of benzyl grignard reagent to ethanol.
(B) Addition of phenyllithium to methyloxirane
(C) Addition of methyl grignard reagent to phenyl acetaldehyde.
(D) Addition of phenyl Magnesium bromide with ethanal.

Section-3 : (One Integer Value Correct Type.)

This section contains 4 questions. Each question, when worked out will result in one integer from 0 to 9 (both inclusive)

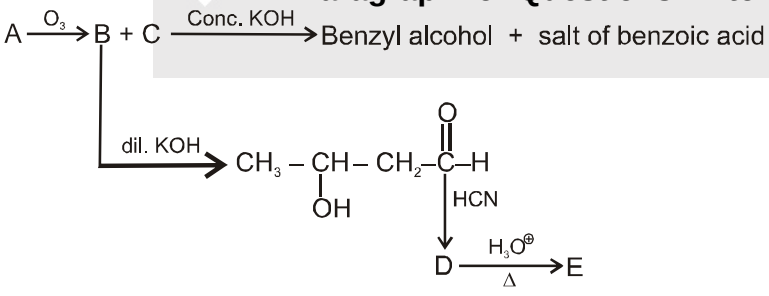
16. How many of the following will give 2,4-DNP test.

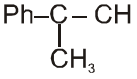
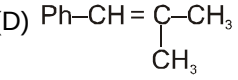
(1) $CH_3CH=O$ (2)  (3) $Ph–CH=O$ (4) 
(5) Glucose (Aldose) (6) Fructose (Ketose) (7) HCOOH (8) Ph–NH–OH

SECTION-4 : Comprehension Type (Only One options correct)

This section contains 2 paragraphs, each describing theory, experiments, data etc. 3 questions relate to the paragraph. Each question has only one correct answer among the four given options (A), (B), (C) and (D)

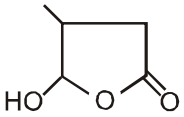
Paragraph for Questions 17 to 19

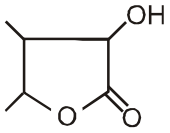


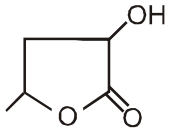
17. Structure of A is :
(A) $H_2C=CH–CHO$ (B) $Ph–CH=CH–CH_3$ (C)  (D) 

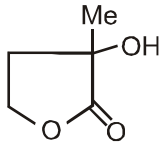
18. Structure of (B) and (C) differentiated by :
(A) Tollen's reagent (B) Fehling solution (C) 2,4-DNP (D) $NaHSO_3$

19. Structure of E is :

(A) 

(B) 

(C) 

(D) 

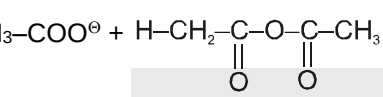
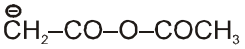
Paragraph for Questions 20 to 22

Perkin reaction is the condensation reaction between aromatic aldehyde and aliphatic acid anhydride in the presence of sodium or potasium salt of the acid of the corresponding anhydride to yield α, β unsaturated aromatic acid.

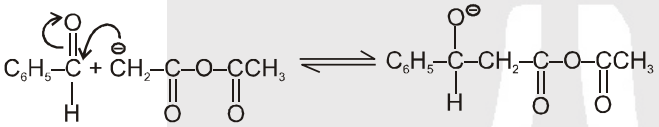
$$Ph–CHO + (CH_3CO)_2O \xrightarrow[170\text{-}180^oC]{AcONa} Ph–CH=CH–COOH + CH_3–COOH$$

Mechanism

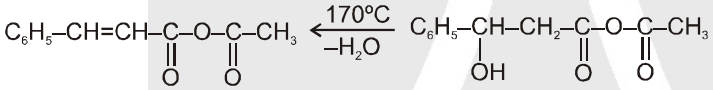
$CH_3–COONa \rightleftharpoons CH_3–COO^{\ominus} + Na^{\oplus}$

$CH_3–COO^{\ominus}$ +  $\rightleftharpoons CH_3–COOH +$ 

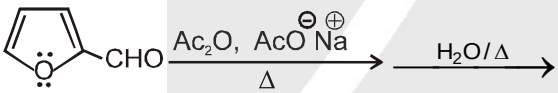
Acetic anhydride

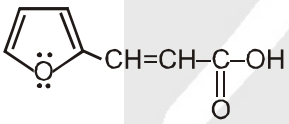


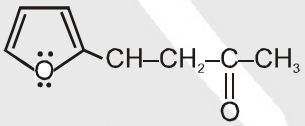
$CH_3–COOH$

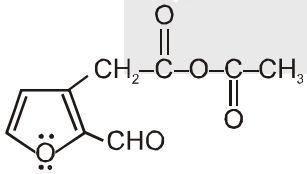


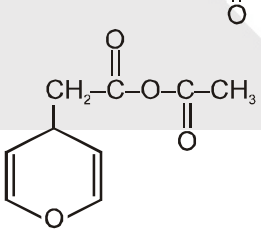
H_2O

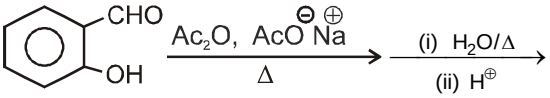
20.  Product is

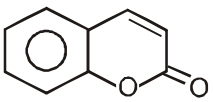
(A) 

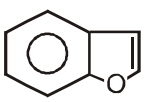
(B) 

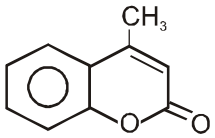
(C) 

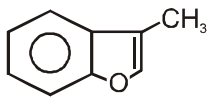
(D) 

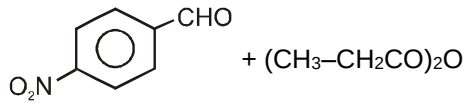
21.  Product is :

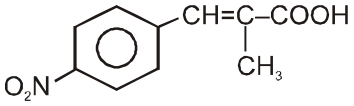
(A) 

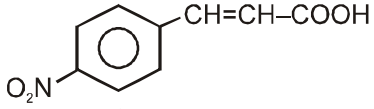
(B) 

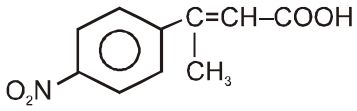
(C) 

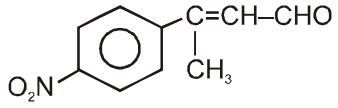
(D) 

22. 

(A) 

(B) 

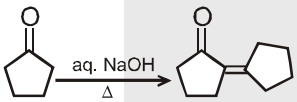
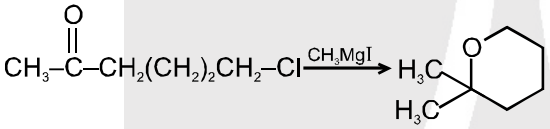
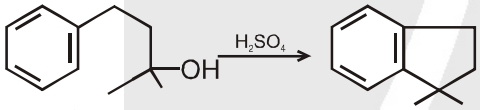
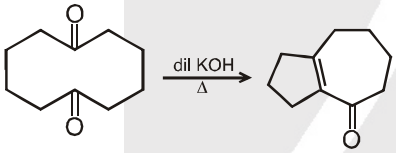
(C) 

(D) 

SECTION-5 : Matching List Type (Only One options correct)

This section contains 1 questions, each having two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (A), (B), (C) and (D) out of which one is correct

23. Match the column:

Column-I	**Column-II**
(A) 	(p) Nucleophilic substitution
(B) 	(q) electrophilic substitution
(C) 	(r) Dehydration
(D) 	(s) Nucleophilic addition
	(t) carbanion intermediate

Practice Test-2 ((IIT-JEE (ADVANCED Pattern))

OBJECTIVE RESPONSE SHEET (ORS)

Que.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ans.										
Que.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Ans.										
Que.	**21**	**22**	**23**							
Ans.			**(A)**		**(B)**		**(C)**		**(D)**	

APSP Answers

PART - I

1.	(1)	**2.**	(1)	**3.**	(4)	**4.**	(4)	**5.**	(2)
6.	(4)	**7.**	(4)	**8.**	(4)	**9.**	(4)	**10.**	(4)
11.	(4)	**12.**	(4)	**13.**	(2)	**14.**	(2)	**15.**	(2)
16.	(1)	**17.**	(2)	**18.**	(4)	**19.**	(2)	**20.**	(1)
21.	(1)	**22.**	(3)	**23.**	(4)	**24.**	(4)	**25.**	(1)
26.	(2)	**27.**	(3)	**28.**	(4)	**29.**	(4)	**30.**	(4)

PART – II

1.	(C)	**2.**	(C)	**3.**	(C)	**4.**	(A)	**5.**	(A)
6.	(C)	**7.**	(B)	**8.**	(C)	**9.**	(D)	**10.**	(C)
11.	(B)	**12.**	(D)	**13.**	(D)	**14.**	(B)	**15.**	(C)
16.	(B)	**17.**	(D)	**18.**	(D)	**19.**	(B)	**20.**	(C)
21.	(C)	**22.**	(B)	**23.**	(A)	**24.**	(B)	**25.**	(D)
26.	(C)	**27.**	(B)	**28.**	(C)	**29.**	(B)	**30.**	(B)
31.	(D)	**32.**	(C)	**33.**	(B)	**34.**	(C)	**35.**	(C)
36.	(D)	**37.**	(A)	**38.**	(A)	**39.**	(C)		

PART - III

1. Two nitrogen atoms of semicarbazide that are adjacent to the (C=O) group have their lone pair present in conjugation so nucleophilicity decreases.

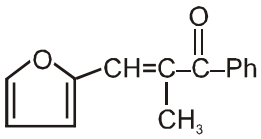
2. c > b > a > d

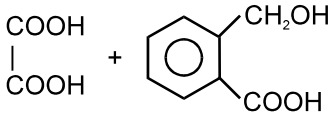
3. [X] = $Ph-CH=CH-\underset{\underset{O}{\|}}{C}-CH=CH-Ph$ (Phorone), Four stereoisomers are formed.

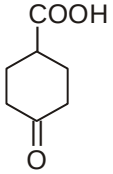
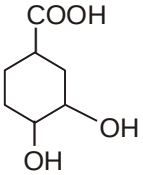
4. (a) $Ph-CH_2-\underset{\underset{O}{\|}}{C}-OCH_3 + H-\underset{\underset{O}{\|}}{C}-OR$

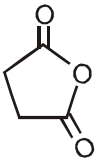
(b) $CH_3O-\underset{\underset{O}{\|}}{C}-OCH_3 + Ph-CH_2-\underset{\underset{O}{\|}}{C}-OCH_3$

(c) $CH_3CH_2CH_2COOEt$

5. 

6. 

7. (a)  ; (b) 

8. A = 

9. (A) = PhCOOH, (B) = $Ph^{18}OH$ **10.** X = $C_2H_5COOC_3H_7$

11.	(D)	**12.**	(C)	**13.**	(C)	**14.**	(C)	**15.**	(B)
16.	(C)	**17.**	(A) - (p) ; (B) - (s) ; (C) - (q) ; (D) - (r)						
18.	6 (I, II, III, V, VII & X)			**19.**	20	**20.**	3	**21.**	(AB)
22.	(ABC)	**23.**	(B)	**24.**	(A)	**25.**	(B)	**26.**	(C)
27.	(D)	**28.**	(D)	**29.**	(A)	**30.**	(D)	**31.**	(A)

PART - IV

1.	(D)	**2.**	(A)	**3.**	(A)	**4.**	(D)	**5.**	(C)
6.	(C)	**7.**	(B)	**8.**	(A)	**9.**	(A)	**10.**	(A)
11.	(B)	**12.**	(AD)	**13.**	(ABC)	**14.**	(ABCD)	**15.**	(ABC)
16.	4(1,2,3,4)	**17.**	(B)	**18.**	(B)	**19.**	(C)	**20.**	(A)
21.	(A)	**22.**	(A)	**23.**	(A – r,s,t) ; (B – p,s) ; (C – q, r) ; (D – r,s,t).				

APSP Solutions

PART - I

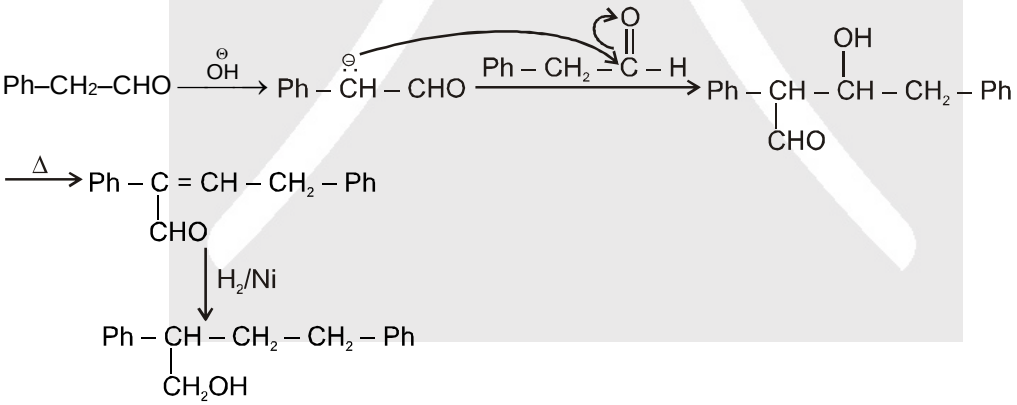
1. Rate of nucleophilic attack $\propto$ amount of +ve charge at carbonyl carbon.

2. It is a protecion of carbonyl group.

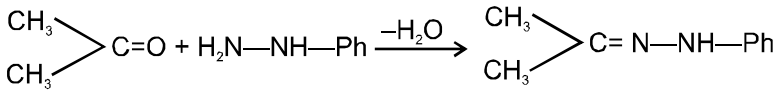
3. In Wolf-Kishner reduction carbonyl compound is converted to hydrocarbon.

4. Vinyl ether does not react with 2,4-DNP and metallic sodium.

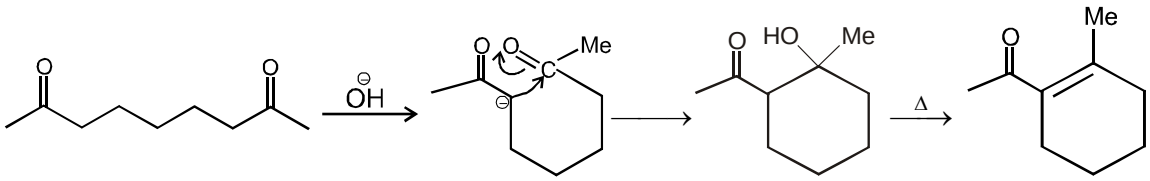
5.



6.



7.



8. $K_2Cr_2O_7$ oxidised secondary alcohol which gives iodoform test.

9. (A) $Ph–CH_2–Br \xrightarrow{KCN} Ph–CH_2–C\equiv N \xrightarrow{H_3O^{\oplus}} Ph–CH_2–CO_2H$ (B)

10. CH_3 – CHO (α–Hydrogen is present)

11. Haloform reaction

12. $R–CH_2OH + RCOCl \longrightarrow R–CH_2–O–CO–R$

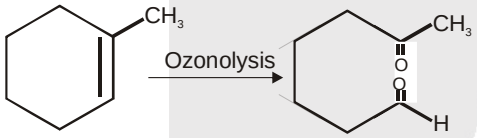
13. $Ph – MgBr + CH_3–\underset{CH_3}{\overset{CH_3}{C}}–OH \longrightarrow Ph – H + CH_3–\underset{CH_3}{\overset{CH_3}{C}}–OMgBr$

14. Its Gabriel phthalimide reaction.

15. $CH_3–\overset{O}{\overset{\|}{C}}–H \xrightarrow[{}^{\ominus}OH]{HCN} CH_3–\overset{*}{\underset{H}{\overset{OH}{C}}}–CN \xrightarrow[\Delta]{H_3O^{\oplus}} CH_3–\underset{H}{\overset{OH}{C}}–COOH$

Cyanohydrin
dℓ mixture

dℓ mixture
dℓ मिश्रण

16. 

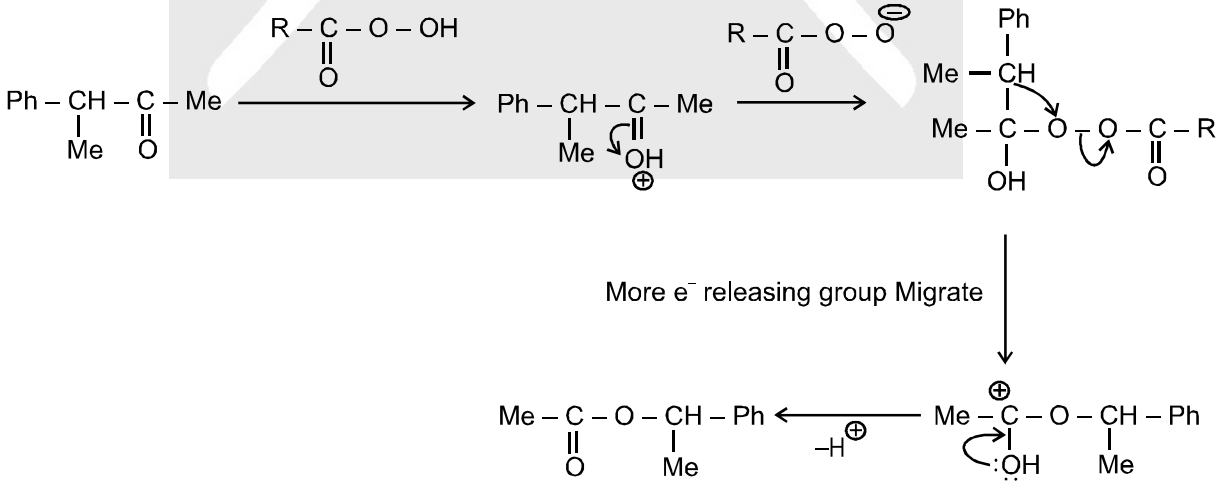
17. $CH_3–\overset{O}{\overset{\|}{C}}–H + HCN \longrightarrow CH_3–\underset{OH}{\overset{CN}{C}}–H \xrightarrow{H_2O} CH_3–\underset{OH}{CH}–COOH$

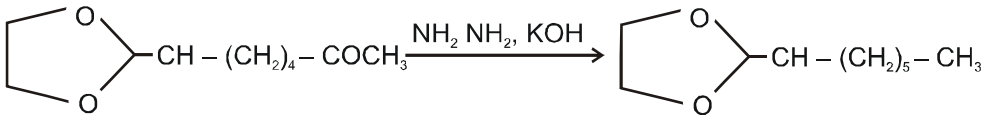
18. α-hydrogen absent.

19. Perkin reaction

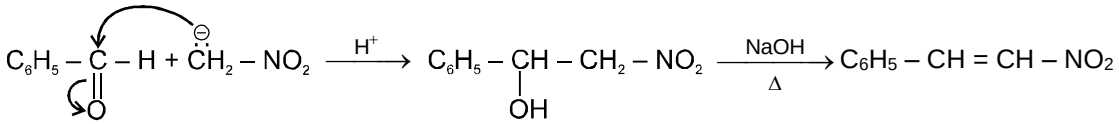
$Ph – CH = CH – COOH \xrightarrow{HBr} Ph – \underset{Br}{CH} – CH_2 – COOH$

(A)

20. 

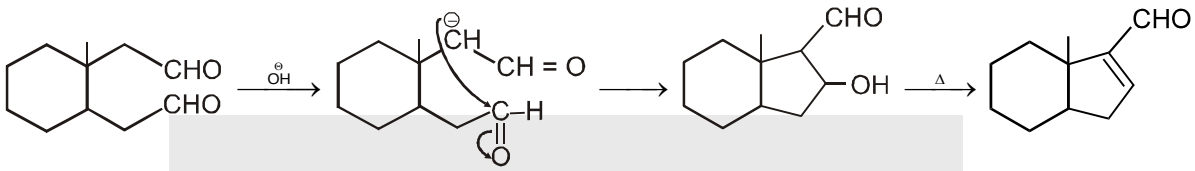
21. 

Acetal is hydrolysed in acidic Medium so clemmensen reduction is not used.

22. 

23. Rate of decarboxylation –m effect of substitutent at α position.

24. (X) : $RCONH_2$ (Y) : R–C≡N (Z) : R–CHO

25. 

26. $CH_3CH_2COOH \xrightarrow{SOCl_2} CH_3CH_2COCl \xrightarrow{NH_3} CH_3CH_2CONH_2 \xrightarrow{Br_2 + KOH} CH_3CH_2NH_2$

27. In fumaric acid both COOH groups are present on opposite side so it is unaffected on heating.

28. It is cannizaro reaction.

30. (i) $Ph–CH_3 + CrO_3 + (CH_3CO)_2O \xrightarrow{273–283\ K} Ph–CH(OCOCH_3)_2 \xrightarrow[\Delta]{H_3O^+} Ph–CHO$

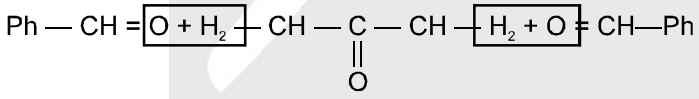
(ii) $Ph–CH_3 \xrightarrow[h\nu]{Cl_2} Ph–CHCl_2 \xrightarrow[100°C]{H_2O} Ph–CHO$

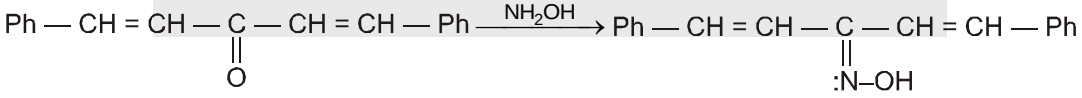
(iii) $C_6H_6 \xrightarrow[AlCl_3]{CO + HCl} Ph–CHO$

(iv) $Ph–COCl + (CH_3)_2Cd \longrightarrow Ph–CO–CH_3$

PART - III

2. Rate of nucleophilic addition reactions depends on the amount of +ve charge present at carbonyl carbon.

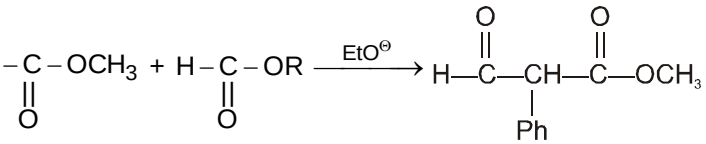
3. 

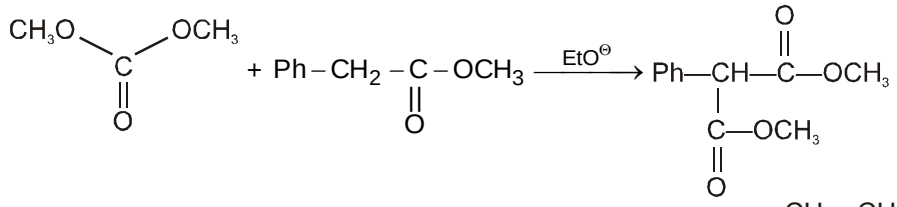


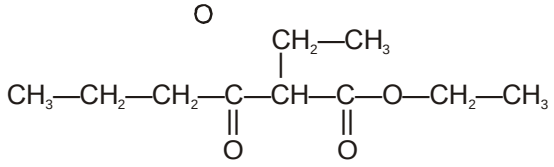
(Phorone)

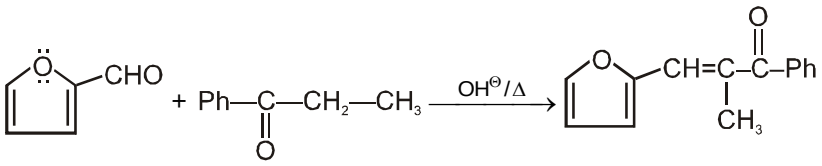
[X]

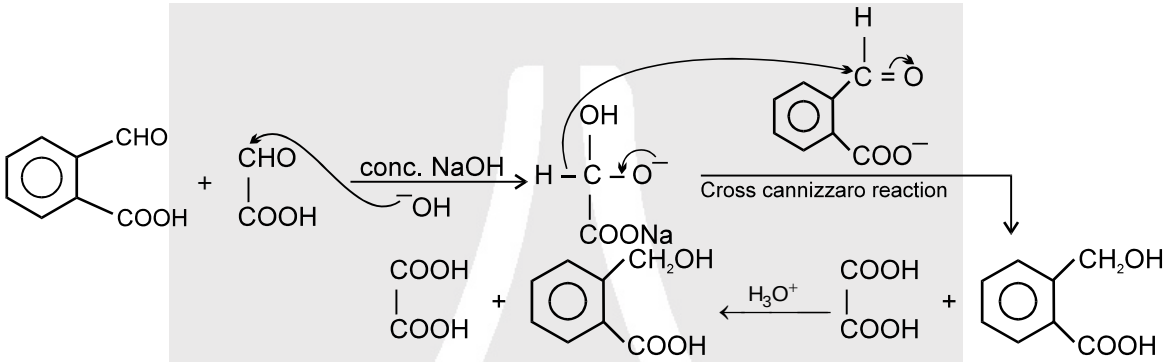
Four stereoisomers are formed.

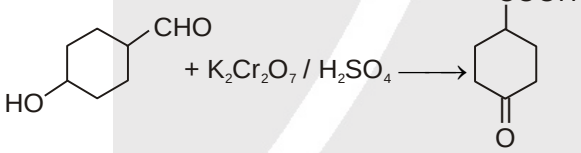
4. (a) 

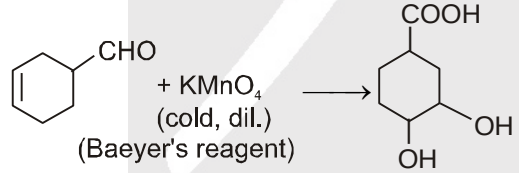
(b) 

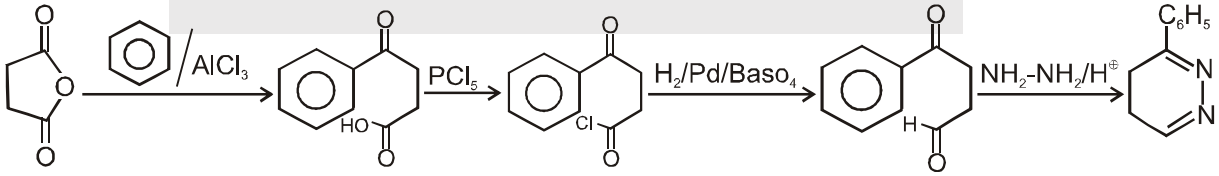
(c) $CH_3CH_2CH_2COOEt \xrightarrow{\text{claisen condensation}}$ 

5. 

6. 

7. (a) 

(b) 

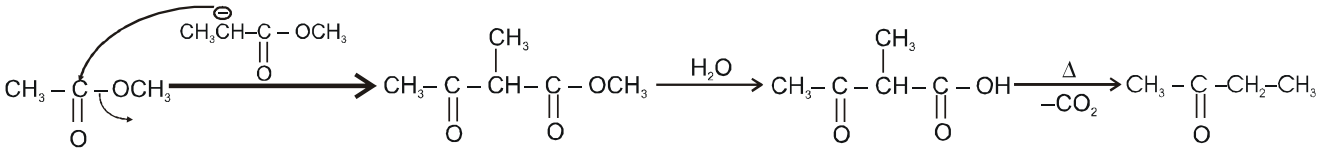
8. 

(A) x (B) (C) (D)

9. $Ph-\underset{\underset{O}{\|}}{C}-\underset{18}{O}-Ph \xrightarrow[\text{hydrolysis}]{\text{dil. } H_2SO_4} PhCOOH + \overset{18}{PhOH}$

10. $C_2H_5COOC_3H_7 \xrightarrow{H_3O^+} C_2H_5CO_2H + C_3H_7OH$

11.



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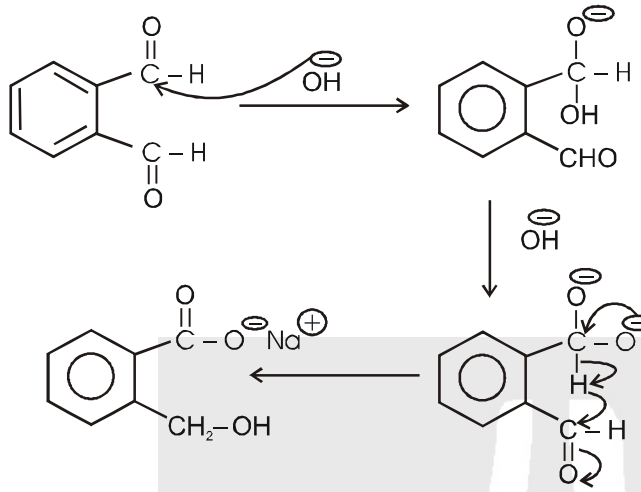

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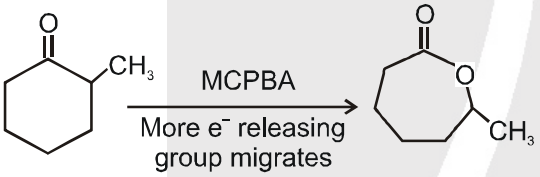

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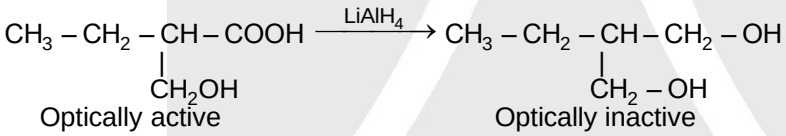
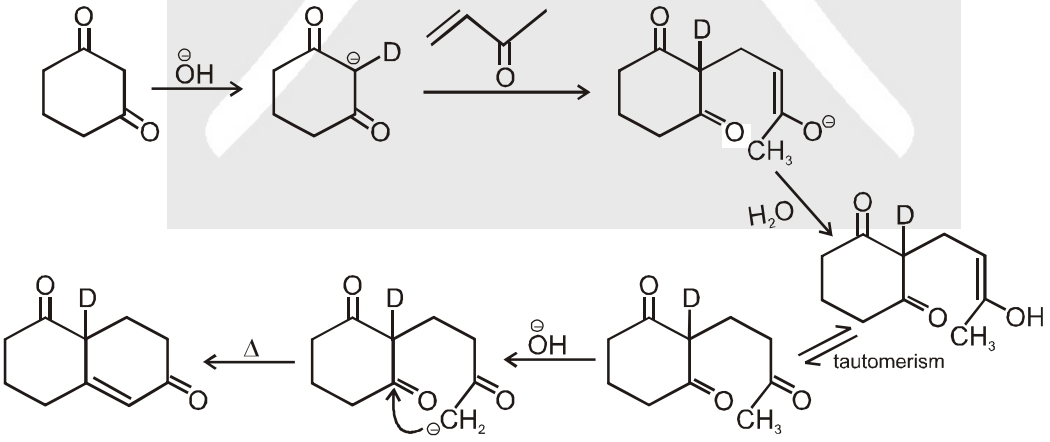


15. When an ester converts into another ester, it is called trans esterification.

16.



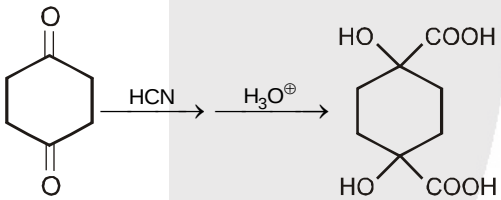
17. (A) $RMgI + CH_3 - C \equiv N \longrightarrow CH_3 - \underset{R}{\overset{|}{C}} = NMgI \xrightarrow{H_3O^+} CH_3 - \overset{O}{\overset{\|}{C}} - R$ (Alkanone)

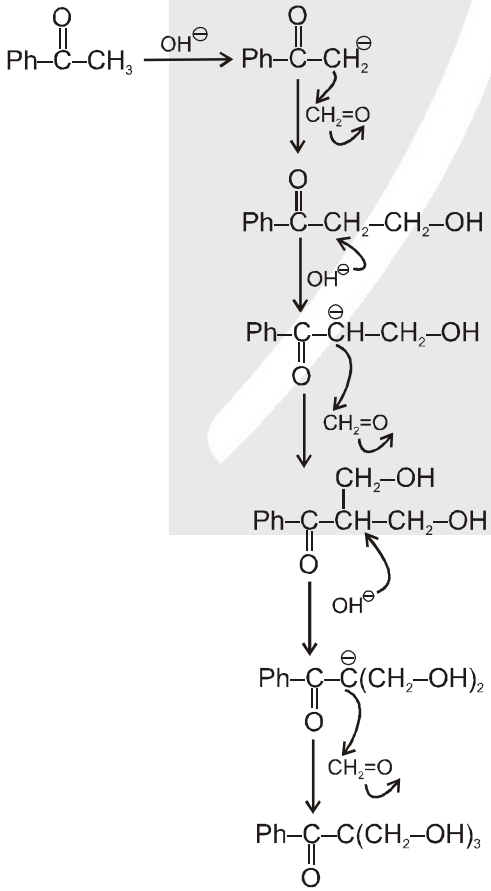
(B) $RMgI + S = C = S \longrightarrow R - \overset{S}{\overset{\|}{C}} - S - MgI \xrightarrow{H_3O^+} R - \overset{S}{\overset{\|}{C}} - SH$ (Dithionic acid)

(C) $RMgI + CH_3CH_2O - \overset{O}{\overset{\|}{C}} - Cl \longrightarrow CH_3 - CH_2 - O - \underset{OMgI}{\overset{R}{\overset{|}{C}}} - Cl \longrightarrow CH_3 - CH_2 - O - \underset{O}{\overset{R}{\overset{|}{\overset{\|}{C}}}}$ (Ester) $+ MgICl$

(D) $RMgI + \underset{O}{CH_2 - CH_2} \longrightarrow R - CH_2 - CH_2 - OMgI \xrightarrow{H_3O^+} R - CH_2 - CH_2 - OH$ (Alcohol)

18. All molecules which have greater positive charge centre at acyl carbon (more than ethyl acetate) are more reactive than it towards hydrolysis.

19. 

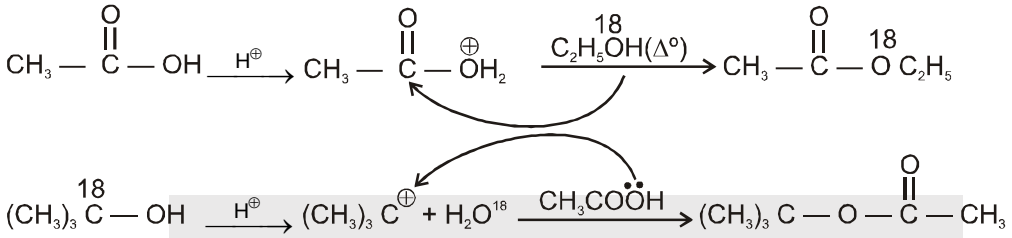
20. 

22. (A) $Ph–CH_2–CH=O \xrightarrow{KCN/H_2O} Ph–CH_2–\underset{\underset{OH}{|}}{CH}–CN \xrightarrow{\ddot{N}H_3} Ph–CH_2–\underset{\underset{NH_2}{|}}{CH}–CN \xrightarrow{\overset{\oplus}{H_3O}} Ph–CH_2–\underset{\underset{NH_2}{|}}{CH}–COOH$

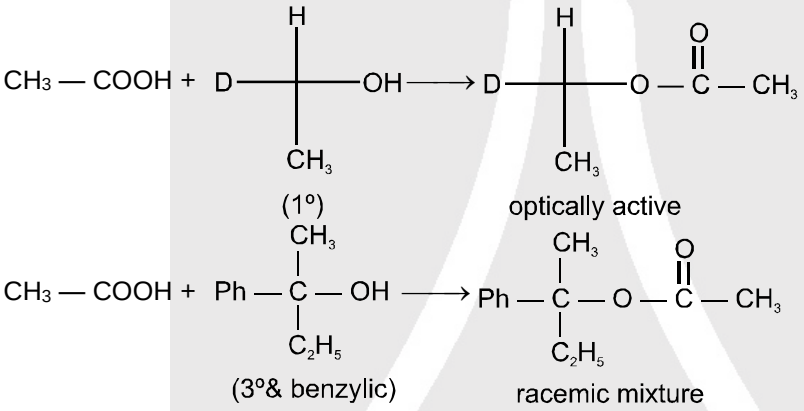
(B) $Ph–CH_2–CH=O \xrightarrow{KCN/NH_4Cl} Ph–CH_2–\underset{\underset{OH}{|}}{CH}–CN \xrightarrow{\ddot{N}H_3} Ph–CH_2–\underset{\underset{NH_2}{|}}{CH}–CN \xrightarrow{\overset{\oplus}{H_3O}} Ph–CH_2–\underset{\underset{NH_2}{|}}{CH}–COOH$

(C) $Ph–CH_2–CH=O \xrightarrow{HCN/NaOH} Ph–CH_2–\underset{\underset{OH}{|}}{CH}–CN \xrightarrow{SOCl_2} Ph–CH_2–\underset{\underset{Cl}{|}}{CH}–CN \xrightarrow[(2)\ \overset{\oplus}{H_3O}]{(1)\ NH_3} Ph–CH_2–\underset{\underset{NH_2}{|}}{CH}–COOH$

23.



24.



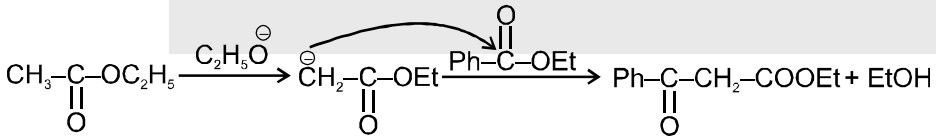
25. Since (+) Octan–2–ol racemises on reaction with acetic acid, therefore it must have gone through an S_N1 reaction i.e., type II reaction.

26. Z is $Ph–\overset{\overset{O}{\|}}{C}–CH_2–COOH$

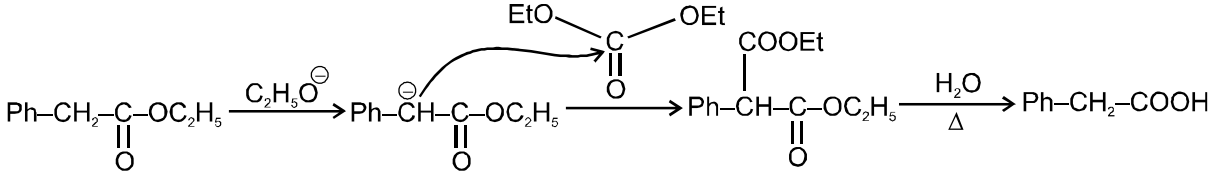
27. X is an anion and it has no acidic hydrogen.

28. Any mono substituted benzene oxidises to benzoic acid.

29.



30.



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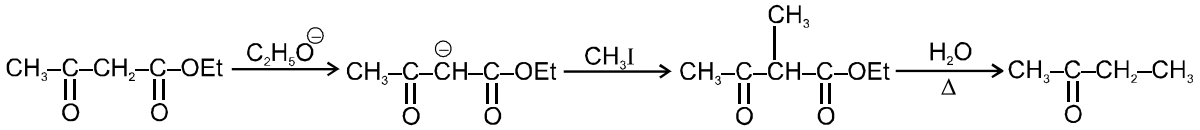
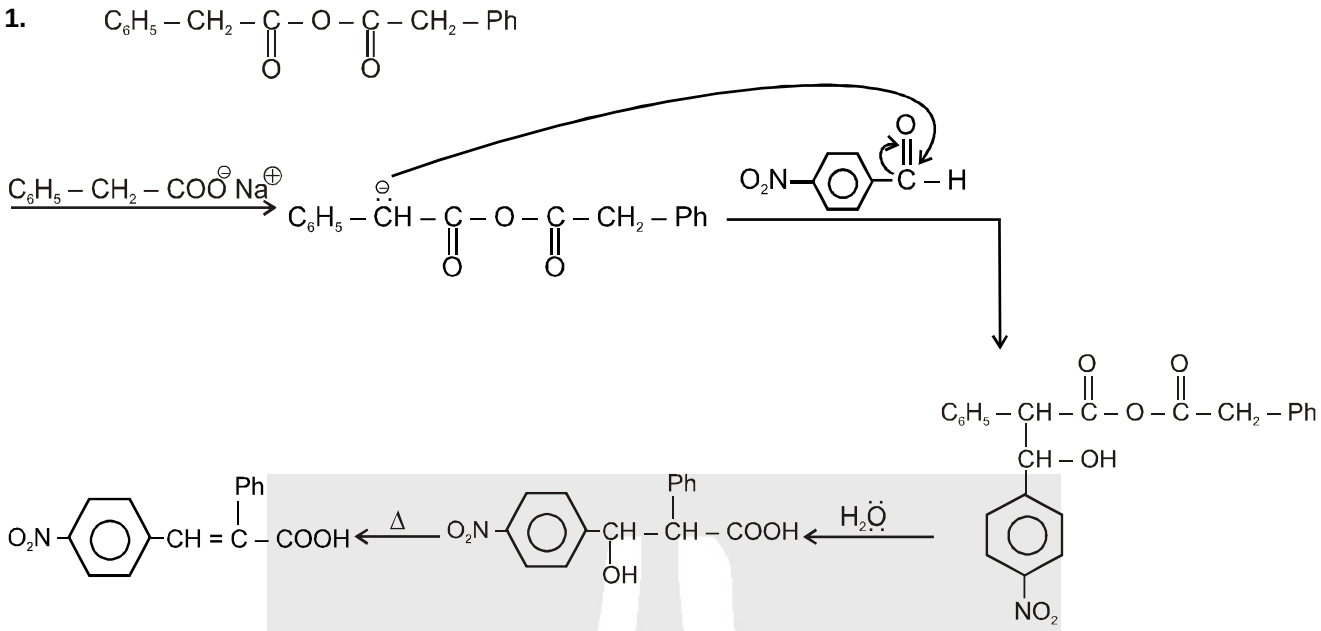


PART - IV

1.



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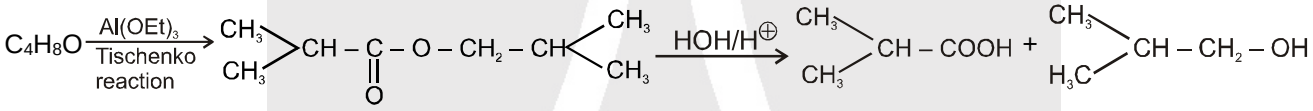

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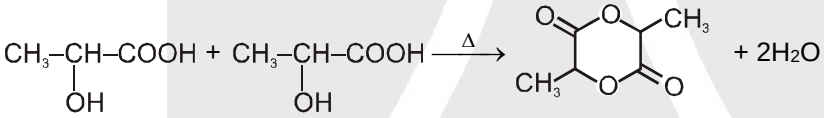

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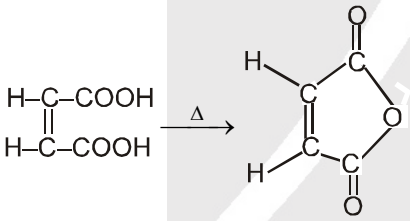

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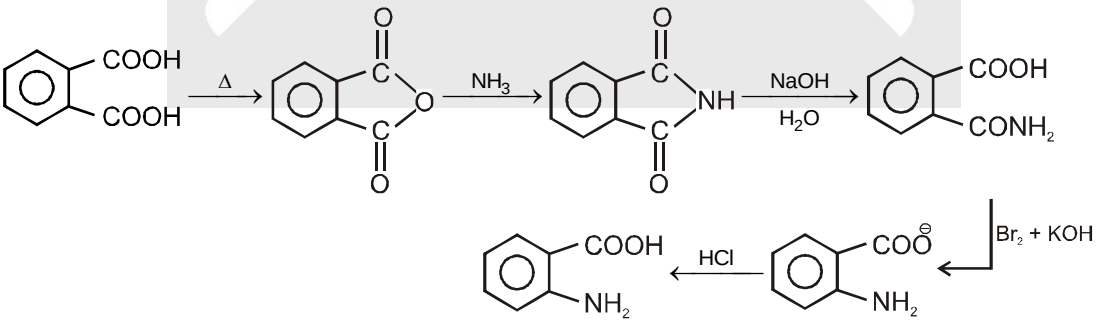

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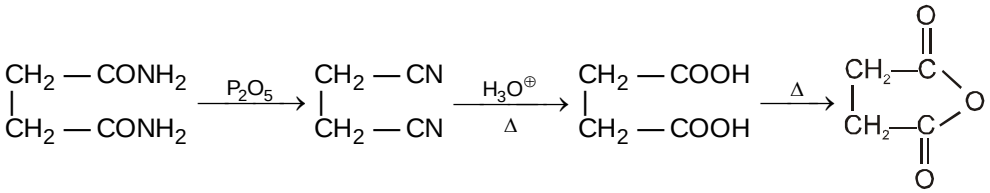
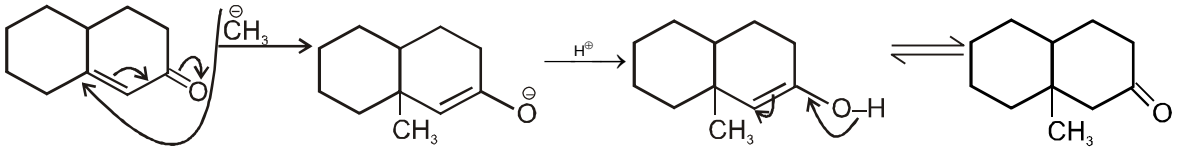


7. Optimun pH for the above reaction = 4–5

8.



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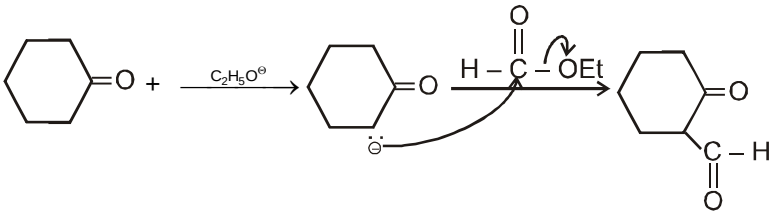

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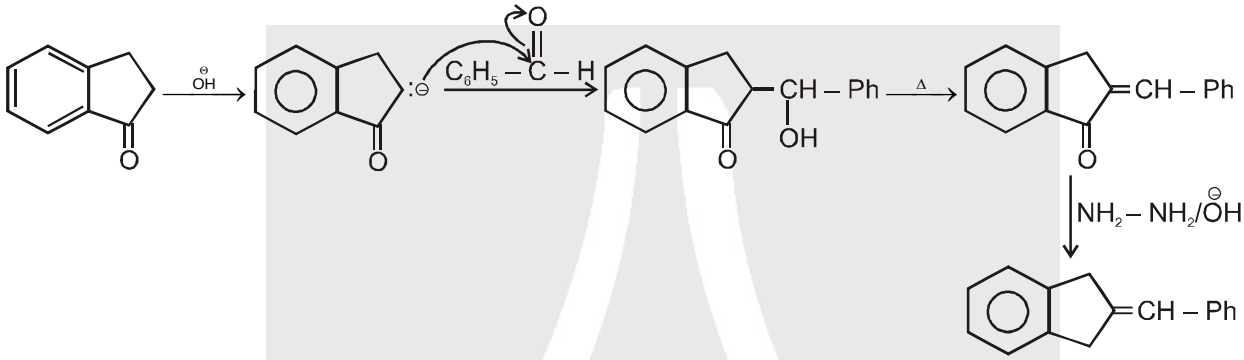

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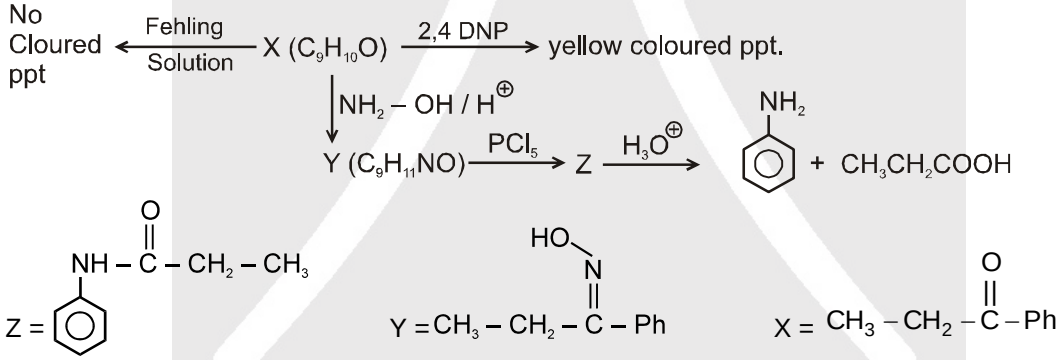

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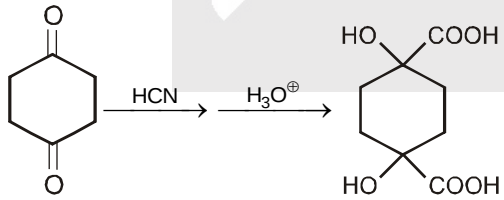

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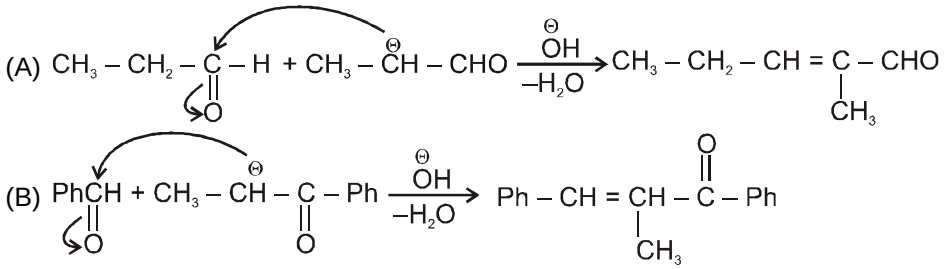
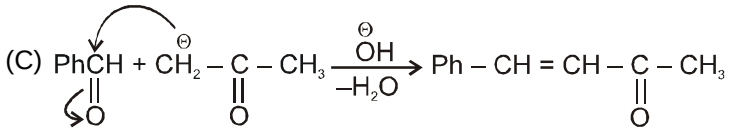
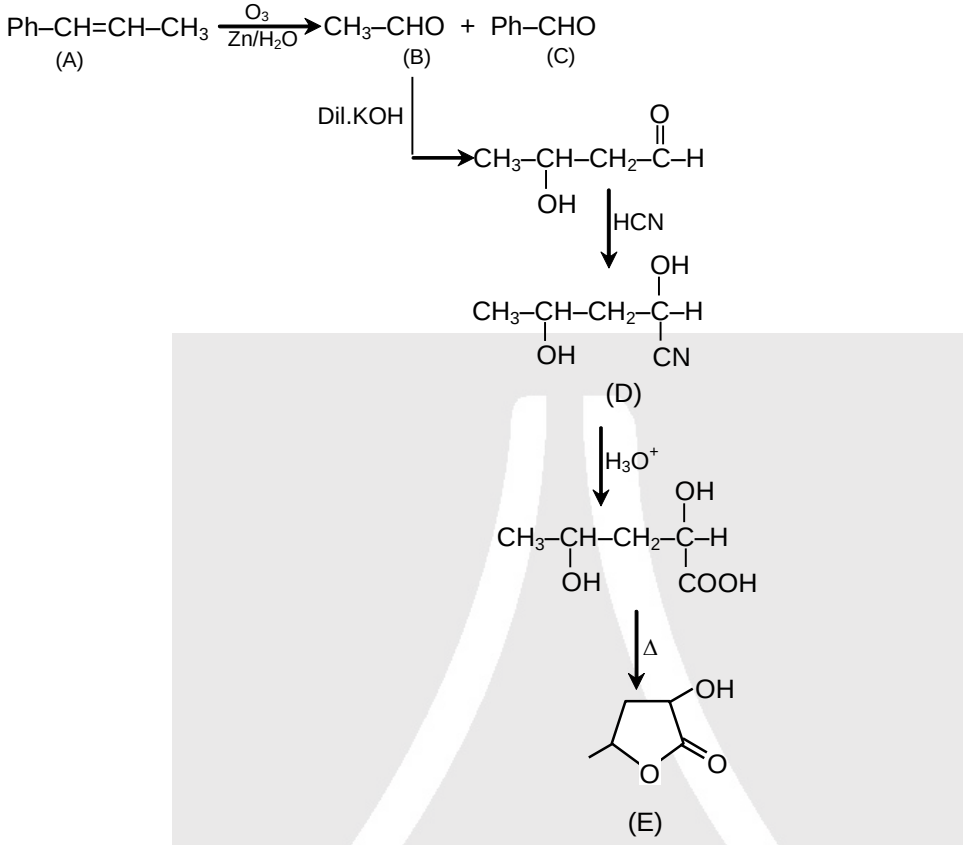
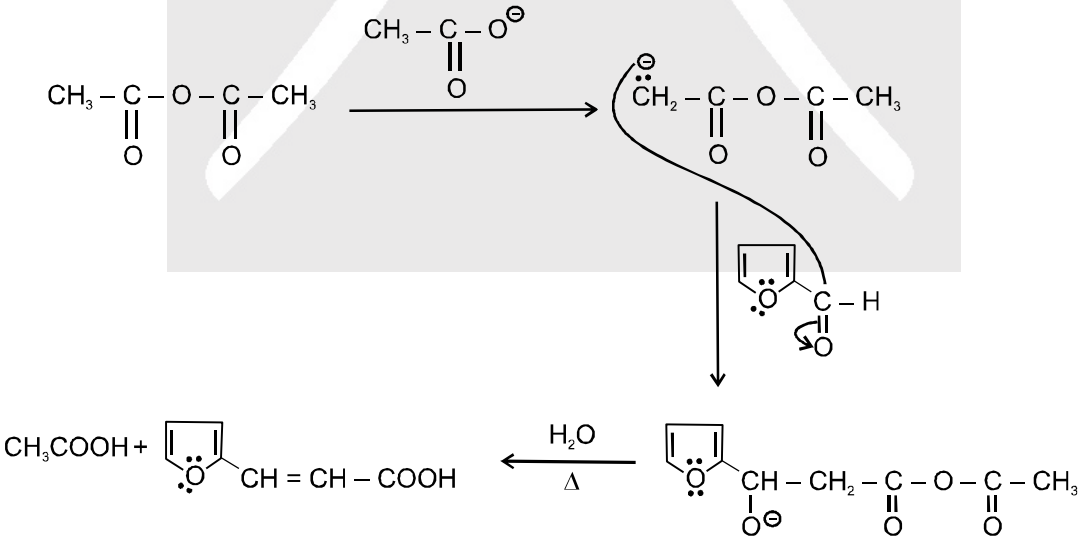


(C) 

15. Option (A), (B) & (C) are true

19. 

20. 

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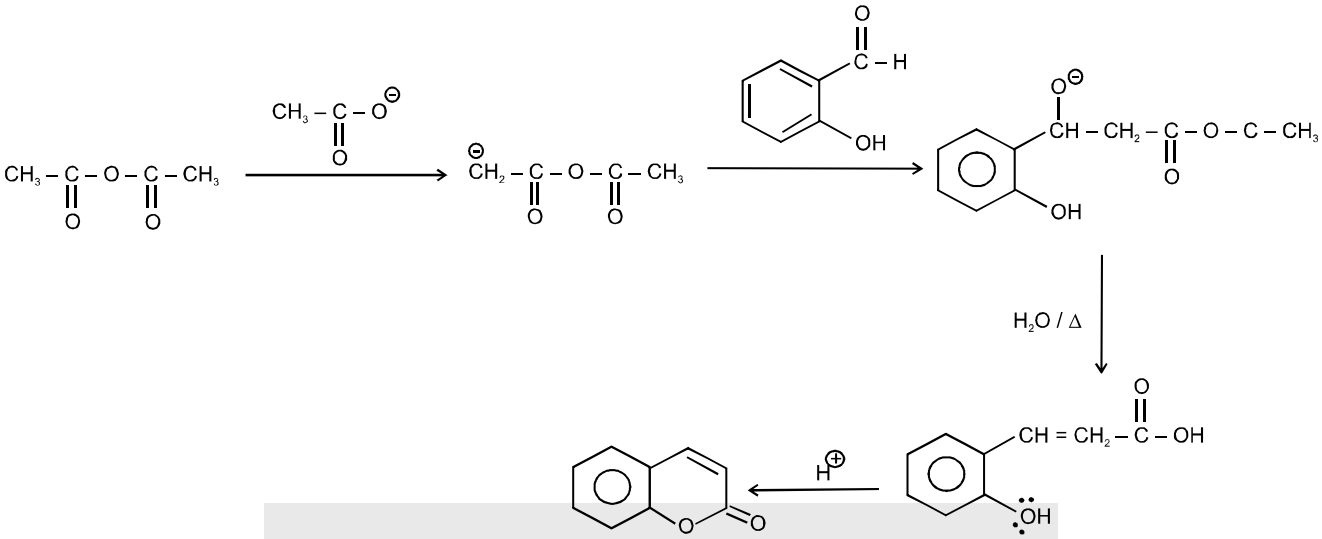

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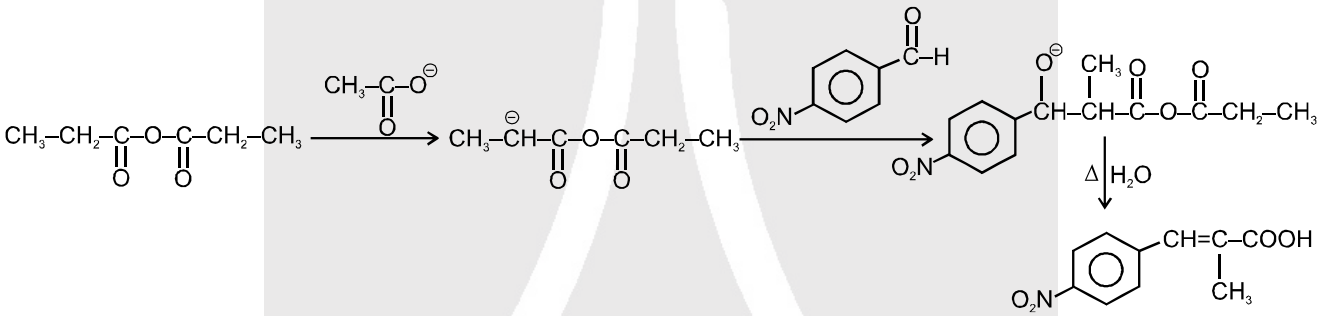

23. (A) Aldol condensation: (In which carbanion (nucleophile) gives nucleophilic addition and last step is dehydration).
(B) G.R. attacks on carbonyl group, followed by internal nucleophilic substitution.
(C) H_2SO_4 protonates OH group and changes it into good lenving group to give electrophilic carbon which under goes $ArSE_2$ interamolecular reaction for ring closure.
(D) Intra molecular aldol condensation involves carbanion, nucleophilic addition and dehydration.