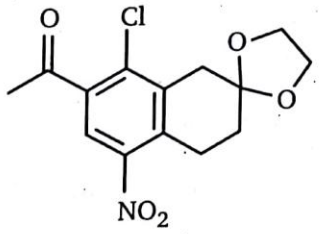
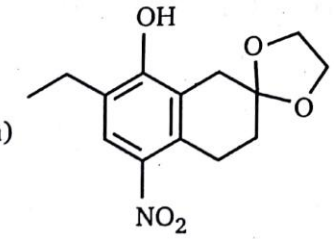
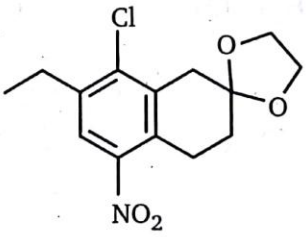
# 7 ALDEHYDES AND KETONES

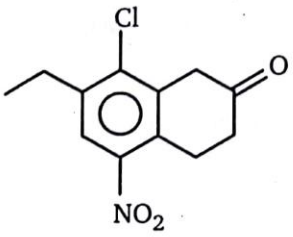
## LEVEL-1

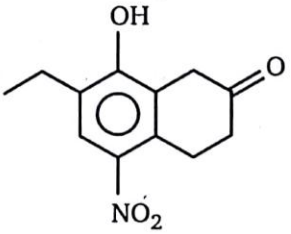
**1.** 

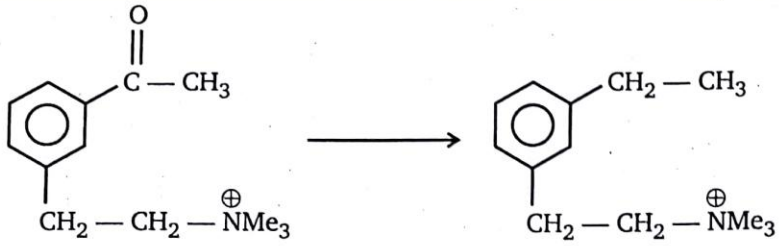

$\xrightarrow[\text{(Wolff-Kishner reduction)}]{N_2H_4/KOH/H_2O}$ (*A*) ; Product *A* is :
major

(a) 


(b) 

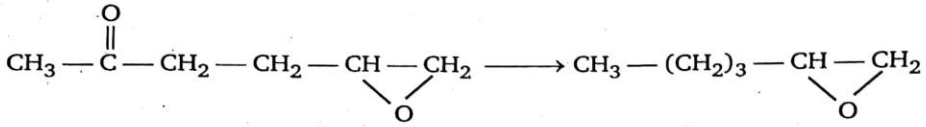

(c) 


(d) 

**2.** 

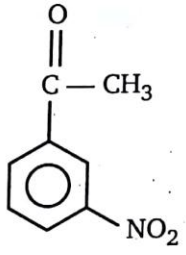
Above conversion can be achieved by :

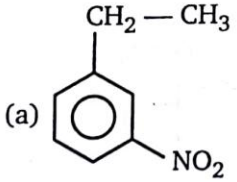
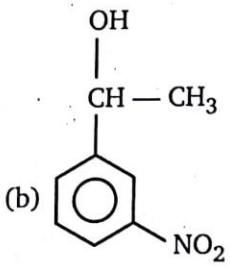
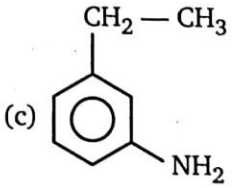
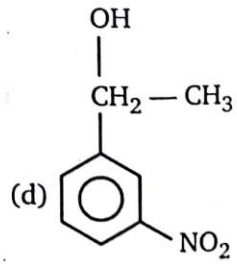
(a) Wolf-Kishner reduction.
(b) Clemmensen reduction
(c) $LiAlH_4$
(d) $NaBH_4$

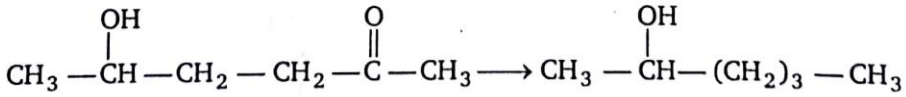
**3.** 

Above conversion can be achieved by :

(a) Wolff- Kishner reduction
(b) Clemmensen reduction
(c) $HS-CH_2-CH_2-SH$, following by Raney Ni
(d) None of these

**4.**  $\xrightarrow[HCl]{Zn(Hg)}$ ; Product of the Clemmensen reduction is :

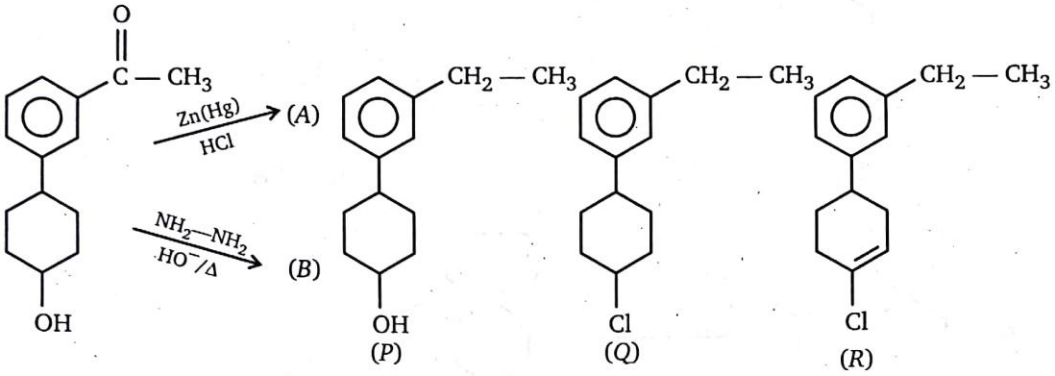
(a) 
(b) 
(c) 
(d) 

**5.** 

Above conversion can be achieved by :

(a) Wolff-Kishner reduction
(b) Clemmensen reduction
(c) $LiAlH_4$
(d) $NaBH_4$

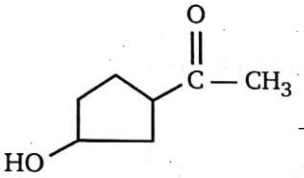
**6.**




Identify product (*A*) & (*B*) from the given product *P*, *Q*, *R*:

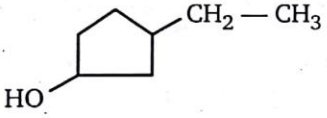
(a) $A = P, B = Q$ (b) $A = Q, B = R$ (c) $A = Q, B = P$ (d) $A = R, B = P$

**7.**

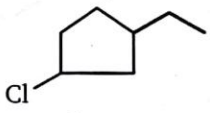



$\xrightarrow[HCl]{Zn(Hg)}$ (*A*) ; Identify the *A*.

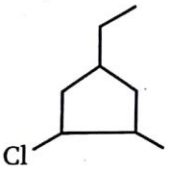
(a)



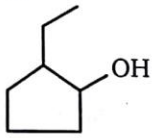

(b)



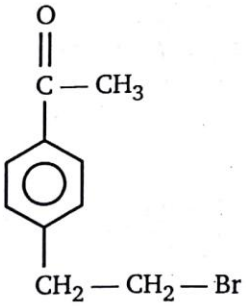

(c)




(d)



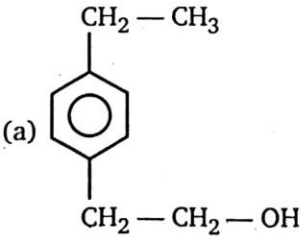

**8.**



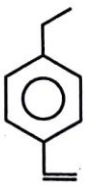

$\xrightarrow[HO^-, \Delta]{N_2H_4}$ (*A*) ; Product (*A*) is :

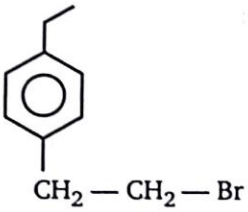
(Wolff-Kishner reduction)

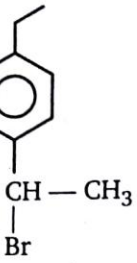
(a)

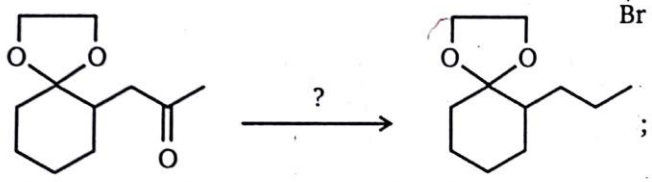



(b)



(c) 

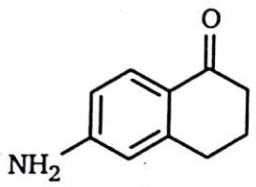

(d) 

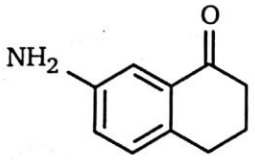

**9.** 

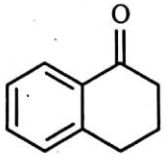

Above conversion can be carried out by :

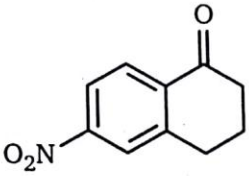
(a) Clemmensen reduction
(b) Wolff-Kishner reduction
(c) $LiAlH_4$
(d) $NaBH_4$

**10.** Increasing order of equilibrium constants for the formation of a hydrate:

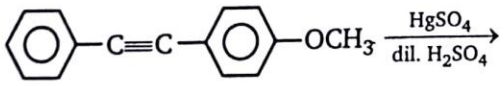

(I)


(II)


(III)

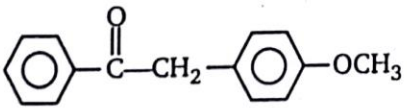

(IV)

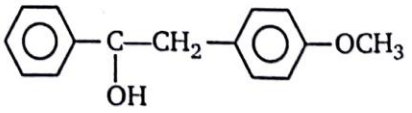
(a) IV < III < II < I
(b) IV < III < I < II
(c) I < II < III < IV
(d) II <III < I < IV

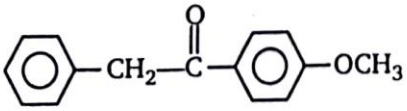
**11.** 

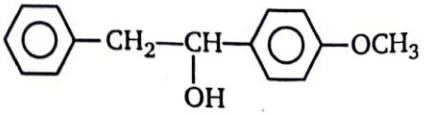

(A) Major product

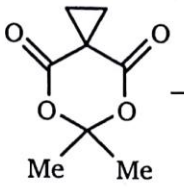
Product (A) is:

(a) 

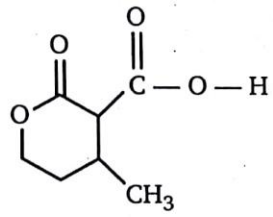
(b) 

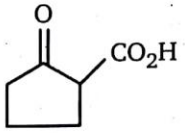
(c) 

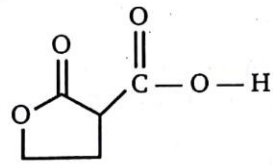
(d) 

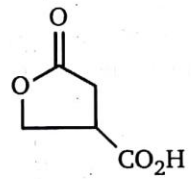
**12.**  $\xrightarrow{H_2O}$ (*A*)

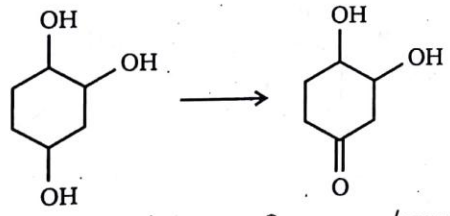
Predict the product of hydrolysis of the above molecule.

(a) 

(b) 

(c) 

(d) 

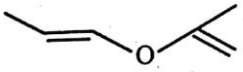
**13.**  , This conversion can be achieved by :

(a) $Me_2CO/H^+, H_3O^{\oplus}, KMnO_4/HO^-$

(b) $Me_2CO/H^+, KMnO_4, H_3O^+$

(c) $KMnO_4/NaO_4$, $Me_2CO/H^+$, $H_3O^+$

(d) $KMnO_4/NaIO_4, H_3O^+, Me_2CO/H^+$

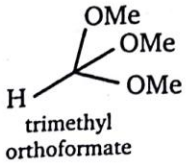
**14.**  $\xrightarrow{H_3O^{\oplus}}$ *A* + *B*. Compound (*A*) & (*B*) can be differentiated by:

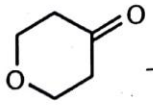
(a) 2-4-DNP

(b) Fehling solution

(c) Lucas reagent

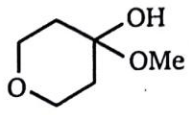
(d) $NaHSO_3$

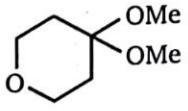
**15.** 
trimethyl orthoformate

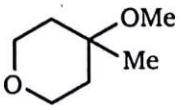
+ 

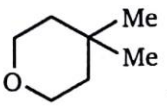
$\xrightarrow[20°C,15min]{HOH,H^+/catalyst}$ (*A*) + H—C(=O)—OMe; Product (*A*) is :

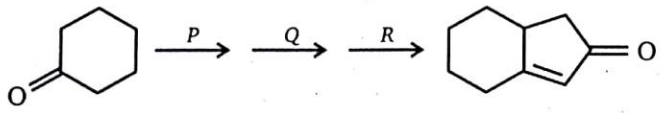
Methyl formate

(a) 

(b) 

(c) 

(d) 

**16.** 

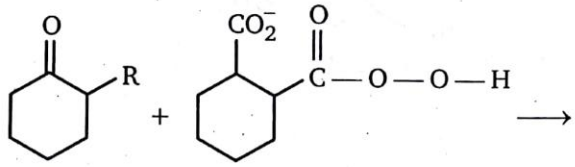
Reagents to carry out above conversion, *P*, *Q*, *R* respectively are :

(a) $H_2C = CH - CH_2 - Br, (HO^{\ominus}), [HO^{\ominus}, \Delta]$, Wacker-process

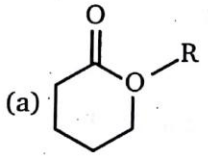
(b) $H_2C = CH - CH_2 - Br(HO^{\ominus})$, Wacker-process, $HO^{\ominus}, \Delta$

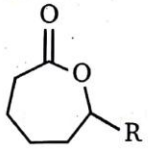
(c) Wacker process, $H_2C = CH - CH_2 - Br(HO^{\ominus}), HO^{\ominus}(\Delta)$

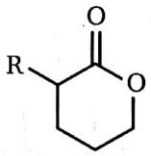
(d) Wacker process, $HO^{\ominus}(\Delta), H_2C = CH - CH_2 - Br(HO^{\ominus})$

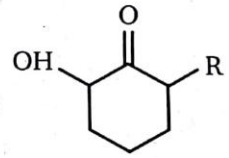
**17.** 

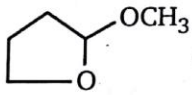
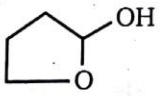
Above reaction is a Baeyer Villiger rearrangement of an asymmetric ketone with magnesium mono peroxo pthalate hexahydrate (in the drawing, $Mg^{+2}$ is omitted for clearity) Identify major product.

(a) 

(b) 

(c) 

(d) 

**18.**  and  ,

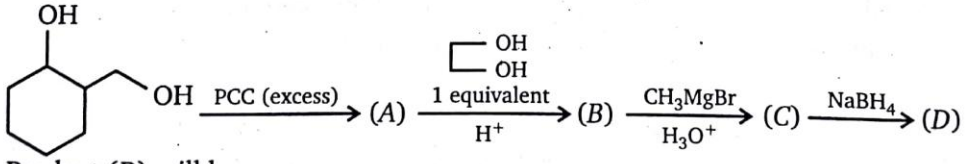
Above compounds can be differentiated by following reagent:

(a) 2-4 DNP (Brady reagent)

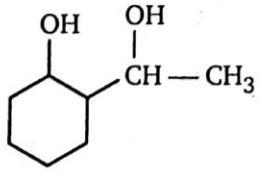
(b) Tollen's reagent

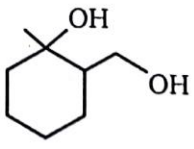
(c) Lucas reagent

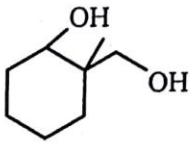
(d) $NaHSO_3$

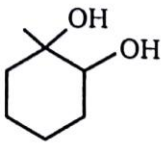
**19.** 

Product (*D*) will be :

(a) 

(b) 

(c) 

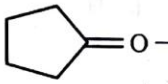
(d) 

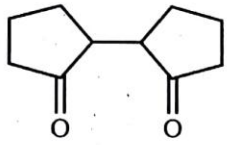
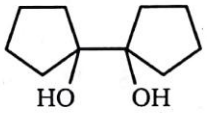
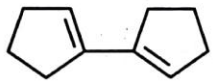
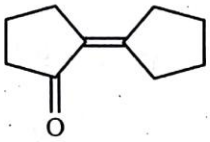
**20.** $CH_3—CH=CH_2$ → ($BH_3$, THF; $H_2O_2$, $\bar{O}H$) → $(P)$ → (Pyridinium Chloro Chromate (PCC), $CH_2Cl_2$) → $(Q)$

$CH_3—CH=CH_2$ → ($Hg(OAc)_2$, $H_2O$; $NaBH_4$, $HO^{\ominus}$) → $(R)$ → (Pyridinium Chloro Chromate (PCC), $CH_2Cl_2$) → $(S)$

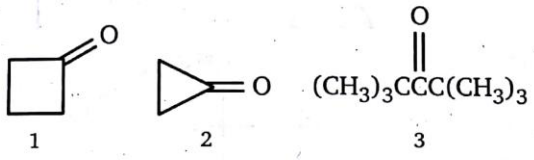
Relationship between products $(Q)$ and $(S)$ is:

(a) Positional isomer
(b) Chain isomer
(c) Stereoisomer
(d) Functional isomer

**21.** In the reaction,  $\xrightarrow[2.\,H_2O,\,heat]{1.\,Al(Hg),\,benzene,\,heat}$ $X$, the product $(X)$ is :

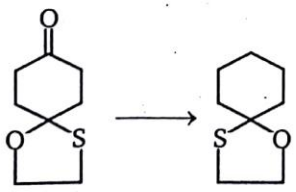
(a) 
(b) 
(c) 
(d) 

**22.** Rank the following in order of increasing value of the equilibrium constant for hydration, $K_{hyd.}$ (smallest value first).



1 2 3

(a) 1 < 2 <3
(b) 3 < 1 < 2
(c) 2 < 1 < 3
(d) 2 < 3 < 1

**23.** 

Above conversion can be achieved by:

(a) Zn(Hg), HCl
(b) $NH_2 — NH_2/KOH/\Delta$
(c) $LiAlH_4$
(d) $H_2/Ni$

**24.** Which sequence represents the best synthesis of hexanal ?

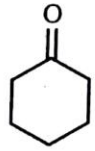
$CH_3CH_2CH_2CH_2CH_2CH=O$
Hexanal

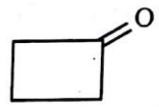
(a) 1. $CH_3CH_2CH_2\ CH_2Br + NaC\equiv CH$
2. $H_2O,\ H_2SO_4, HgSO_4$

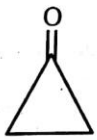
(b) 1. $CH_3CH_2CH_2CH=CH_2 + CH_3\overset{O}{\overset{\|}{C}}OOH$
2. $CH_3MgBr$, diethyl ether
3. $H_3O^+$
4. PCC, $CH_2Cl_2$

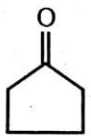
(c) 1. $CH_3CH_2CH_2CH_2\overset{O}{\overset{\|}{C}}CH_3$
2. $CH_3\overset{O}{\overset{\|}{C}}OOH$
3. $LiAlH_4$
4. $H_2O$
5. PCC, $CH_2Cl_2$

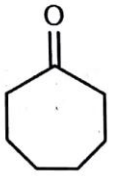
(d) 1. $CH_3CH_2CH_2CH_2MgBr + H_2C\text{—}CH_2$ (O)
2. $H_3O^+$
3. PCC, $CH_2Cl_2$

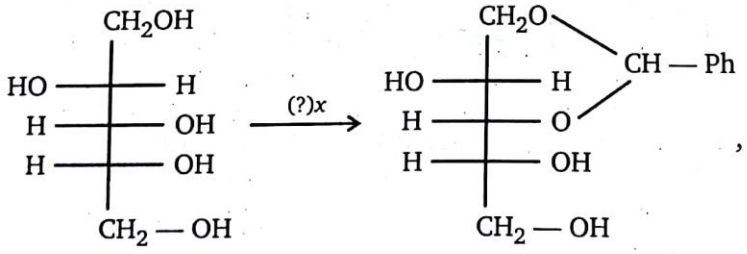
**25.**  $\xrightarrow{HNO_3}(A)\xrightarrow{Ca(OH)_2}(B)$, Product $(B)$ in this reaction is :

(a) 

(b) 

(c) 

(d) 

**26.** 

Compound $(x)$ in the above reaction is :

(a) $Ph\text{—}\overset{O}{\overset{\|}{C}}\text{—}CH_3$

(b) $Ph\text{—}\overset{O}{\overset{\|}{C}}\text{—}H$

(c) $Ph\text{—}CH_2\text{—}\overset{O}{\overset{\|}{C}}\text{—}H$

(d) $Ph\text{—}CH_2\text{—}\overset{O}{\overset{\|}{C}}\text{—}CH_3$

**27.** $Ph-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[HCl]{NaNO_2} (A) \xrightarrow[heat]{AC_2O} (B) \xrightarrow{H_3O^+} (C)$

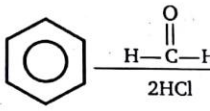
Product (*C*) of the above reaction is :

(a) $Ph-CO_2H$

(b) $Ph-\overset{O}{\overset{\|}{C}}-CO_2H$

(c) $Ph-\overset{O}{\overset{\|}{C}}-\overset{O}{\overset{\|}{C}}-H$

(d) $Ph-\overset{O}{\overset{\|}{C}}-CH_2OH$

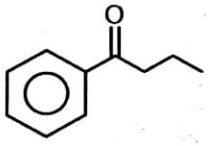
**28.**  $\xrightarrow[2HCl]{H-\overset{O}{\overset{\|}{C}}-H} (A) \xrightarrow{AgNO_2} (B)$ ; Product (*B*) of the reaction is :

(a) $Ph-CH_2-NO_2$

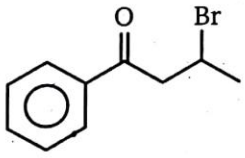
(b) $Ph-CH_2-ONO$

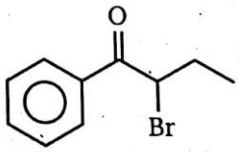
(c) $Ph-CHO$

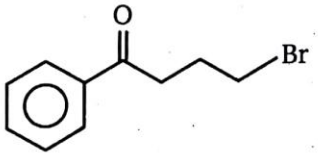
(d) $Ph-O-N=O$

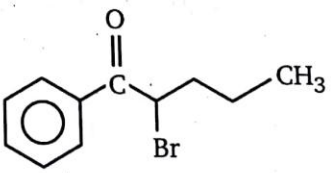
**29.**  $\xrightarrow[0.75\ mole\ \%,\ AlCl_3\ Et_2O]{Br_2} (A)$ ; (100%)

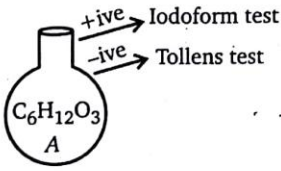
Product (*A*) of the above reaction is (bromination occur not in the benzene ring) :

(a) 

(b) 

(c) 

(d) 

**30.** 


$\xrightarrow[drop\ of\ H_2SO_4]{H_2O}$ Positive Tollens test

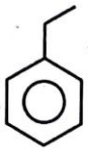
Compound (*A*) is :

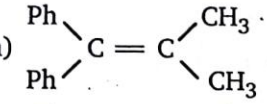
(a) $CH_3-\overset{O}{\overset{\|}{C}}-\underset{OCH_3}{\underset{|}{CH}}-\underset{OCH_3}{\underset{|}{CH_2}}$

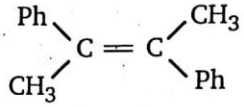
(b) $CH_3-\overset{O}{\overset{\|}{C}}-\underset{OCH_3}{\underset{|}{\overset{OCH_3}{\overset{|}{C}}}}-CH_3$

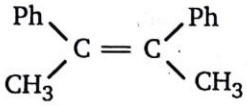
(c) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-\underset{\underset{OCH_3}{|}}{CH}-OCH_3$

(d) $H-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-\underset{\underset{OCH_3}{|}}{CH}-OCH_3$

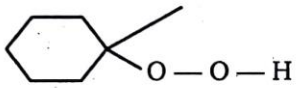
**31.** $\underset{(A)}{C_{16}H_{16}} \xrightarrow{O_3} \underset{C_8H_8O}{(B)} \xrightarrow[HO^-/\Delta]{NH_2-NH_2}$  ; Reactant (*A*) in this reaction is :

(a) 

(b) 

(c) 

(d) both (b) and (c)

**32.** 

1-methyl 1-cyclohexyl hydrogen peroxide

$\xrightarrow{H_3O^{\oplus}}$ (*P*) $C_7H_{14}O_2$

- +ive Iodoform test
- +ive 2-4 DNP test
- +ive test with $CrO_3$

Compound (*P*) is :

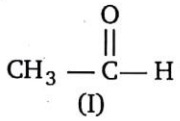
(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_2-\underset{\underset{OH}{|}}{CH}-CH_3$

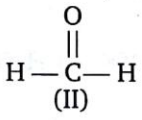
(b) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2-CH_2-CH_3$

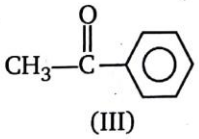
(c) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_2-CH_2-CH_2-OH$

(d) $CH_3-\overset{\overset{O}{\|}}{C}-\underset{\underset{CH_3}{|}}{CH}-\underset{\underset{CH_3}{|}}{\overset{\overset{OH}{|}}{C}}-CH_3$

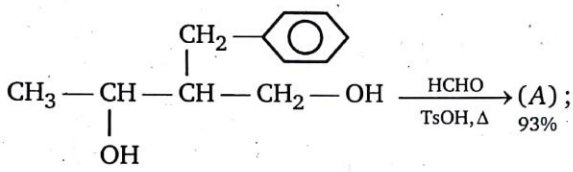
**33.** Correct order of reactivity of following compounds towards Grignard reagent?

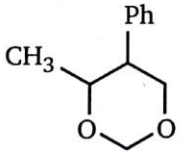

(I)

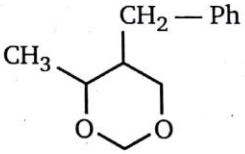

(II)

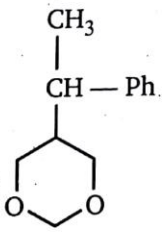

(III)

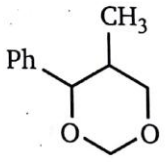
(a) I > II > III (b) II > I > III (c) II > III > I (d) I > III > II

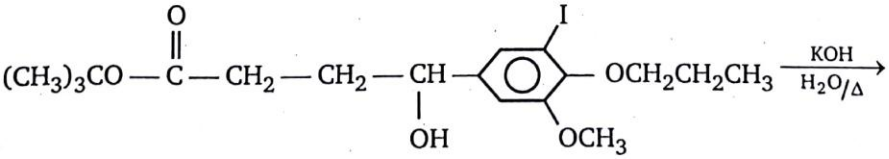
**34.** 
; Product (*A*) is :

(a) 

(b) 

(c) 

(d) 

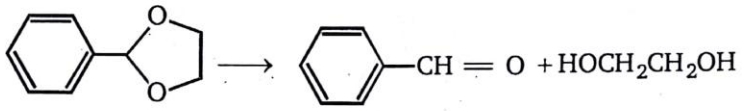
**35.** 

Total number of products obtained in above reaction is :

(a) 2 (b) 3

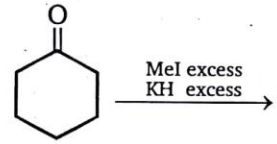
(c) 4 (d) 5

**36.** What reagent and/or reaction conditions would you choose to bring about the following conversion?

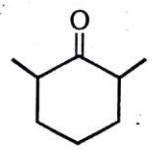


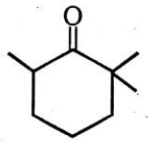

(a) 1. $LiAlH_4$, 2. $H_2O$ (b) $H_2O$, $H_2SO_4$, heat

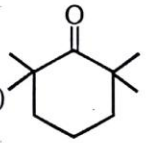
(c) $H_2O$, NaOH, heat (d) PCC, $CH_2Cl_2$

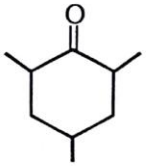
**37.** 

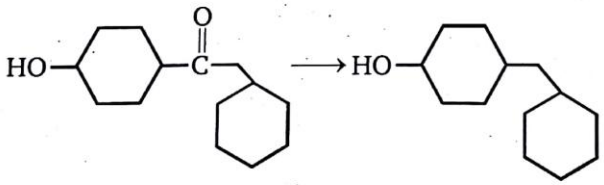
81% yield ; Product of the reaction is :

(a) 

(b) 

(c) 

(d) 


**38.** 


The above reduction can be best carried out by :

(a) Clemmensen reduction (b) Wolff-Kishner reduction

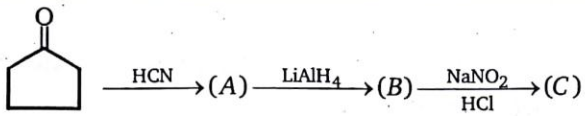
(c) $NaBH_4$ (d) None of these

**39.** $CH_3 - C \equiv CH \xrightarrow[\text{dil. } H_2SO_4]{HgSO_4} (A)$

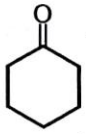
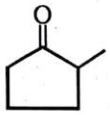
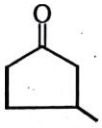
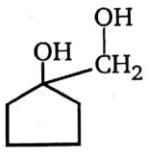
$CH_3 - C \equiv CH \xrightarrow[(2)\,H_2O_2/HO^-]{(1)\,BH_3\cdot THF} (B)$

Product (*A*) and (*B*) is differentiated by:

(a) 2-4-DNP (b) NaOI (c) Na-metal (d) $NaHSO_3$

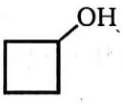
**40.** 

End product (*C*) in above reaction is :

(a)  (b)  (c)  (d) 

**41.** Compound (*X*) $C_4H_8O$, which reacts with 2, 4-DNP derivative and gives negative haloform test is :

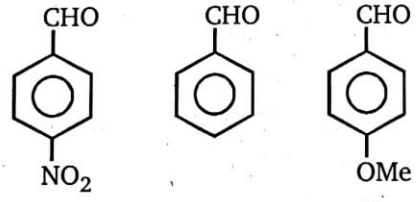
(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_3$ (b) $CH_3-\underset{\underset{CH_3}{|}}{CH}-CHO$

(c)  (d) $CH_3-CH_2-\underset{\underset{OH}{|}}{CH}-CH_3$

**42.** When a nucleophile encounters a ketone, the site of attack is :

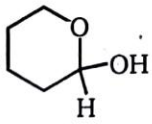
(a) the carbon atom of the carbonyl
(b) the oxygen atom of the carbonyl
(c) both the carbon and oxygen atoms, with equal probability
(d) no attack occurs as ketones do not react with nucleophiles

**43.** The correct order of rate of reaction toward nucleophilic addition reaction:



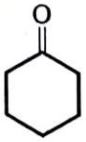
(a) (b) (c) (d) (e)

(a) $a > b > c > d > e$ (b) $a > b > d > c > e$
(c) $a > d > e > b > c$ (d) $a > b > e > d > c$

**44.** The structure  would be best classified as a(an) :

(a) Acetal (b) Hemiacetal (c) Hydrate (d) Cyanohydrin

**45.** Which of the following pairs of reactants is most effective in forming an enamine ?

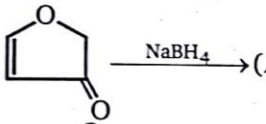
(a) $CH_3CH_2\overset{\overset{O}{\|}}{C}H + [(CH_3)_2CH]_2NH$ (b)  $+ CH_3-NH-CH_3$

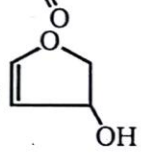
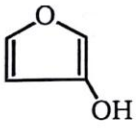
(c) $(CH_3)_3C\overset{O}{\overset{\|}{C}}H + (CH_3)_2NH$ (d) None of these form an enamine.

**46.** The reaction of $C_6H_5CH = CHCHO$ with $LiAlH_4$ gives :

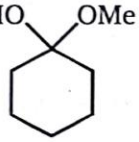
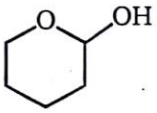
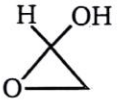
(a) $C_6H_5CH_2CH_2CH_2OH$ (b) $C_6H_5CH = CHCH_2OH$

(c) $C_6H_5CH_2CH_2CHO$ (d) $C_6H_5CH_2CHOHCH_3$

**47.**  $\xrightarrow{NaBH_4}$ $(A)$ $\xrightarrow[\Delta]{H^+}$ $(B)$ ; Product $(B)$ of the reaction is :

(a)  (b)  (c)  (d) 

**48.** Which of following compound is hemiacetal ?

(a)  (b)  (c)  (d) all of these

**49.** $Ph - CH_2 - C \equiv N \xrightarrow[THF]{LDA} \xrightarrow{CH_3I} 71\%$ ; End product of the reaction will be :

(a) $Ph - CH_2 - CH_2 - NH_2$ (b) $Ph - CH_2 - NH_2$

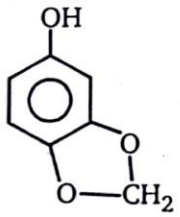
(c) $Ph - \underset{\displaystyle CH_3}{\underset{|}{CH}} - C \equiv N$ (d) $Ph - CH = C = N - CH_3$

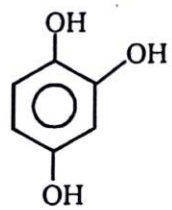
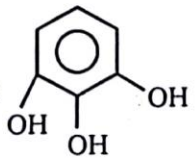
**50.** $Ph - CH = CH - \overset{O}{\overset{\|}{C}} - CH_3 \longrightarrow Ph - CH = CH - CO_2H$

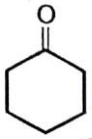
Above conversion can be achieved by :

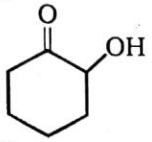
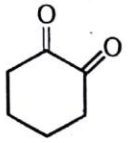
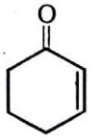
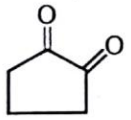
(a) $KMnO_4$, $\Delta$ followed by $H^+$ (b) $I_2/NaOH$ followed by $H^+$

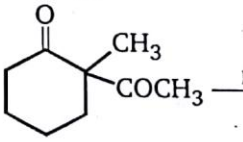
(c) $H_2/Pt$ (d) $LiAlH_4$

**51.**  $\xrightarrow{H_3O^{\oplus}}$ Products ; Product of the reaction is/are :

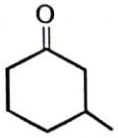
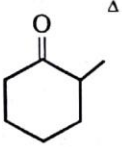
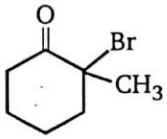
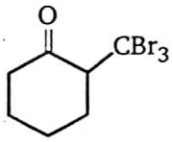
(a)  (b)  (c) HCHO (d) Both (a) and (c)

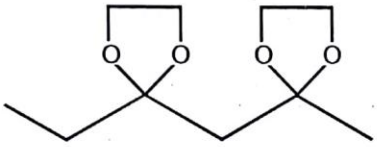
**52.**  $\xrightarrow{SeO_2}$ (*A*); Product (*A*) of the reaction is :

(a) 
(b) 
(c) 
(d) 

**53.**  $\xrightarrow[\Delta]{Br_2+NaOH}$ (*A*) + $CHBr_3$ ; Product (*C*) of the reaction is :

$\xrightarrow[\Delta]{H^+}$ (*C*)

(a) 
(b) 
(c) 
(d) 

**54.**  $\xrightarrow{H_3O^{\oplus}}$ (*A*) + 2 Glycol

Product (*A*) of the reaction will be :

(a) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-CH_2-CH_3$

(b) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

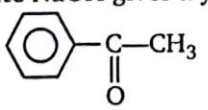
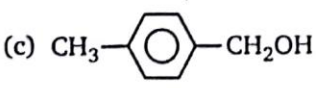
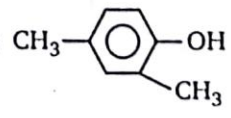
(c) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

(d) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

**55.** $R-\overset{\overset{O}{\|}}{C}-H \xrightarrow{R-NH_2} R-CH=N-R$. This reaction gives best yield at :

(a) pH 1 - 2 (b) pH 4 - 5 (c) pH 10 - 11 (d) pH 13 - 14

**56.** An aromatic compound *A* of the molecular formula $C_8H_{10}O$ on reaction with iodine and dilute NaOH gives a yellow precipitate. The structure of the compound is expected to be:

(a) 
(b) $C_6H_5CHOHCH_3$
(c) 
(d) 

**57.** Compound *A* (molecular formula $C_3H_8O$) is treated with acidified potassium dichromate to form a product *B*(molecular formula $C_3H_6O$). *B* forms a shining silver mirror on warming with ammonical silver nitrate, *B* when treated with an aqueous solution of $NH_2NHCONH_2$ and sodium acetate gives a product *C*. Identify the structure of *C*.

(a) $CH_3CH_2CH = NNHCONH_2$ (b) $CH_3C(CH_3) = NHHCONH_2$

(c) $CH_3C(CH_3) = NCONHNH_2$ (d) $CH_3CH_2CH = NCONHNH_2$

**58.** In the reaction, the acid obtained will be :

$CH_3CHO + HCN \longrightarrow CH_3CH(OH)CN \xrightarrow{H-OH} CH_3CH(OH)COOH$

(a) D-isomer (b) L-isomer

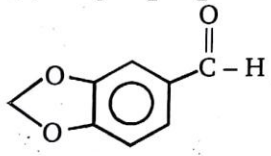
(c) (80%D + 20%L) mixture (d) (50%D + 50%L) mixture

**59.** In the following sequence :

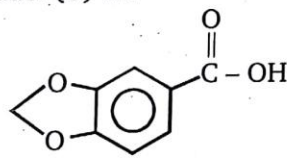
$CH_3CH_2Cl \xrightarrow{NaCN}$ (i) $\xrightarrow{Ni/H_2}$ (ii) $\xrightarrow{\text{acetic anhydride}}$ (iii), Product (iii) is :

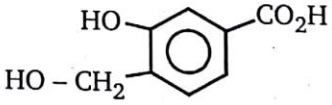
(a) $CH_3CH_2CH_2NH_2$ (b) $CH_3CH_2CH_2CONHCH_3$

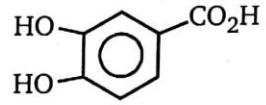
(c) $CH_3CH_2CH_2NHCOCH_3$ (d) $CH_3CH_2CH_2CONHCOCH_3$

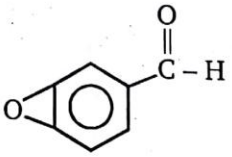
**60.**  $\xrightarrow[H_2O,\Delta]{KMnO_4} \xrightarrow{H_3O^{\oplus}}$ (*G*)

Product (*G*) is :

(a) 

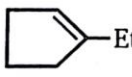
(b) 

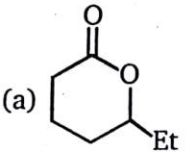
(c) 

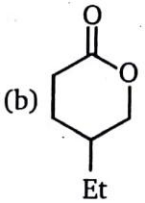
(d) 

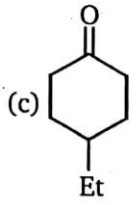
**61.** Carbonyl compounds can generally be converted to hydrocarbons by :

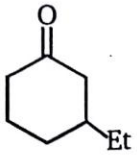
(a) $H_2/Pt$ (b) $LiAlH_4$ (c) $N_2H_4$-KOH/Δ (d) $K_2Cr_2O_7$ - $H_2SO_4$

**62.**  $\xrightarrow[(2)\ Ag_2O\ (3)\ NaBH_4\ (4)\ H^{\oplus}]{(1)\ O_3}$ (*A*); Product (*A*) is :

(a) 

(b) 

(c) 

(d) 

**63.** Which statement about the aldol condensation is correct ?

(a) A Lewis acid is commonly used as a catalyst

(b) The initial step is probably the formation of a carbanion

(c) A Lewis base is employed to induce carbocation formation

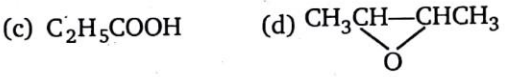
(d) The carbon chain is lengthened through the elimination of 1 mole of water

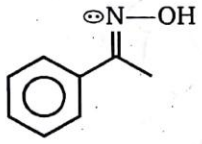
**64.** A compound gives a positive test with $I_2/NaOH$ and is extracted from benzene by saturated $NaHSO_3$. It may be :

(a) $CH_3(CH_2)_4CHO$ (b) $CH_3(CH_2)_3COCH_3$

(c) $CH_3CH_2COCH_2CH_3$ (d) $CH_3(CH_2)_4CH_2OH$

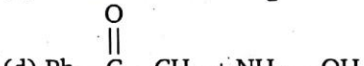
**65.** Which of the following compounds on reaction with excess $CH_3MgBr$ and subsequent hydrolysis will give a tertiary alcohol?

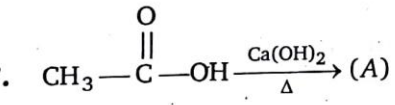
(a) $C_2H_5CHO$ (b) $C_2H_5CO_2CH_3$ (c) $C_2H_5COOH$ (d) 

**66.** $A + B \longrightarrow$ 

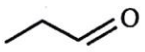
Reactant (*A*) and (*B*) is :

(a) $Ph—CH_2—CH=O + NH_2—OH$ (b) $Ph—CH=O + NH_2—OH$

(c)  (d) 

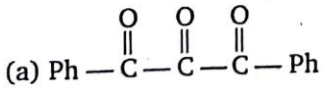
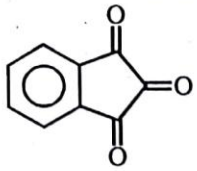
**67.** 

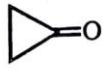
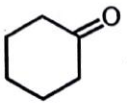
Product (*A*) is :

(a)  (b) 

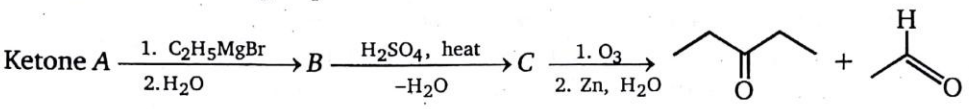
(c)  (d) 

**68.** Which of the following does not form a stable hydrate on addition of $H_2O$ ?

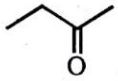
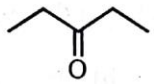
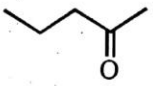
(a)  (b) 

(c)  (d) 

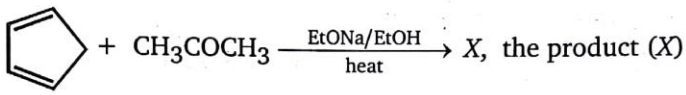
**69.** Consider the following sequence of reactions.

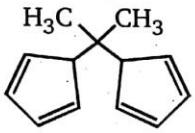
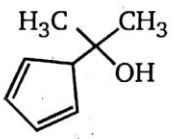


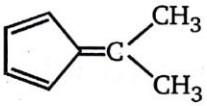
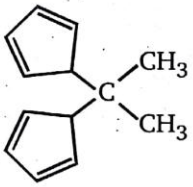

The ketone (*A*) is :

(a)  (b)  (c)  (d) 

**70.** In the reaction,



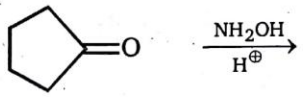

(a)  (b) 

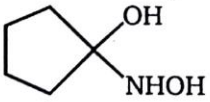
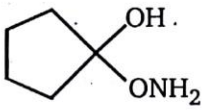
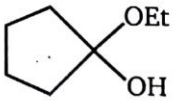
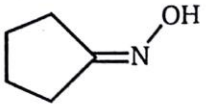
(c)  (d) 

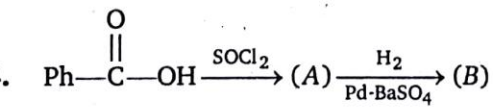
**71.** The conversion of acetophenone into benzoic acid can be achieved by its reaction with :
(a) sodium hydroxide followed by acidification
(b) iodine and sodium hydroxide, followed by acidification
(c) hydroxylamine followed by reaction with $H_2SO_4$
(d) *m*-chloroperoxobenzoic acid

**72.** In which of the following compounds the methylenic hydrogens are the most acidic ?
(a) $CH_3COCH_2CH_3$ (b) $CH_3CH_2COOC_2H_5$
(c) $CH_3CH_2CH(COOC_2H_5)_2$ (d) $CH_3COCH_2CN$

**73.** Which is the major product of the following reaction ?




(a)  (b)  (c)  (d) 

**74.** 


Product (*B*) is :

(a) $Ph-\overset{\overset{O}{\|}}{C}-H$ (b) $Ph-CH_2-OH$

(c) $Ph-CH_2-Cl$ (d) $Ph-CH=CH_2$

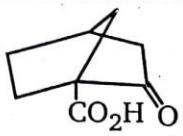
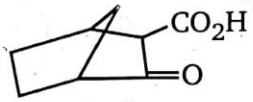
**75.** The presence of unsaturation in organic compounds can be tested with :

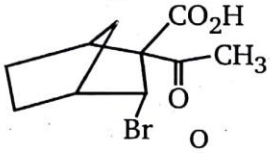
(a) Schiff's reagent (b) Tollens' reagent (c) Fehling's reagent (d) Baeyer's reagent

**76.** Which of the following gives iodoform test ?

(a) $CH_3CH_2OH$ (b) $C_2H_5CHO$ (c) $(CH_2OH)_2$ (d) None of these

**77.** Which of the following β-keto carboxylic acid does not undergo decarboxylation on heating ?

(a)  (b) 

(c)  (d) None of these

**78.** $HOCH_2CH_2CH_2-\overset{\overset{O}{\|}}{C}-OCH_2CH_3 \xrightarrow{PCC} (A) \xrightarrow[\text{(1 molar equivalent)}]{H_2C=CHMgBr} (B) \xrightarrow{NH_4Cl/H_2O} (C)$

$$\xrightarrow[H_2O]{KOH} \xrightarrow{H_3O^{\oplus}} \xrightarrow[\text{Pyridine}]{(CH_3-\overset{\overset{O}{\|}}{C})_2O} (D)$$

Product (*D*) is :

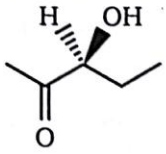
(a) $H_2C=CH-\underset{\underset{O-\overset{\overset{O}{\|}}{C}-CH_3}{|}}{CH}-CH_2-CH_2-\overset{\overset{O}{\|}}{C}-OH$

(b) $H_2C=CH-CH_2-\underset{\underset{OH}{|}}{C}-CO_2H$

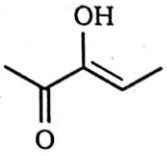
(c) $H_2C=CH-\underset{\underset{OH}{|}}{C}-CH_2-CH_2-\overset{\overset{O}{\|}}{C}-O-\overset{\overset{O}{\|}}{C}-CH_3$

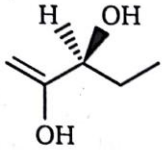
(d) $H_2C=CH-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2-\overset{\overset{O}{\|}}{C}-O-H$

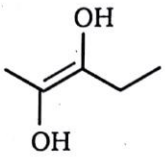
**79.** The compound shown in the below undergoes racemization on reaction with aqueous acid.

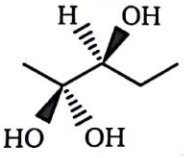


Which of the following structures best represents the intermediate responsible for this process?

(a) 

(b) 

(c) 

(d) 

**80.** The final product of the following sequence of reaction is :

$$(CH_3O)_2CHCH_2CH_2CH_2Br \xrightarrow{Mg} \xrightarrow{H_2C=O} \xrightarrow[\text{heat}]{H_3O^+}$$

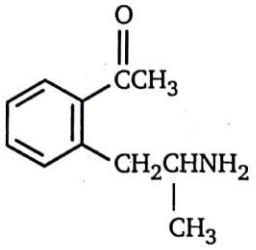
(a) $CH_3O\overset{O}{\overset{\|}{C}}CH_2CH_2CH_2CH_2OH$

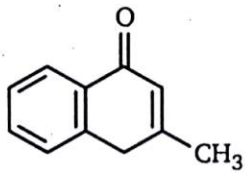
(b) $CH_3\overset{O}{\overset{\|}{C}}CH_2CH_2CH_2CH_2OH$

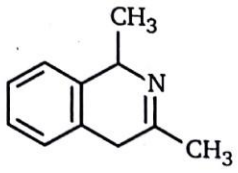
(c) $HC\overset{O}{\overset{\|}{C}}H_2CH_2CH_2CH_2OH$

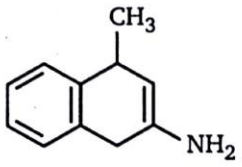
(d) $HC\overset{O}{\overset{\|}{C}}H_2CH_2CH_2\overset{O}{\overset{\|}{C}}H$

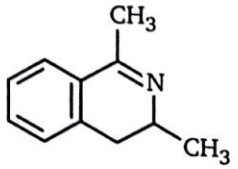
**81.** The amino ketone shown below undergoes a spontaneous cyclization on standing. What is the major product of this intramolecular reaction ?



(a) 

(b) 

(c) 

(d) 

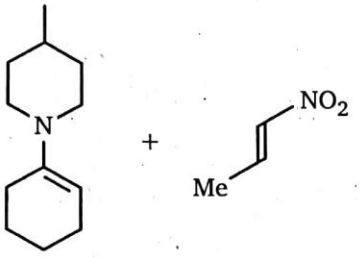
**82.** Compound (*A*) $C_6H_{12}O$ is optically active. Compound (*A*) give negative Tollens test and positive test with 2-4-di-nitro phenyl hydrazine. Identify *A*.

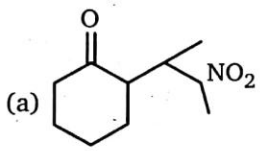
(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-\underset{\underset{CH_3}{|}}{CH}-CH_3$

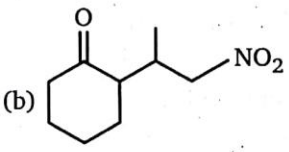
(b) $CH_3-\overset{\overset{O}{\|}}{C}-\underset{\underset{CH_2-CH_3}{|}}{CH}-CH_3$

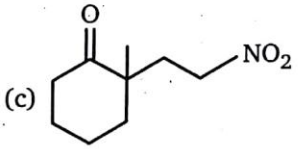
(c) $H-\overset{\overset{O}{\|}}{C}-CH_2-\underset{\underset{CH_2-CH_3}{|}}{CH}-CH_3$

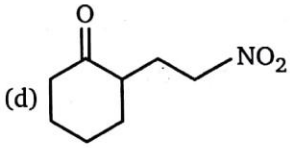
(d) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_2-CH_3$

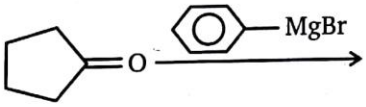
**83.**  ; Product (*A*) of the reaction is :

(a) 

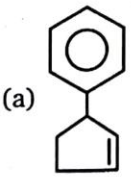
(b) 

(c) 

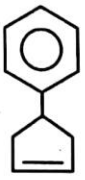
(d) 

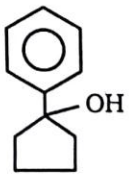
**84.** 

Product (*Q*) will be :

(a) 

(b) 

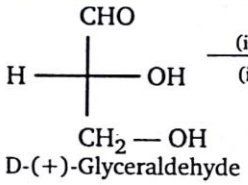
(c) 

(d) 

**85.** $Ph-CH_3 \xrightarrow{CrO_2Cl_2} (A) \xrightarrow{conc.KOH} Ph-CH_2OH + (B)$

Product (*B*) of above the reaction is :

(a) $Ph-CO_2H$ (b) $Ph-CO_2^-$ (c) $Ph-CHO$ (d) $Ph-CH_3$

**86.** 

Product ; Product obtained in the reaction is :

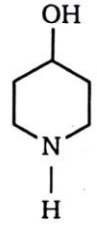
D-(+)-Glyceraldehyde

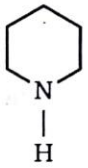
(a) Diastereomer (b) Racemic

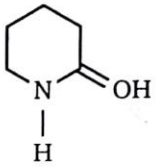
(c) Meso (d) Optically pure enantiomer

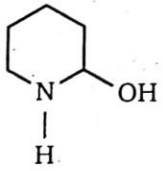
**87.** 

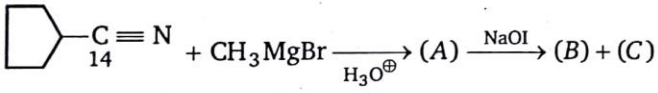
; Product (*C*) of the reaction is :

(a) 

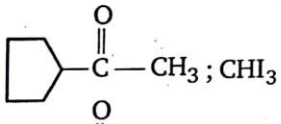

(b) 

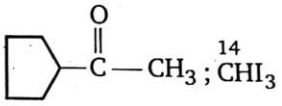

(c) 

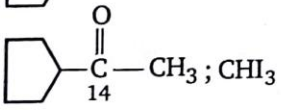

(d) 

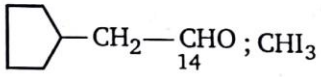

**88.** 

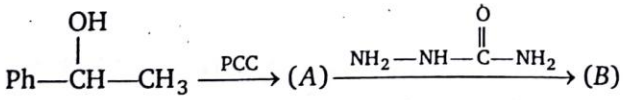

Product (*A*) and (*C*) is :

(a) 

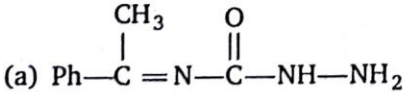

(b) 

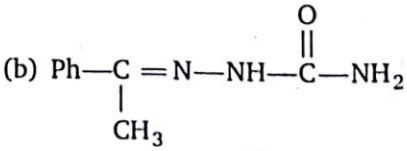

(c) 

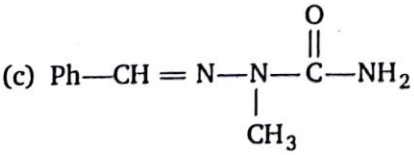

(d) 

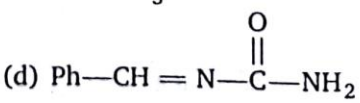

**89.** 

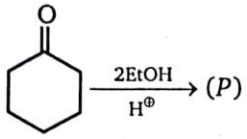

Product (*B*) is :

(a) 


(b) 

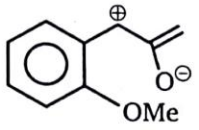

(c) 


(d) 

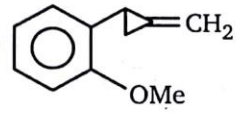
**90.** 

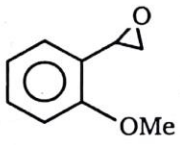
Product (*P*) is :

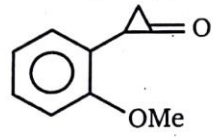
(a) Hemiacetal (b) Acetal (c) Alcohol (d) Alkane

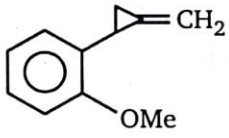
**91.**  ; Product of rearrangement is :

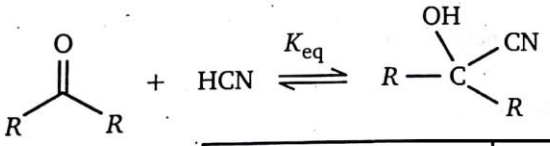
(Oxyallyl cation)

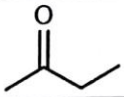
(a) 

(b) 

(c) 

(d) 

**92.** 

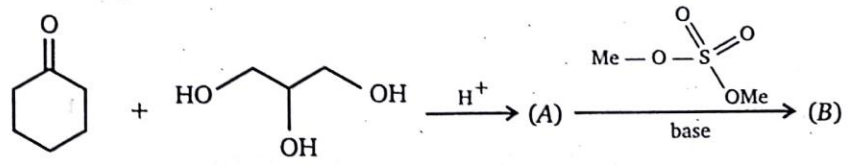
| Reactant | $K_{eq.}$ |
|---|---|
| PhCHO | *a* |
|  | *b* |
|  | *c* |
|  | *d* |

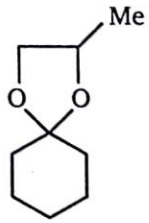
The correct order of decreasing value of $K_{eq.}$ is :

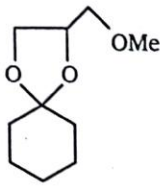
(a) $a > b > c > d$ (b) $d > a > b > c$

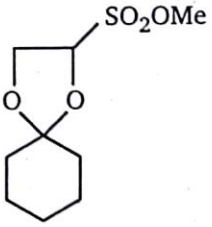
(c) $d > b > a > c$ (d) $d > a > c > d$

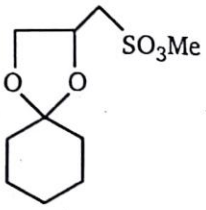
**93.** Product (*B*) of the given reaction is :



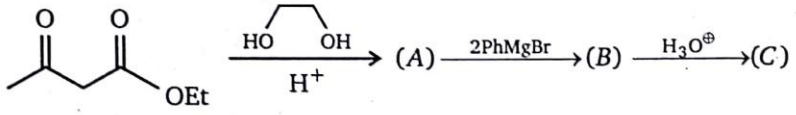
(a) 

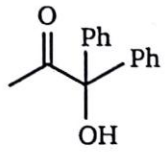
(b) 

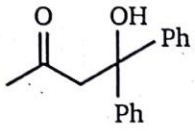
(c) 

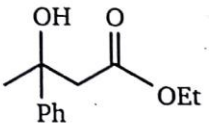
(d) 

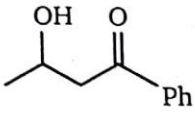
**94.** End product (*C*) of the reaction is :

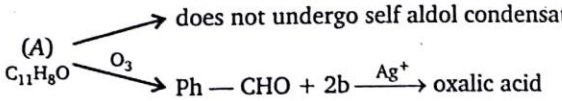


(a) 

(b) 

(c) 

(d) 

**95.** 

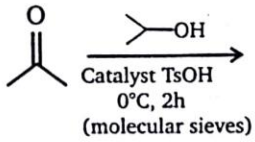
Compound (*A*) will be :

(a) $Ph-C\equiv C-C\equiv C-CHO$

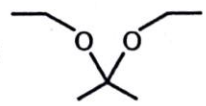
(b) $Ph-C\equiv C-CH=CH-CHO$

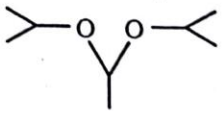
(c) $Ph-CH=CH-C\equiv C-CHO$

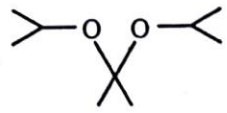
(d) $Ph-CH=CH-C=CH-CO_2H$

**96.** 

Product ; Product of the reaction is :

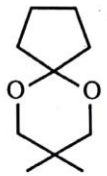
(a) 

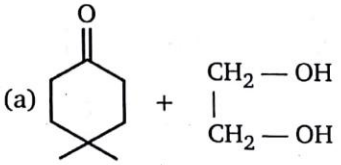
(b) 

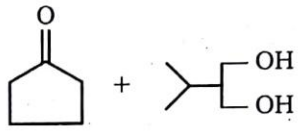
(c) 

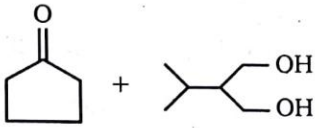
(d) 

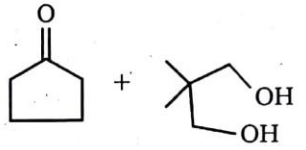
**97.** Which pair of reactants compounds may be used to make given acetal ?

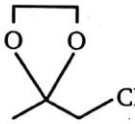


(a) 

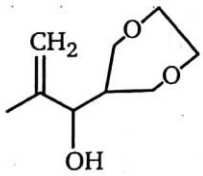
(b) 

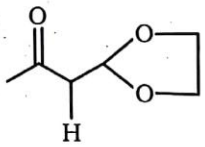
(c) 

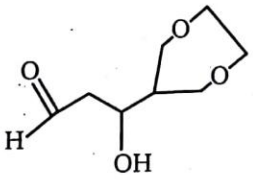
(d) 

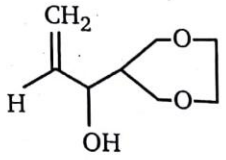
**98.** 
(A)

$\xrightarrow{H^{\oplus}}$ (*B*) ; (*A*) & (*B*) are isomers ; Isomer (*B*) is :

(a) 

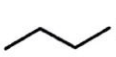
(b) 

(c) 

(d) 

**99.** 

$\xrightarrow{PCC}$ (*A*)



$\xrightarrow{PCC}$ (*B*)

(*A*) and (*B*) is differentiated by :

(a) NaH (b) 2-4 DNA (c) Tollen's reagent (d) $NaHSO_3$

**100.** Which of the following pairs cannot be differentiated by Tollens' reagent ?

(a) Benzaldehyde and benzyl alcohol (b) Hexanal and 2-hexanone

(c) 2-Hexanol and 2-hexanone (d) Pentanal and diethyl ether

**101.** An optically active compound $C_6H_{12}O$ gives positive test with 2, 4-dinitrophenyl hydrazine, but negative with Tollens' reagent, what is the structure of the compound ?

(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH_2-CH_3$ (b) $H-\overset{\overset{O}{\|}}{C}-\underset{\underset{CH_3}{|}}{CH}-CH_2-CH_2-CH_3$

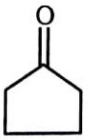
(c) $CH_3-\overset{\overset{O}{\|}}{C}-\underset{\underset{CH_3}{|}}{CH}-CH_2-CH_3$ (d) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-\underset{\underset{CH_3}{|}}{CH}-CH_3$

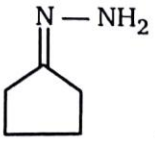
**102.** Compound (*A*) $C_6H_{12}O_3$, when treated with $I_2$ in aqueous sodium hydroxide gives yellow precipitate. When *A* is treated with Tollens reagent no reaction occur. When *A* is hydrolysed and then treated with Tollens reagent, a silver mirror is formed in test tube. Compound (*A*) will be :

(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-\underset{\underset{OCH_3}{|}}{CH}-OH$ (b) $CH_3-\overset{\overset{O}{\|}}{C}-\underset{\underset{OCH_3}{|}}{\overset{\overset{OCH_3}{|}}{C}}-CH_3$

(c) $CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH(OCH_3)_2$ (d) $H-\overset{\overset{O}{\|}}{C}-CH_2-CH_2-CH(OCH_3)_2$

**103.** $\begin{matrix}CH_2-CH_2-CO_2H\\|\\CH_2-CH_2-CO_2H\end{matrix} \xrightarrow[BaCO_3]{\Delta} A \xrightarrow{NH_2-NH_2} B \xrightarrow[KOH]{heat} (C)$, Product (*C*) obtained is :

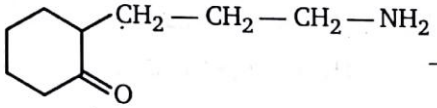
(a) $CH_3-CH=CH-CH_2$ (b) 

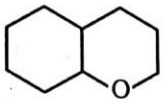
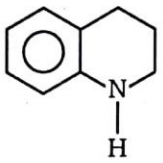
(c)  (d) 

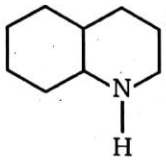
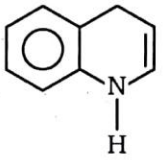
**104.** Which of following does not react with $NaHSO_3$ (sodium bisulphite)?

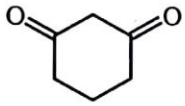
(a) $CH_3-\overset{\overset{O}{\|}}{C}-H$ (b) $CH_3-\overset{\overset{O}{\|}}{C}-Et$

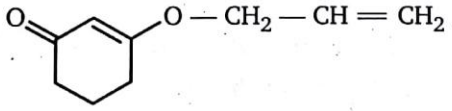
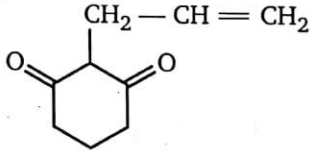
(c) $Et-\overset{\overset{O}{\|}}{C}-Et$ (d) $Ph-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

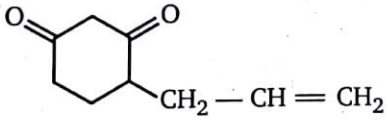
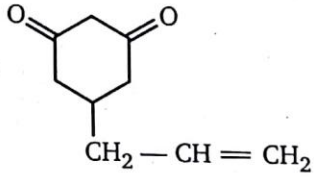
**105.**  ; Product (*A*) is :

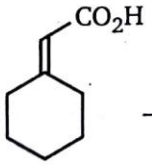
(a)  (b) 

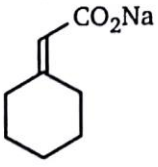
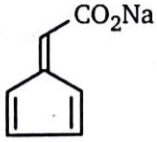
(c)  (d) 

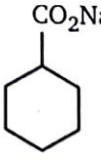
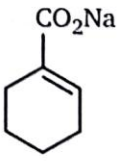
**106.**  ; Product (*A*) is :

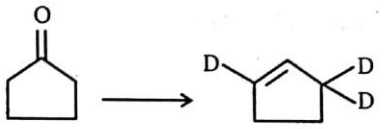
(a)  (b) 

(c)  (d) 

**107.**  ; Product (*B*) in this reaction is :

(a)  (b) 

(c)  (d) 

**108.** 

Arrange the following reagent in the correct order in which above transformation is carried out :

(a) $KOD/D_2O, H^+/\Delta, LiAlH_4$ (b) $H^+/\Delta, KOD/D_2O, LiAlH_4$

(c) $KOD/D_2O, LiAlH_4, H^+/\Delta$ (d) $LiAlH_4, H^+/\Delta, KOD/D_2O$

**109.** $CH_3-\overset{\overset{O}{\|}}{C}-H \xrightarrow{HCN} (A) \xrightarrow{H_3O^{\oplus}} (B) \xrightarrow[\Delta]{} (C) \xrightarrow{LiAlH_4} (D) \xrightarrow{HIO_4} HCHO + (E)$

Compound $(C)$ can show geometrical isomerism. Product $(E)$ of the reaction will be :

(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ (b) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-H$

(c) $CH_3-CHO$ (d) $HCHO$

**110.** Arrange in their increasing order of equilibrium constants for hydration ?

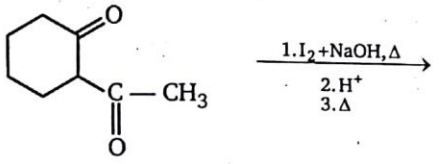
$CH_3-\overset{\overset{O}{\|}}{\underset{(A)}{C}}-CH_3$, $CH_3-\overset{\overset{O}{\|}}{\underset{(B)}{C}}-H$, $CH_3-\overset{\overset{O}{\|}}{\underset{(C)}{C}}-CH_2-Cl$, $H-\overset{\overset{O}{\|}}{\underset{(D)}{C}}-H$,

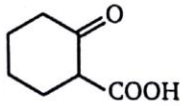
$Cl-CH_2-\overset{\overset{O}{\|}}{\underset{(E)}{C}}-H$

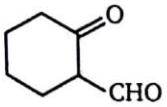
(a) $A < B < C < D < E$ (b) $A < C < B < E < D$

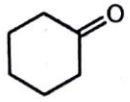
(c) $A < C < E < B < D$ (d) $C < A < B < E < D$

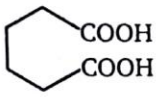
**111.** End products of the following sequence of reactions are :



(a) yellow ppt. of $CHI_3$, 

(b) yellow ppt. of $CHI_3$, 

(c) yellow ppt. of $CHI_3$, 

(d) yellow ppt. of $CHI_3$, 

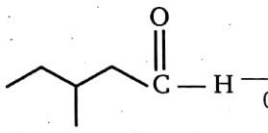
**112.** $Ph-CH_2-CN \xrightarrow[(2)\,CH_3-\overset{\overset{O}{\|}}{C}-Cl \\ (3)\,H_3O^{\oplus}/\Delta]{(1)\,EtONa} (P)$ ; Product $(P)$ of the reaction will be :

(a) $Ph-CH_2-\overset{\overset{O}{\|}}{C}-H$

(b) $Ph-CH_2-\overset{\overset{O}{\|}}{C}-CH_3$

(c) $Ph-\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{\|}}{C}-H$

(d) $Ph-\underset{\underset{CH_3}{|}}{CH}-\overset{\overset{O}{\|}}{C}-CH_3$

**113.**  $\xrightarrow[(ii)\,H_2SO_4]{(i)\,NaCN}$ Products. Products of the reaction are :

(a) Racemic mixture

(b) Diastereomers

(c) Meso

(d) Mixture of meso compound and optically active compound

**114.** $(A) \xrightarrow[\text{dil. } H_2SO_4]{HgSO_4} (B) \xrightarrow{LiAlH_4} \underset{\text{recemic mixture}}{(C)}$

$\therefore$ reactant $(A)$ is :

(a) $CH_3-C\equiv CH$

(b) $HC\equiv CH$

(c) $CH_3-C\equiv C-CH_3$

(d) $Ph-CH=CH_2$

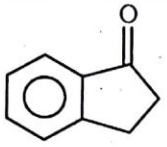
**115.** $CH_3CH_2-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow[HCl]{NaNO_2}$ ; Major product of this reaction is :

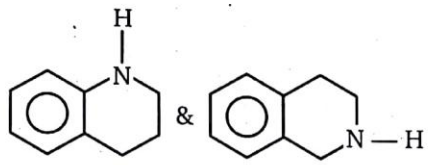
(a) $CH_3\underset{\underset{NO}{|}}{CH}-\overset{\overset{O}{\|}}{C}-CH_3$

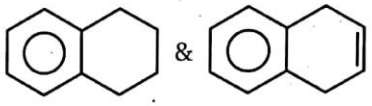
(b) $CH_3-CH_2-\overset{\overset{O}{\|}}{C}-CH=N-OH$

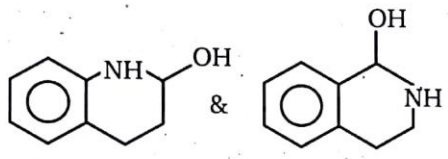
(c) $CH_3-\overset{\overset{N-OH}{\|}}{C}-\overset{\overset{O}{\|}}{C}-CH_3$

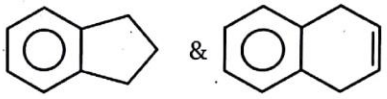
(d) $CH_3-CH_2-\overset{\overset{N-OH}{\|}}{C}-CH_3$

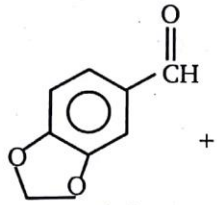
**116.**  $\xrightarrow[(2)\,H^+,\Delta\\(3)\,LiAlH_4]{(1)\,NH_2OH}$ $(A)+(B)$. Product $(A)$ & $(B)$ are :

(a) 

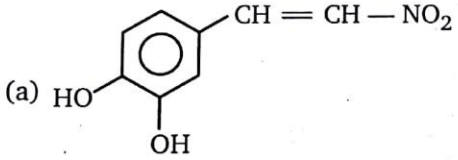
(b) 

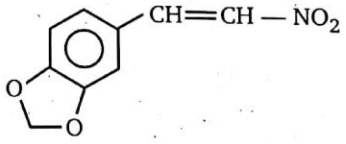
(c) 

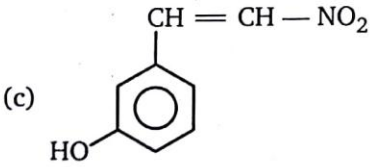
(d) 

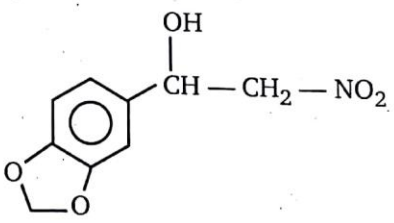
**117.** 
3, 4-Methylene dioxybenzaldehyde

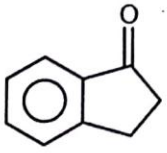
$+\ CH_3NO_2$ (nitromethane) $\xrightarrow{NaOH} A \xrightarrow[\Delta]{HCl}$ $(B)$. Product $(B)$ is : 93%

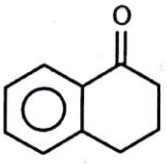
(a) 

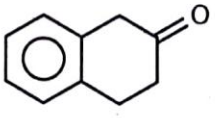
(b) 

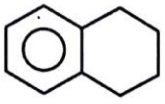
(c) 

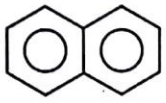
(d) 

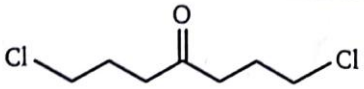
**118.**  $\xrightarrow[(2)\ LiAlH_4\\(3)\ NaNO_2/H^+]{(1)\,HCN}$ $(A)$ . Product $(A)$ is : major

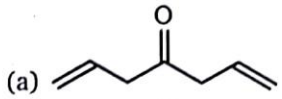
(a) 

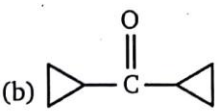
(b) 

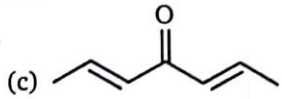
(c) 

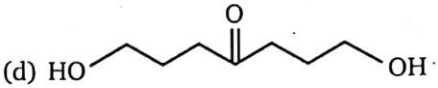
(d) 

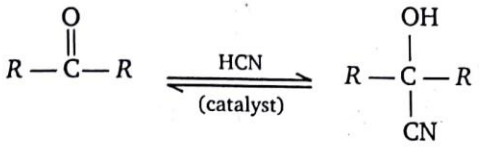
**119.**  $\xrightarrow[(2\text{mole})]{\text{alc. KOH}}$ (*A*). Product (*A*) is :

(a) 

(b) 

(c) 

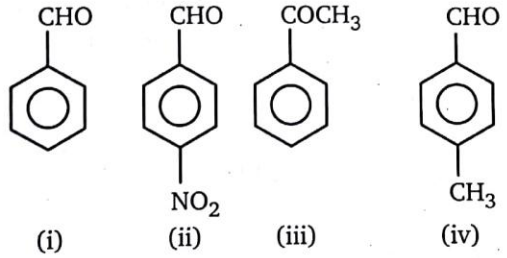
(d) 

**120.** 

Which of following can be used as a catalyst in the above reaction?

(a) $Cl^-$ (b) $CH_3-\overset{\overset{O}{\|}}{C}-O^-$ (c) $Et-O^-$ (d) $HSO_4^-$

**121.** Arrange the following carbonyl compounds in decreasing order of their reactivity in nucleophilic addition reaciton.

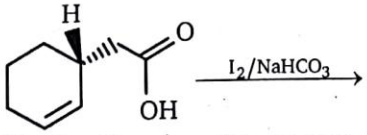


(i) (ii) (iii) (iv)

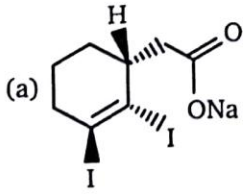
(a) ii > iii > i > iv (b) ii > i > iv > iii

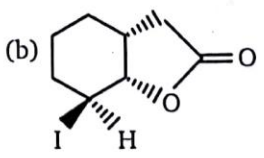
(c) iii > ii > i > iv (d) iii > i > iv > ii

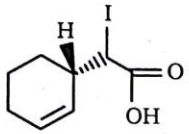
**122.** The following reaction were carried out.

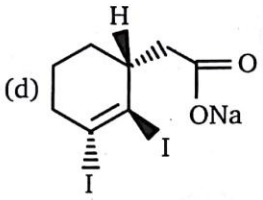


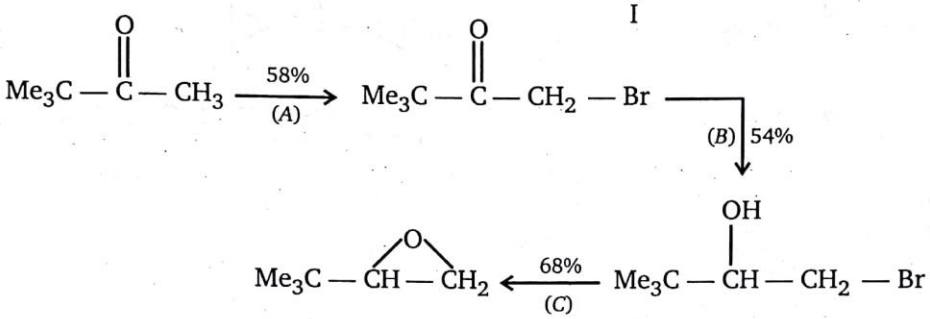
The final product formed in the above reaction sequence is :

(a) 

(b) 

(c) 

(d) 

**123.** 

**A.** Yield of each step as actually carried out in the laboratory is given above. What is overall yield of reaction?

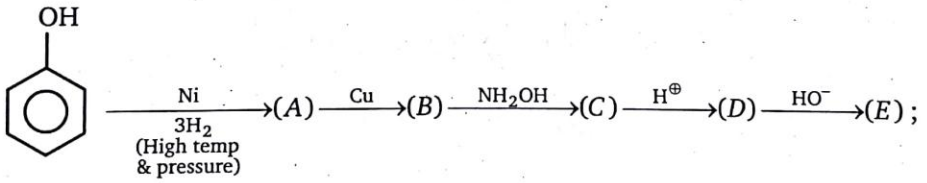
(a) 42% (b) 31%

(c) 21% (d) 60%

**B.** What is the appropriate reagent to carry out above synthesis, *i. e.*, *A*, *B*, *C* respectively are :

(a) $Br_2/H^+$, $LiAlH_4$, $H^\oplus$ (b) $Br_2/H^+$, $NaBH_4$, $HO^-$

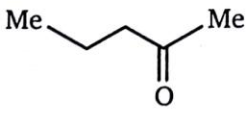
(c) NBS, $AlCl_3$, $HO^-$ (d) $Br_2/HO^-$, $BF_3$, $HO^-$

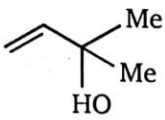
**124.** 

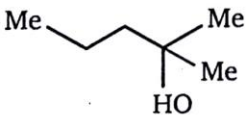
Product (*E*) is :

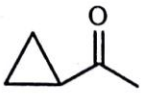
(a) Nylon 66 (b) Nylon 6 (c) Styrene (d) Polystyrene

**125.** Methyl vinyl ketone on reaction with $LiCuMe_2$ gives a major product, whose structure is :

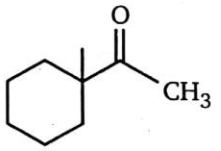
(a) 

(b) 

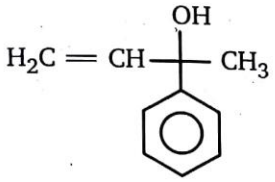
(c) 

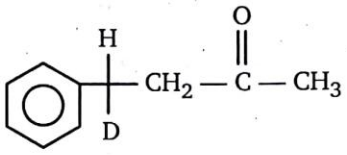
(d) 

**126.** Which of following is in capable to show iodoform test ?

(a) 

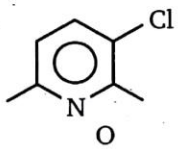
(b) $Ph-CH=CH-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$

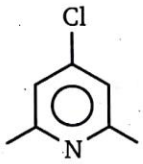
(c) 

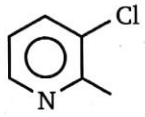
(d) 

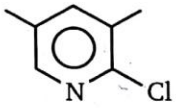
**127.** $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_2-CH_2-\overset{\displaystyle O}{\overset{\|}{C}}-CH_3 \xrightarrow[\Delta]{(NH_4)_2CO_3} (A) \xrightarrow[\Delta]{CCl_3CO_2Na} \underset{\text{(major)}}{(B)}$

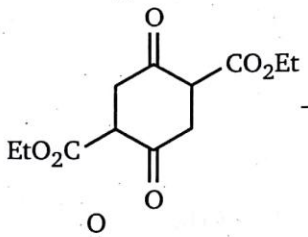
Product (*B*) of above reaction is :

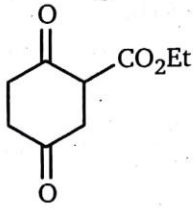
(a) 

(b) 

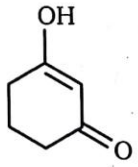
(c) 

(d) 

**128.**  $\xrightarrow[\Delta]{H_3O^+} A$ ; Product obtained is :

(a) 

(b) 

(c) 

(d) None of these

**129.** $\underset{\text{Symmetrical Ketone}}{(A)} \xrightarrow{LiAlH_4} (B) \xrightarrow[\Delta]{H^{\oplus}}$ Diastereomers

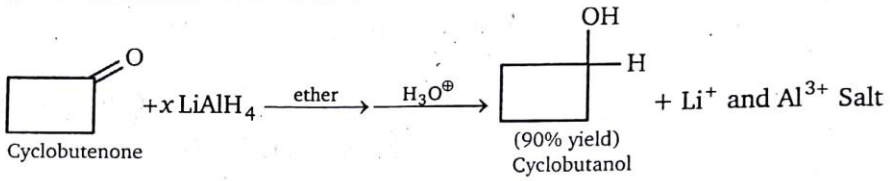
Reactent (*A*) is :

(a) $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_3$

(b) $CH_3-\overset{\displaystyle O}{\overset{\|}{C}}-CH_2-CH_3$

(c) $CH_3-CH_2-\overset{\displaystyle O}{\overset{\|}{C}}-CH_2-CH_3$

(d) $CH_3-CH_2-CH_2-CH=O$

**130.** 


Cyclobutenone

(90% yield)
Cyclobutanol

Value of $x$ in above reaction is :

(a) 1 (b) 2 (c) 3 (d) 4

**131.** $(A) \xrightarrow[\Delta]{NH_2OH} (B) \xrightarrow{H_2SO_4} (C) \xrightarrow{H_3O^{\oplus}} (D) + (E) \xrightarrow[KOH,\Delta]{CHCl_3} CH_3 - N \overset{\rightarrow}{\equiv} C$

$(D) \xrightarrow{SOCl_2} (F) \xrightarrow[(ii)\ H^{\oplus}]{(i)\ PhMgBr(excess)} (G) \xrightarrow[\Delta]{H^{\oplus}} (H) \xrightarrow[Zn/Cu]{CH_2I_2}$ 


Molecular weight of compound $(A)$ is :

(a) 58 (b) 120

(c) 60 (d) 182

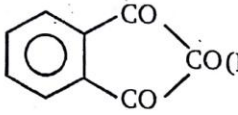
**132.** $Ph_2CH-\overset{O}{\overset{\|}{C}}-H \xrightarrow{\text{aqueous acid}} \underset{81\%}{(A)} + \underset{2\%}{\text{enol}} + \underset{17\%}{\text{aldehyde}}$

Product $(A)$ of above reaction will be :

(a) $Ph-\underset{Ph}{\overset{|}{C}}=CH-O$ (b) $Ph_2CH-\overset{OH}{\overset{|}{C}}H_2$

(c) $Ph_2CH-\overset{OH}{\overset{|}{C}}H-OH$ (d) $Ph_2CH-\overset{O}{\overset{\|}{C}}-CH_3$

**133.** Which of the following will form stable hydrate ?

(a) $CCl_3CHO$ (Chloral) (b) 

(Ninhydrin)

(c) $(CF_3)_2CO$ (d) All of these

**134.** The pH at which maximum hydrate is present in an solution of oxaloacetic acid:

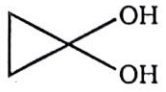
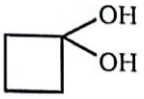
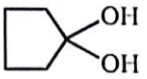
$H-O-\overset{O}{\overset{\|}{C}}-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{C}}-O-H$

$pK_a = 2.2$ $pK_a = 3.98$

(a) pH = 0 (b) pH = 12

(c) pH = 4 (d) pH = 6

**135.** Arrange their stabilities of given gem- diols in decreasing order.

(I)  (II)  (III) 

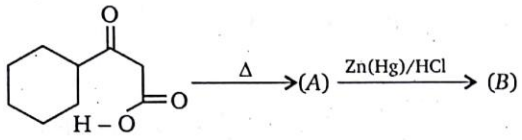
(a) I > II > III (b) III > II > I (c) I > III > II (d) III > I > II

**136.** Maximum hydration takes place of :

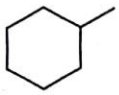
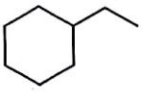
(a) $CF_3\overset{\overset{O}{\|}}{C}CF_3$ (b) $CH_3\overset{\overset{O}{\|}}{C}CH_3$ (c) $CH_3\underset{\underset{Cl}{|}}{CH}-\overset{\overset{O}{\|}}{C}CH_3$ (d) $C_6H_5\overset{\overset{O}{\|}}{C}C_6H_5$

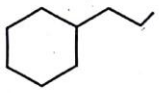
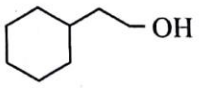
**137.** The conversion, $PhCN \rightarrow PhCOCH_3$, can be achieved most conveniently by reaction with:

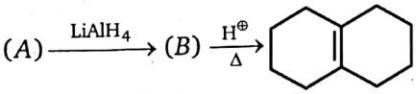
(a) $CH_3MgBr$ followed by hydrolysis
(b) $I_2$ — NaOH, $CH_3I$
(c) dil. $H_2SO_4$ followed by reaction with $CH_2N_2$
(d) LAH followed by reaction with $CH_3I$

**138.** 

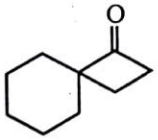
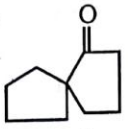
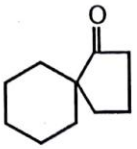
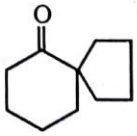

In the above reaction, product (*B*) is:

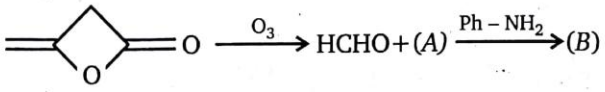
(a)  (b) 

(c)  (d) 


**139.** 


Structure of *A* is :

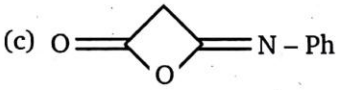
(a)  (b)  (c)  (d) 

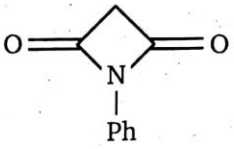
**140.** 

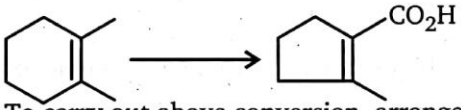
Product (*B*) is :

(a) Ph — NH — C(=O) — $CO_2H$

(b) Ph — NH — C(=O) — $CH_2$ — $CO_2H$

(c) 

(d) 

**141.** 

To carry out above conversion, arrange the following reagents in correct order.

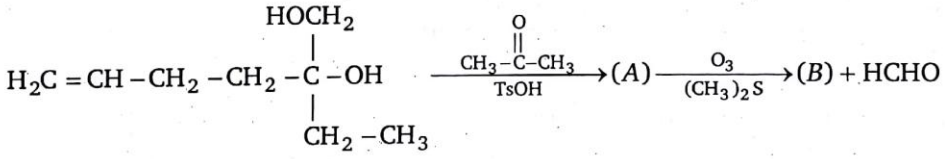
$O_3$/Zn (1) EtONa / EtOH/Δ (2) NaOCl (3) $H^+$ (4)

(a) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

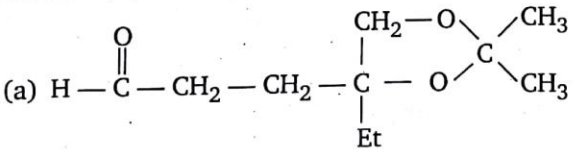
(b) $1 \rightarrow 2 \rightarrow 4 \rightarrow 3$

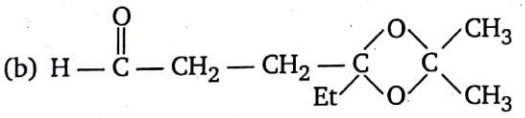
(c) $1 \rightarrow 3 \rightarrow 4 \rightarrow 2$

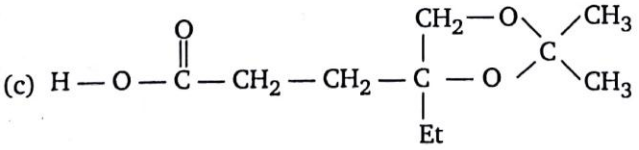
(d) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

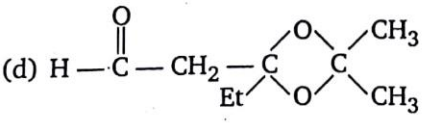
**142.** 

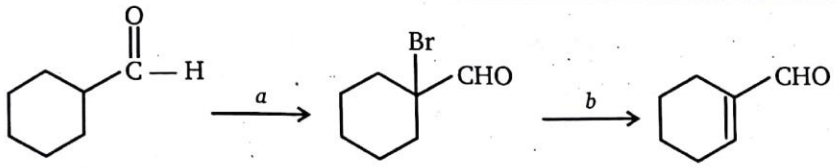
Product (*B*) is:

(a) 

(b) 

(c) 

(d) 

**143.** 

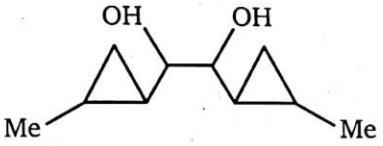

Identify appropriate reagents for the above reaction:

(a) $a = Br_2/CCl_4$, $b$ = aq. KOH

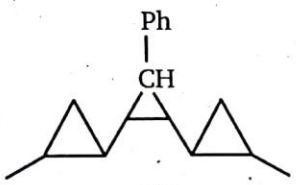
(b) $a = Br_2/H^+$, $b$ = aq. KOH

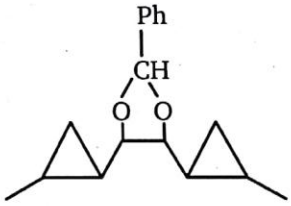
(c) $a = Br_2/H^+$, $b$ = alc. KOH

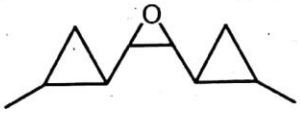
(d) $a = Br_2/HO^-$, $b$ = aq. KOH

**144.** 


$\xrightarrow[H^+]{PhCHO}$ (X) ; Product (X) of this reaction is : 96%

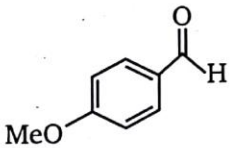
(a) 


(b) 

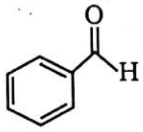

(c) 


(d) 

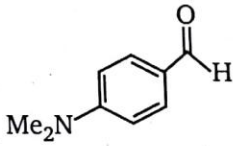
**145.** The $K_{eq.}$ values in HCN addition to following aldehydes are in the order :




(I)

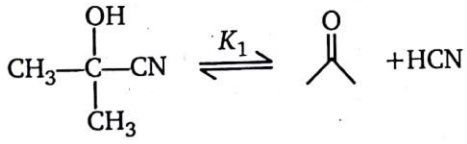


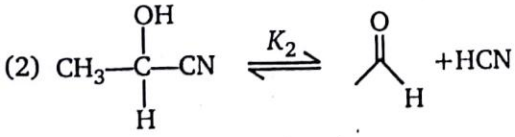

(II)




(III)

(a) I > II > III (b) II > III > I (c) III > I > II (d) II > I > III

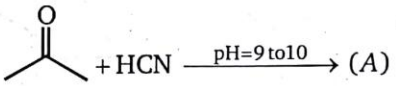
**146.** (1) 


(2) 


elation between $K_1$ and $K_2$ is :

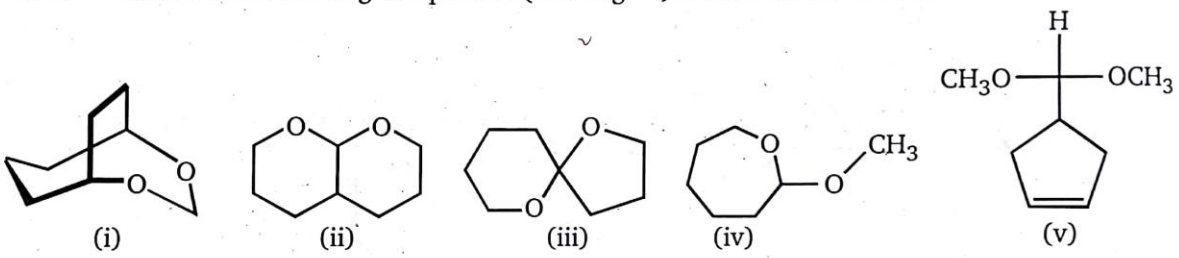
(a) $K_1 = K_2$ (b) $K_1 > K_2$ (c) $K_2 > K_1$ (d) $K_1 = K_2 = 1$

**147.** Which of the following is correct for the reaction ?




(a) *A* is cyanohydrin
(b) Nucleophilic-addition reaction
(c) The above reaction is not shown by alkenes
(d) All of these

**148.** Which of the following compounds (i through v) should not be classified as an acetal ?




(a) ii and iii
(b) iv
(c) i
(d) none (they are all acetals)

**149.** In which of reactions final product is NOT a ketone :

(a) $CH_3-C\equiv C-H \xrightarrow{NaNH_2} (A) \xrightarrow{CH_3-I} (B) \xrightarrow[H_2SO_4]{HgSO_4} (C)$

(b) $H-C\equiv C-H \xrightarrow{NaNH_2} (C) \xrightarrow{CH_3-CH_2-I} (D) \xrightarrow[NaBH_4, H^-]{Hg(OAc)_2, H_2O} (E)$

(c) $R-\overset{O}{\overset{\|}{C}}-OH \xrightarrow{NaOH} (A) \xrightarrow{CH_3-I} (B)$

(d) 1-butyne $\xrightarrow{NaNH_2} (A) \xrightarrow{CH_3-I} (B) \xrightarrow[(2)\ H_2O_2/HO^{\ominus}]{(1)\ BH_3\cdot THF} (C)$

**150.** The reaction of ethyl methyl ketone with $Cl_2$/excess $OH^-$ gives the following major product

(a) $ClCH_2CH_2COCH_3$
(b) $CH_3CH_2COCCl_3$
(c) $ClCH_2CH_2COCH_2Cl$
(d) $CH_3CCl_2COCH_2Cl$

**151.** The product obtained from the following sequence of reactions is

$$CH_3-C\equiv CH \xrightarrow[H_2SO_4]{HgSO_4} A \xrightarrow{NaBH_4} B$$

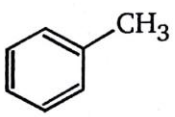
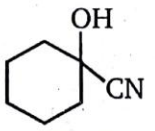
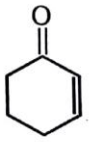
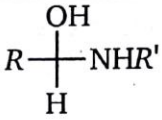
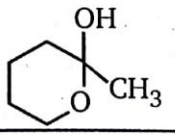
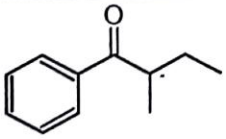
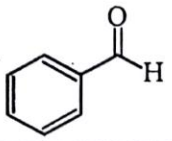
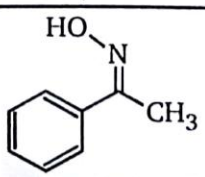
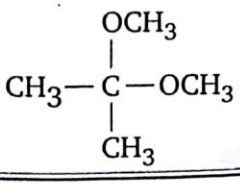
(a) propanol
(b) 2-propanol
(c) 1-propanol
(d) propanhe

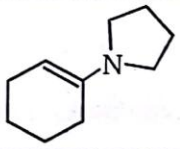
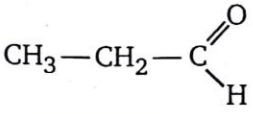
| ANSWERS — LEVEL 1 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1.** | (a) | **2.** | (b) | **3.** | (d) | **4.** | (c) | **5.** | (a) | **6.** | (c) | **7.** | (b) | **8.** | (b) |
| **9.** | (b) | **10.** | (c) | **11.** | (c) | **12.** | (c) | **13.** | (b) | **14.** | (b) | **15.** | (b) | **16.** | (b) |
| **17.** | (b) | **18.** | (b) | **19.** | (b) | **20.** | (d) | **21.** | (b) | **22.** | (b) | **23.** | (b) | **24.** | (d) |
| **25.** | (c) | **26.** | (b) | **27.** | (b) | **28.** | (a) | **29.** | (b) | **30.** | (c) | **31.** | (d) | **32.** | (c) |
| **33.** | (b) | **34.** | (b) | **35.** | (a) | **36.** | (b) | **37.** | (c) | **38.** | (d) | **39.** | (b) | **40.** | (a) |
| **41.** | (b) | **42.** | (a) | **43.** | (a) | **44.** | (b) | **45.** | (b) | **46.** | (a) | **47.** | (b) | **48.** | (d) |
| **49.** | (c) | **50.** | (b) | **51.** | (d) | **52.** | (b) | **53.** | (b) | **54.** | (c) | **55.** | (b) | **56.** | (b) |
| **57.** | (a) | **58.** | (d) | **59.** | (c) | **60.** | (c) | **61.** | (c) | **62.** | (a) | **63.** | (b) | **64.** | (b) |
| **65.** | (b) | **66.** | (d) | **67.** | (b) | **68.** | (d) | **69.** | (b) | **70.** | (c) | **71.** | (b) | **72.** | (d) |
| **73.** | (d) | **74.** | (a) | **75.** | (d) | **76.** | (a) | **77.** | (a) | **78.** | (a) | **79.** | (c) | **80.** | (c) |
| **81.** | (d) | **82.** | (b) | **83.** | (b) | **84.** | (b) | **85.** | (b) | **86.** | (a) | **87.** | (b) | **88.** | (c) |
| **89.** | (b) | **90.** | (b) | **91.** | (c) | **92.** | (b) | **93.** | (b) | **94.** | (b) | **95.** | (c) | **96.** | (c) |
| **97.** | (d) | **98.** | (b) | **99.** | (c) | **100.** | (c) | **101.** | (c) | **102.** | (c) | **103.** | (c) | **104.** | (c) |
| **105.** | (c) | **106.** | (b) | **107.** | (a) | **108.** | (c) | **109.** | (c) | **110.** | (b) | **111.** | (c) | **112.** | (b) |
| **113.** | (b) | **114.** | (c) | **115.** | (c) | **116.** | (a) | **117.** | (a) | **118.** | (a) | **119.** | (b) | **120.** | (c) |
| **121.** | (b) | **122.** | (b) | **123.** | A-c | **123.** | B-b | **124.** | (b) | **125.** | (a) | **126.** | (c) | **127.** | (a) |
| **128.** | (b) | **129.** | (c) | **130.** | (a) | **131.** | (a) | **132.** | (c) | **133.** | (d) | **134.** | (a) | **135.** | (a) |
| **136.** | (a) | **137.** | (a) | **138.** | (b) | **139.** | (d) | **140.** | (b) | **141.** | (d) | **142.** | (a) | **143.** | (c) |
| **144.** | (b) | **145.** | (d) | **146.** | (b) | **147.** | (d) | **148.** | (d) | **149.** | (c) | **150.** | (b) | **151.** | (b) |

# LEVEL-2

**1.** Select the best choice for example (A to L) from the examples (a to n) given below. Write your choice in the box given.

| | | |
|---|---|---|
| **A.** | An acetal derivative of a ketone. | |
| **B.** | A chiral ketone. | |
| **C.** | An aldehyde that gives a aldol condensation with itself. | |
| **D.** | An oxime derivative | |
| **E.** | A reagent that reduces aldehydes to 1°- alcohols. | |
| **F.** | An α, β-unsaturated ketone. | |
| **G.** | A reagent that oxidizes aldehydes to carboxylic acids. | |
| **H.** | A reagent that reduces ketones to alkanes. | |
| **I.** | An enamine derivative of a ketone. | |
| **J.** | An intermediate in imine formation. | |
| **K.** | A cyclic hemiacetal. | |
| **L.** | A cyanohydrin derivative. | |

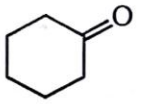
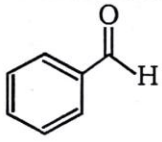
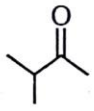
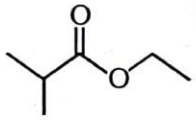
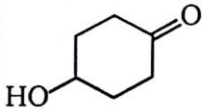
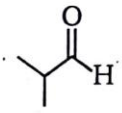
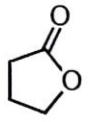
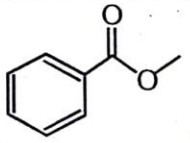
| | | | | | |
|---|---|---|---|---|---|
| **(a)** |  | **(b)** |  | **(c)** |  |
| **(d)** |  | **(e)** |  | **(f)** | $Zn(Hg)H_3O^{(+)}$ |
| **(g)** |  | **(h)** | $NaBH_4$ aq. alcohol | **(i)** |  |
| **(j)** | $Ag(NH_3)_2^{(+)}OH^{(-)}$ | **(k)** |  | **(l)** |  |

| | | | | | |
|---|---|---|---|---|---|
| (m) |  | (n) |  | | |

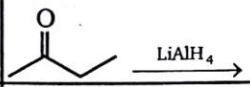
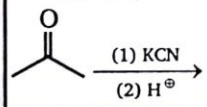
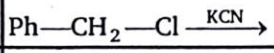
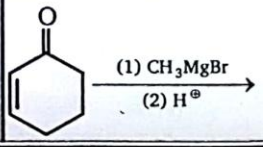
2. The following questions refer to the compounds (A to G) shown below :

| i. | Which compounds are reduced by sodium borohydride ? | ii. | Which compounds are hydrolyzed by hot aqueous acid ? | iii. | Which compound are oxidisized by $CrO_3$/pyridine? |
|---|---|---|---|---|---|

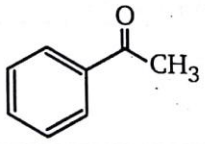
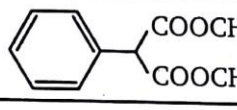
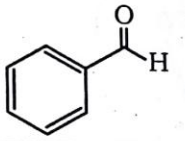
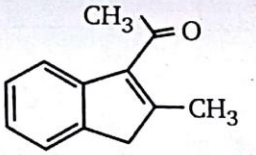
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | | E | | A | | E | | A | | E | |
| B | | F | | B | | F | | B | | F | |
| C | | G | | C | | G | | C | | G | |
| D | | H | | D | | H | | D | | H | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A. |  | B. |  | C. |  | D. |  |
| E. |  | F. |  | G. |  | H. |  |

3. **Match the column:**

| | Column (I) | | Column (II) |
|---|---|---|---|
| (a) |  | (p) | racemic mixture |
| (b) |  | (q) | Diastereomers |
| (c) |  | (r) | Nu-addition reaction |
| (d) |  | (s) | Nu-Substitutions reaction |

**4. Complete the following table.**

| | REACTANT | REAGENT(S)/ CONDITIONS | MAJOR ORGANIC PRODUCTS |
|---|---|---|---|
| **a.** |  | $H_2$/Pd - C in ethanol (solvent) | **A** |
| **b.** |  | $H^+/H_2O/\Delta$ | **B** |
| **c.** |  | $(CH_3)_2\bar{C}-\overset{+}{P}(C_6H_5)_3$ | **C** |
| **d.** |  | 1. $Li^+[(CH_3)_2Cu]^-$ in dry ether 2. $H^+/H_2O$ | **D** |
| **e.** | **E** | $OH^-$/ethanol/$\Delta$ |  |

**5. Comprehension**

Consider the following reactions and answer A and B.

$$(CH_3)_3C-\overset{O}{\overset{\|}{C}}-CH_3 \xrightarrow[(a)]{58\%} (CH_3)_3C-\overset{O}{\overset{\|}{C}}-CH_2-Br \xrightarrow[(b)]{54\%}$$

$$(CH_3)_3C-\overset{OH}{\overset{|}{\underset{H}{\underset{|}{C}}}}-CH_2-Br \xrightarrow{68\%} (CH_3)_3C-\overset{O}{\underset{H}{\underset{|}{C}}}-CH_2$$

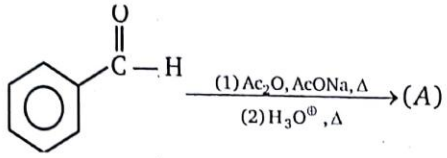
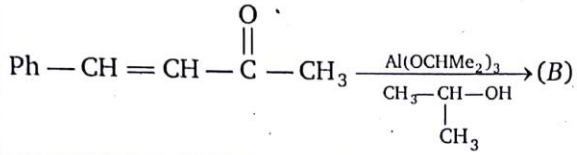
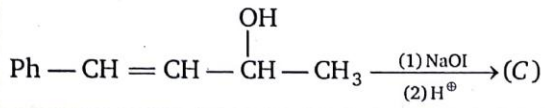
**A.** Suggest a reagent appropriate step (*a*) the synthesis.

(a) $HO^-/Br_2$ (1 mole)
(b) $H^+/Br_2$ (1 mole)
(c) both (a) and (b)
(d) None of these

**B.** Yield of each step as actually carried out in laboratory is given above each arrow. What is overall yield of the reaction ?

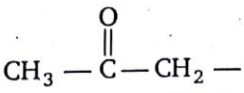
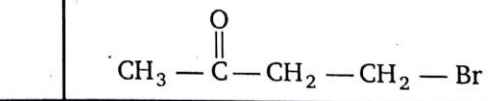
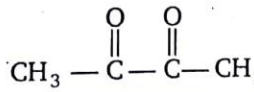
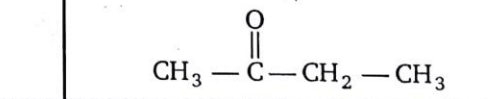
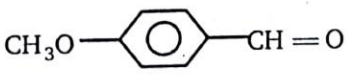
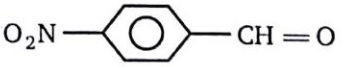
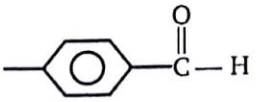
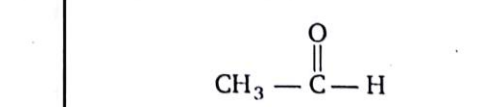
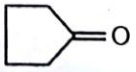
(a) 60% (b) 21% (c) 40% (d) 68%

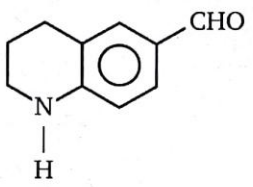
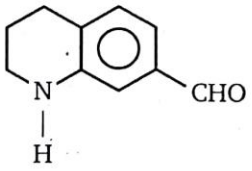
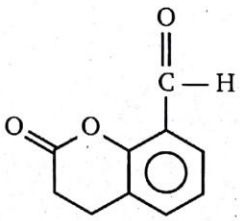
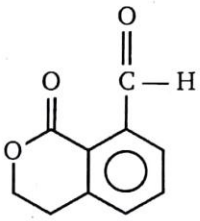
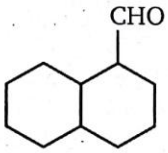
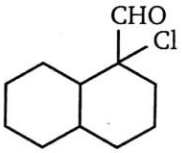
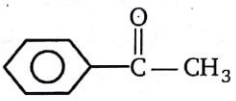
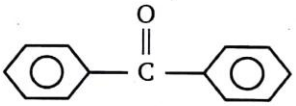
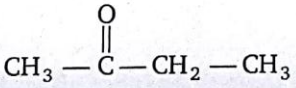
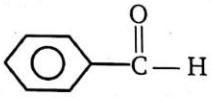
**6.**

| | |
|---|---|
| **Reaction 1.** |  |
| **Reaction 2.** |  |
| **Reaction 3.** |  |

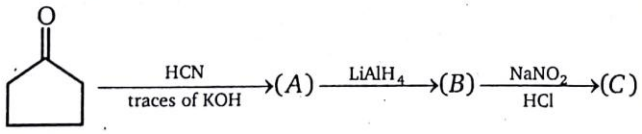
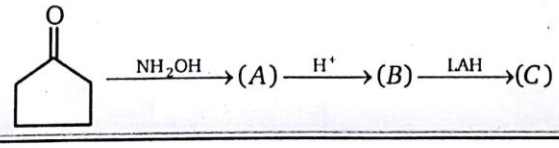
**Degree of unsaturation present in compound (*A* + *B* + *C*) is ?**

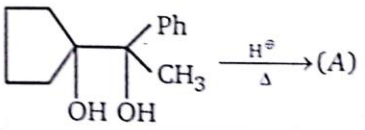
**7.** Within each set, which compound should be more reactive toward carbonyl addition reaction ?

| | **A** | **B** |
|---|---|---|
| **Set (1)** |  |  |
| **Set (2)** |  |  |
| **Set (3)** |  |  |
| **Set (4)** |  |  |
| **Set (5)** |  |  |

| | | |
|---|---|---|
| **Set (6)** |  |  |
| **Set (7)** |  |  |
| **Set (8)** |  |  |
| **Set (9)** |  |  |
| **Set (10)** |  |  |

**8. Match the Column (I) and Column (II). (Matrix)**

| | Column (I) | | Column (II) |
|---|---|---|---|
| **(A)** |  | **(p)** | Formation of six member ring takes place |
| **(B)** |  | **(q)** | Final product is Ketone |

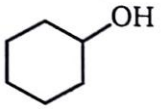
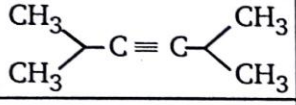
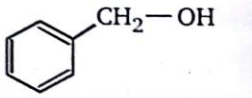
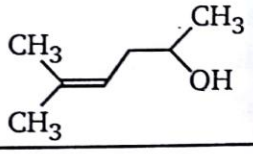
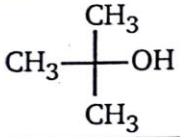
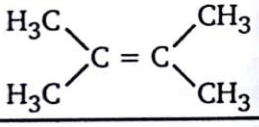
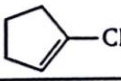
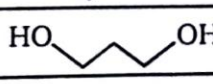
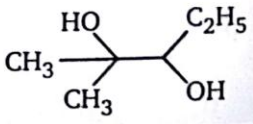
| | | | |
|---|---|---|---|
| **(C)** | $CH_3-\overset{O}{\overset{\|\|}{C}}-CH_2-CH_2-CH_2-\overset{O}{\overset{\|\|}{C}}-H \xrightarrow[\Delta]{HO^-} (A)$ | **(r)** | Final product formed will give positive Tollens test |
| **(D)** |  | **(s)** | Final product formed will react with 2,4-DNP. (2,4-di-nitrophenyl hydrazine) |

**9.** Consider reactions A through F. Those carbon atoms undergoing change, as part of a functional group, are marked as $C^{12}$, $C^{14}$ or starred. In the cases shown, each carbon atom has either been reduced or oxidized. Your job is to identify the change in oxidation state that has occurred for each of the marked carbon.

| | Reaction | $C^{12}$ | | $C^{14}$ | |
|---|---|---|---|---|---|
| **A.** | $CH_3\overset{12}{C}H=\overset{14}{C}H_2 \xrightarrow{Br_2} CH_3CHBrCH_2Br$ | | Reduced | | Reduced |
| | | | Oxidized | | Oxidized |
| **B.** | $CH_3\overset{12}{C}H=\overset{14}{C}H_2 \xrightarrow[(ii)\,H_2O_2,NaOH]{(i)\,B_2H_6} CH_3CH_2CH_2OH$ | | Reduced | | Reduced |
| | | | Oxidized | | Oxidized |
| **C.** | $CH_3CH_2\overset{*}{C}H=O \xrightarrow{NaBH_4} CH_3CH_2CH_2OH$ | | Reduced | | |
| | | | Oxidized | | |
| **D.** | $CH_3CH_2\overset{*}{C}H=O \xrightarrow[H_2O,\,pH>8]{Ag^{(+)}} CH_3CH_2CO_2H$ | | Reduced | | |
| | | | Oxidized | | |
| **E.** | $CH_3CO\overset{12}{C}H_2\overset{14}{C}O_2H \xrightarrow{Heat} \begin{matrix}CH_3COCH_3\\ + \\ O=C=O\end{matrix}$ | | Reduced | | Reduced |
| | | | Oxidized | | Oxidized |
| **F.** | $H_2\overset{12}{C}=\overset{14}{C}(OH)C_2H_5 \xrightarrow{\text{tautomerization}} H_3CCOC_2H_5$ | | Reduced | | Reduced |
| | | | Oxidized | | Oxidized |

**10.** Consider the possible formation of an aldehyde or ketone product when each of the ten compounds in the column on the left is treated with each of the reagents shown in the top row. Check the designated answer box if you believe an aldehyde or ketone will be formed.

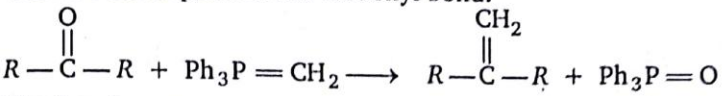
Assume that the reagents may be present in excess. For each checked reaction, try to draw the structure of the major product (s).

| Starting | PCC $C_5H_5NHCrO_3Cl$ | Jone's Reagent $CrO_3$ in aq. acid | $Pb(OAc)_4$ [or $HIO_4$] | (i) $O_3$, (ii) Zn dust | $H_3O^{\oplus}$ | (i) $BH_3$ in THF (ii) $H_2O_2$ + NaOH |
|---|---|---|---|---|---|---|
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |

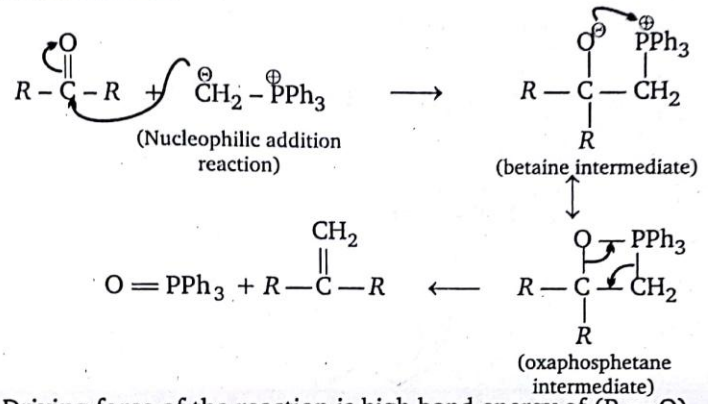
## 11. Comprehension

Wittig reaction :

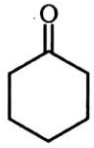
The reaction of a phosphorus ylide with an aldehyde (or) ketnoe introduces a carbon-carbon double bond is place of the carbonyl bond.

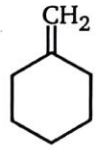
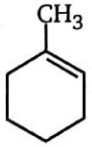
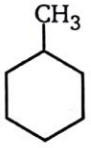
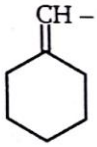


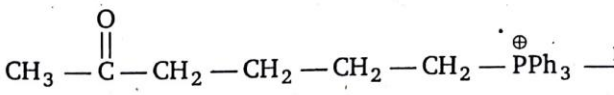
**Mechanism :**

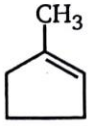
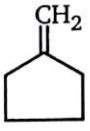
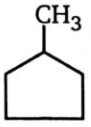


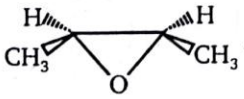

Driving force of the reaction is high bond energy of (P = O) . ($\Delta H$ = –ve)

**A.**  + $Ph_3P = CH_2 \longrightarrow$ (*A*) (major), Major product (*A*) is :

(a)  (b)  (c)  (d) 

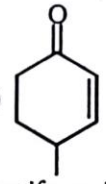
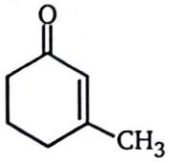
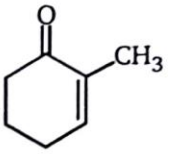
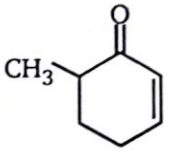
**B.**  (*A*), Major product (*A*) is :

(a)  (b)  (c)  (d) 

**C.**  (*A*) , Major product (*A*) is :

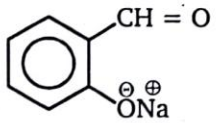
(a) *cis*-2-butene (b) *trans*-2-butene (c) iso-butene (d) 1-butene

**D.** $CH_3-\overset{O}{\overset{\|}{C}}-(CH_2)_3-\overset{O}{\overset{\|}{C}}-CH_2-\overset{O}{\overset{\|}{P}}(OEt)_2 \xrightarrow{NaH}$ (*A*) (cyclic). Product (*A*) is :

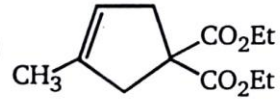
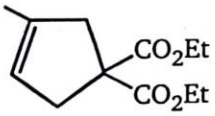
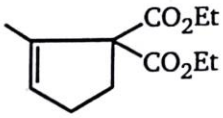
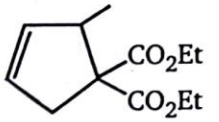
(a) 
(b) 
(c) 
(d) 

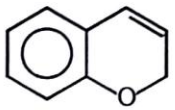
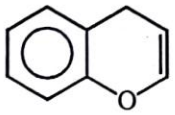
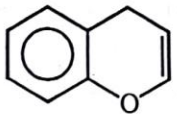
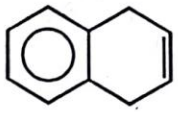
**E.** Identify major product in given intramolecular Wittig reaction :

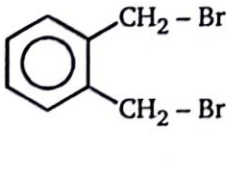
Rxn.-1 $\longrightarrow$ $CH_3-\overset{O}{\overset{\|}{C}}-CH_2-CH(CO_2Et)_2 + H_2C=CH-\overset{\oplus}{P}Ph_3 \xrightarrow{NaH}$ (*A*)

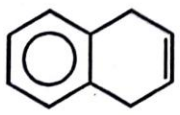
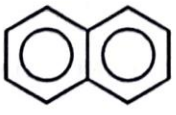
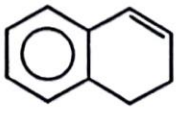
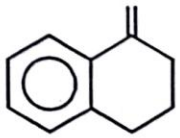
Rxn.-2 $\longrightarrow$  $+ H_2C=CH-\overset{\oplus}{P}Ph_3 \longrightarrow$ (*B*)

Product (*A*) and (*B*) respectively are :

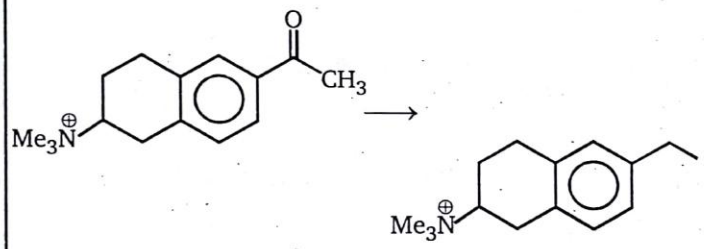
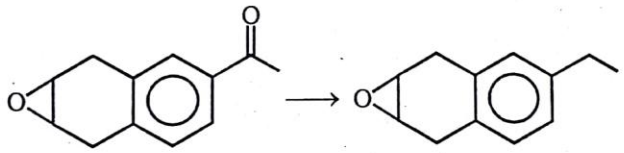
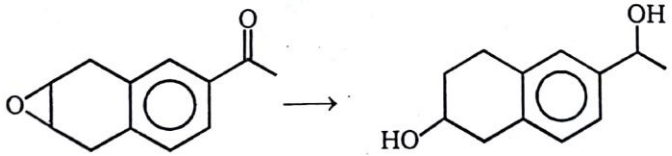
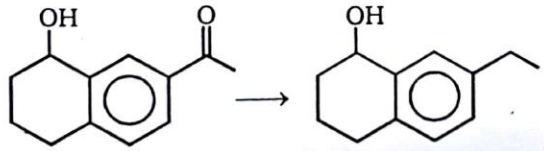
(a)  &
(b)  &
(c)  &
(d)  &

**F.**  $\xrightarrow[(2)\ 2Ph-Li\ (3)\ CHO-CHO]{(1)\ Ph_3P(2\ mole)}$ (*A*) ; product (*A*) is :

(a) 
(b) 
(c) 
(d) 

**12. Match the column :**

| Column (I) | | Column (II) | |
|---|---|---|---|
| **Conversion** | | **Reagent** | |
| **(a)** |  | **(p)** | $NH_2/NH_2/HO^{\ominus}$, $\Delta$ (Wolff-Kishner reduction) |
| **(b)** |  | **(q)** | Zn(Hg), HCl (Clemmensen reduction) |
| **(c)** |  | **(r)** | $LiAlH_4$ |
| **(d)** |  | **(s)** | None |

## 13. Comprehension

$$(A) \xrightarrow[\text{dil. } H_2SO_4]{HgSO_4} (B) \xrightarrow[(2)\ H^{\oplus}/\Delta]{(1)\ NaBH_4} CH_3-\underset{\underset{CH-CH_3}{\|}}{C}-CH_2-CH_3$$

**A.** Reactant (*A*) is :

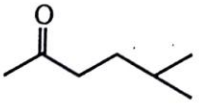
(a) $CH_3-C\equiv C-\underset{\underset{CH_3}{|}}{CH}-CH_3$

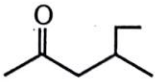
(b) $HC\equiv C-C-\underset{\underset{C-C}{|}}{C}-C$

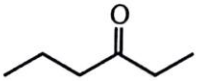
(c) $CH_3-\underset{\underset{CH_2-CH_3}{|}}{CH}-C\equiv CH$

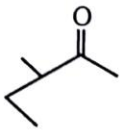
(d) $CH_3-C\equiv C-CH_2-CH_2-CH_3$

**B.** Product (*B*) is :

(a) 

(b) 

(c) 

(d) 

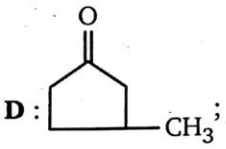
## ANSWERS — LEVEL 2

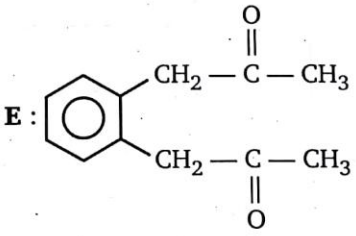
**1.** A – l; B – g; C – n; D – k; E – h; F – c; G – j; H – f; I – m; J – d; K – e; L – b

**2.** i – A, B, C, E, F; ii – D, G, H; iii – B, E, F

**3.** a - p,r; b - r; c - s; d - p, r

**4.** **A** : $Ph-\underset{\displaystyle OH}{\underset{|}{CH}}-CH_3$; **B** : $Ph-CH_2-COOH$; **C** : $Ph-CH=C\begin{matrix}CH_3\\CH_3\end{matrix}$;

**D** :  ;

**E** : 

**5.** A – b; B – b

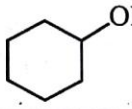
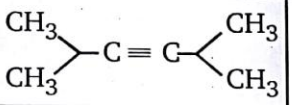
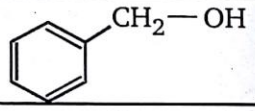
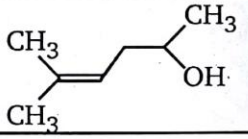
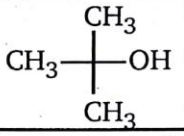
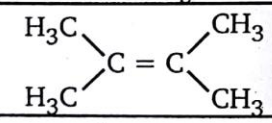
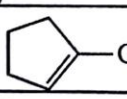
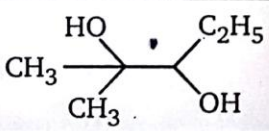
**6.** $A+B+C=17$

**7.** set 1 – A; set 2 – A; set 3 – B; set 4 – B; set 5 – A; set 6 – B; set 7 – B; set 8 – B; set 9 – A; set 10 – B

**8.** A – p, q, s; B – p; C – p, q, s; D – p, q, s

**9.** A : both are oxidized; B : $C^{12}$ is reduced, $C^{14}$ is oxidized; C : reduced; D : oxidized E : $C^{12}$ is reduced, $C^{14}$ is oxidized; F : $C^{12}$ is reduced, $C^{14}$ is oxidized

**10.**

| Compound | PCC $C_5H_5NHCrO_3Cl$ | Jone's Reagent $CrO_3$ in aq. acid | $Pb(OAc)_4$ [or $HIO_4$] | (i) $O_3$, (ii) Zn dust | $H_3O^+$ | (i) $BH_3$ in THF (ii) $H_2O_2$ + NaOH |
|---|---|---|---|---|---|---|
|  | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ |
|  | ✗ | ✗ | ✗ | ✓ | ✓ | ✓ |
|  | ✓ | ✓ | ✗ | ✓ | ✗ | ✗ |
|  | ✗ | ✗ | ✗ | ✓ | ✗ | ✗ |
|  | ✓ | ✓ | ✗ | ✓ | ✓ | ✓ |
|  | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ |
|  | ✗ | ✗ | ✗ | ✓ | ✓ | ✓ |
|  | ✗ | ✗ | ✗ | ✓ | ✓ | ✓ |
|  | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ |
|  | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ |

**11.** A – a; B – a; C – b; D – b; E – a; F – b

**12.** a – q; b – s; c – r; d – p

**13. A.** (c) **B.** (d)