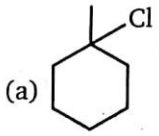
5B ALKYL HALIDES

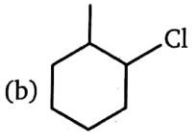
Elimination Reactions (E_1, E_2, E_{1CB}, E_i)

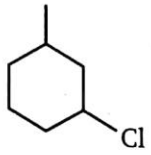
LEVEL 1

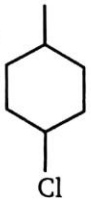
1. Which of the following alkyl halide gives only one product (excluding stereoisomer) when undergo E_2 reaction ?

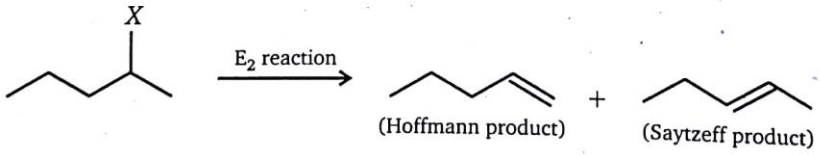
(E_2 = elimination bi-molecular)

(a) 

(b) 

(c) 

(d) 

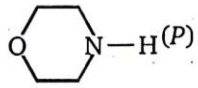
2. 

(A) In the above reaction, maximum Saytzeff product will obtained when :

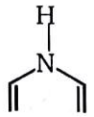
(a) $X = -I$ (b) $X = -Cl$ (c) $X = -Br$ (d) $X = -F$

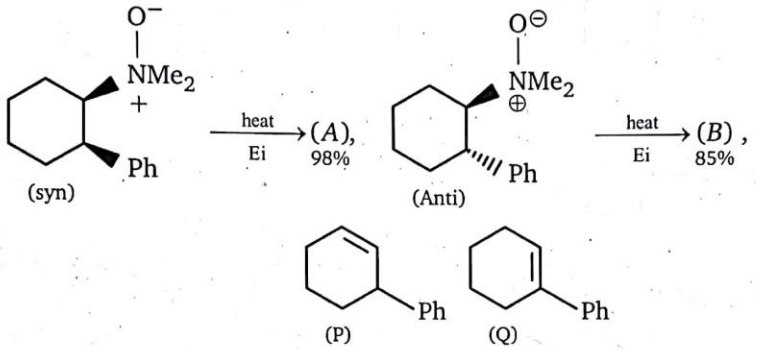
(B) In the above reaction Hoffmann product is major when X is :

(a) $-I$ (b) $-Cl$ (c) $-Br$ (d) $-F$

3. 

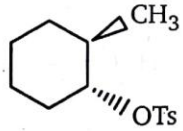
when (*P*) undergoes Hoffmann exhaustive methylation (twice) then the product obtained will be :

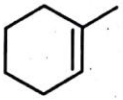
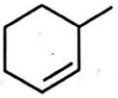
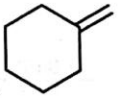
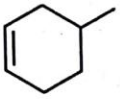
(a)  (b)  (c)  (d) 

4. 

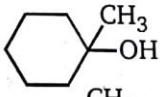
Product (*A*) & (*B*) of the above reaction is :

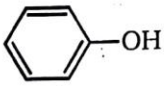
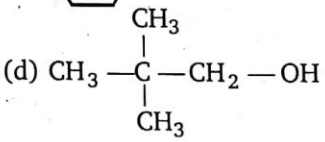
(a) $A = P, B = P$ (b) $A = Q, B = Q$ (c) $A = P, B = Q$ (d) $A = Q, B = P$

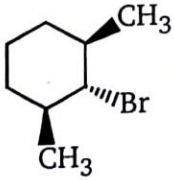
5.  $\xrightarrow[\Delta]{HO^-}$ Major product of the reaction is :

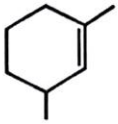
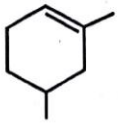
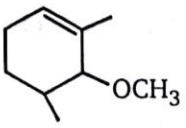
(a)  (b)  (c)  (d) 

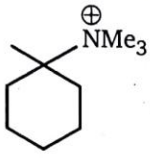
6. Which of these dehydrates most easily ?

(a) $CH_3 - CH_2 - CH_2 - OH$ (b) 

(c)  (d) 

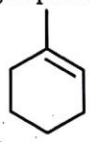
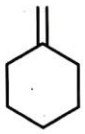
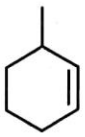
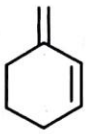
7.  $\xrightarrow[CH_3OH\ (E_2\ reaction)]{NaOCH_3}$ Product; Product of the reaction is :

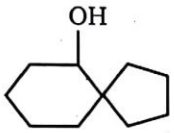
(a)  (b)  (c)  (d) No reaction

8. 

$\xrightarrow[\Delta]{HO^-}$ *A* (Major)

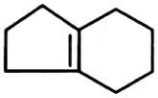
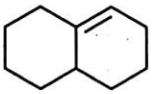
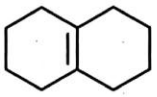
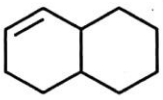
Major product *A* is :

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

9. 

$\xrightarrow[\Delta]{H_2SO_4}$ *A* (Major)

Major product *A* is :

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

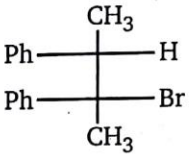
10. In which of the following reaction Saytzeff alkene is major product ?

(a) $CH_3-CH_2-\overset{CH_3}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}}-\overset{\oplus}{N}Me_3 \xrightarrow[\Delta]{HO^-}$

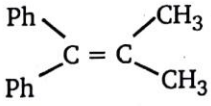
(b) $CH_3-CH_2-CH_2-\underset{F}{CH}-CH_3 \xrightarrow[\Delta]{EtO^-}$

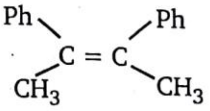
(c) $CH_3-CH_2-\overset{CH_3}{\underset{Br}{\overset{|}{\underset{|}{C}}}}-CH_3 \xrightarrow[\Delta]{t\text{-BuOK}}$

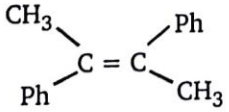
(d) $CH_3-CH_2-CH_2-\overset{Br}{\underset{CH_3}{\overset{|}{\underset{|}{C}}}}-CH_3 \xrightarrow[\Delta]{CH_3OK}$

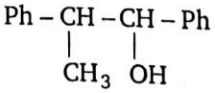
11. 

$\xrightarrow[(E_2 \text{ reaction})]{\text{alc. KOH}}$ Major product of the reaction is :

(a) 

(b) 

(c) 

(d) 

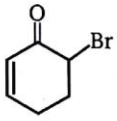
12. The conversion of 2, 3-dibromobutane to 2-butene with Zn is :

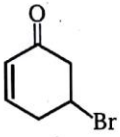
(a) Redox reaction
(b) α-Elimination
(c) β-Elimination
(d) Both α-elimination and redox reaction

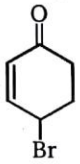
13. 1, 3-Dibromopropane is heated with zinc dust in ether. The product formed is :

(a) propene (b) propane

(c) cyclopropane (d) 3-bromopropane

14. Reaction (1)  $\xrightarrow{\text{alc. KOH}}$ (A) (major)

Reaction (2)  $\xrightarrow{\text{alc. KOH}}$ (B) (major)

Reaction (3)  $\xrightarrow{\text{alc. KOH}}$ (C) (major)

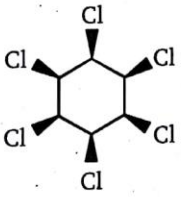
Product obtained in above reactions (1), (2) & (3) is :

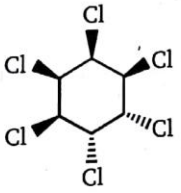
(a) A = B but C is different

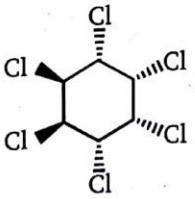
(b) A = C, but B is different

(c) B = C, but A is different

(d) A = B = C all product are identical

15. Reaction (1)  $\xrightarrow{\text{3 mole alc. KOH}}$ (A)

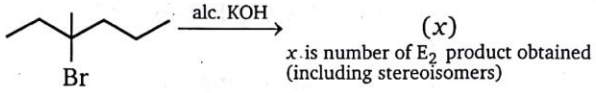
Reaction (2)  $\xrightarrow{\text{3 mole alc. KOH}}$ (B)

Reaction (3)  $\xrightarrow{\text{3 mole alc. KOH}}$ (C)

Product obtained in above reactions (1), (2) & (3) is :

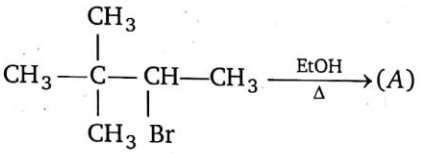
(a) $A = B$, C is different (b) $A = C$, B is different

(c) $B = C$, A is different (d) $A = B = C$ is same

16. 

Find (x).

(a) 3 (b) 4 (c) 5 (d) 6

17. 

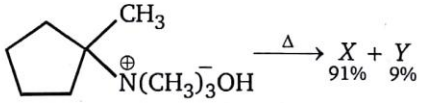
Major product (A) is :

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

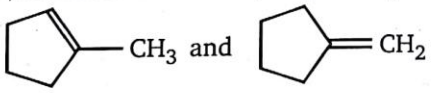
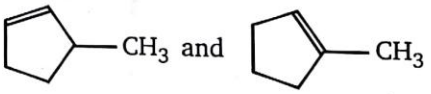
18. Which one of the following compound will be least susceptible to elimination of hydrogen bromide ?

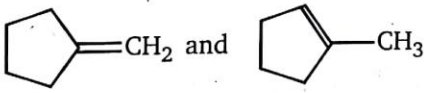
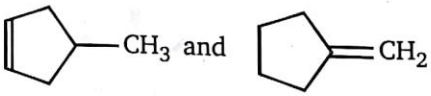
(a) $Br—CH_2—CH_2—NO_2$ (b) $Br—CH_2—CH_2—CH_3$
(c) $Br—CH_2—CH_2—CN$ (d) $Br—CH_2—CH_2—CO_2Et$

19. Two alkenes, X(91% yield) and Y(9% yield) are formed when the following compound is heated.

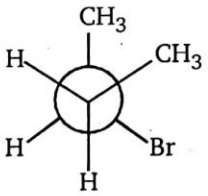
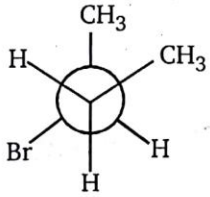
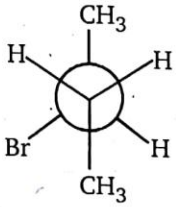
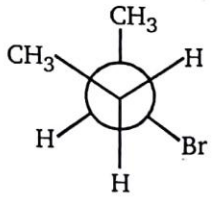


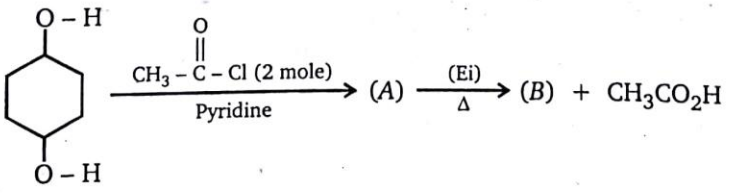
The structures of X and Y, respectively are :

(a)  (b) 

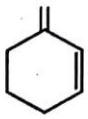
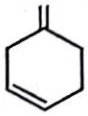
(c)  (d) 

20. In the dehydrohalogenation of 2-bromobutane; which conformation leads to the formation of *cis*-2-butene ?

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

21. 

Product (*B*) of given reaction is:

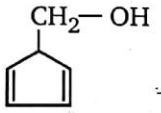
(a)  (b)  (c)  (d) 

22. What product will be formed from Hoffmann exhaustive methylation of following compound?

$$Me_2CHCH_2NHCH_2CH_2Me \xrightarrow[\substack{(ii)\ Ag_2O \\ (iii)\ \Delta}]{(i)\ CH_3\text{–}I\ (excess)} \text{Product}$$

(a) $Me-CH=CH_2$ (b) $H_2C=CH_2$

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

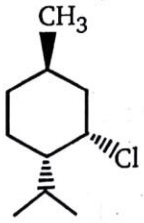
23.  $\xrightarrow[\Delta]{H^{\oplus}}$ (*A*)

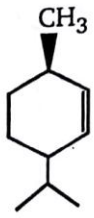
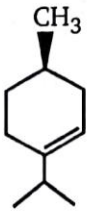
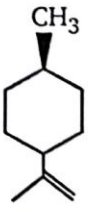
Product (*A*) is :

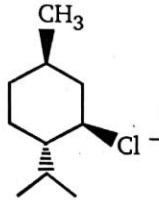
(a)  (b)  (c)  (d) 

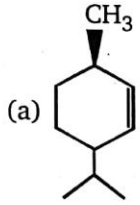
24.  $\xrightarrow[\Delta]{H^{\oplus}}$; Products obtained are :

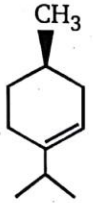
(a) Racemic (b) Diastereomers (c) G.I (d) Positional isomers

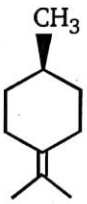
25.  $\xrightarrow[(E_2\text{reaction})]{NaOEt}$; Major product of the reaction is :

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

26.  ; Major product of the reaction is :

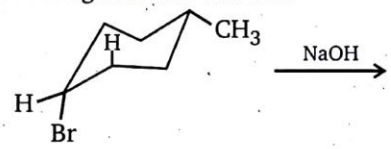
(a) 

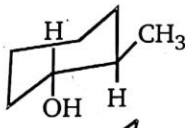
(b) 

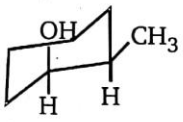
(c) 

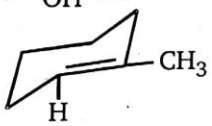
(d) 

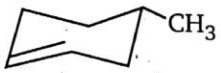
27. The E_2 product of the following reaction will be ?



(a) 

(b) 

(c) 

(d) 

28. An halide $C_5H_{11}Br$ on treatment with alc. KOH give 2-pentene only. The halide will be :

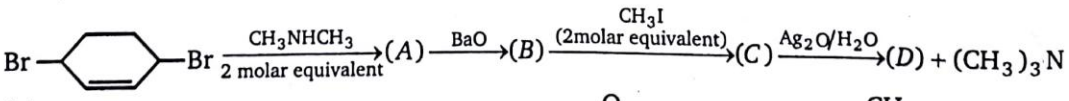
(a) $CH_3-CH_2-CH_2-CH_2-CH_2-Br$

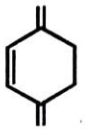
(b) $CH_3-CH_2-CH_2-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3$

(c) $CH_3-CH_2-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-CH_3$

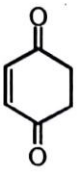
(d) $CH_3-\underset{\displaystyle Br}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{CH}}}}-\overset{\displaystyle CH_3}{\overset{|}{C}}-CH_3$

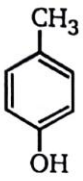
29. End product (D) in the given sequence is:



(a) 

(b) 

(c) 

(d) 

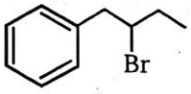
30. For each of the following pairs of E_2 reaction, select the one that occurs with the greater rate constant.

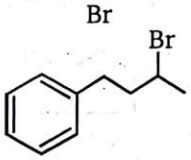
(1) $CH_3CH_2CH_2Cl + CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-O^-$

(2) $CH_3CH_2CH_2I + CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-O^-$

(3) $H_3C-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3 + CH_3O^-$

(4) $H_3C-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3 + CH_3S^-$

(5)  + ^-OH

(6)  + ^-OH

(a) 2, 4, 6
(b) 1, 3, 5
(c) 2, 3, 5
(d) 2, 4, 5

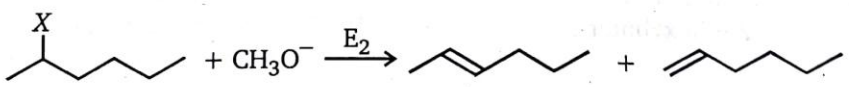
31. $CH_3-\underset{\displaystyle Br}{\overset{\displaystyle Br}{\overset{|}{\underset{|}{C}}}}-\underset{\displaystyle Br}{\overset{\displaystyle Br}{\overset{|}{\underset{|}{C}}}}-CH_3 \xrightarrow{x\,NaNH_2} \xrightarrow{y\,CH_3I} CH_3-C\equiv C-C\equiv C-CH_3$

x and y mole consumed.

Value of $x + y$ =

(a) 5 (b) 6 (c) 7 (d) 8

32. The following bimolecular elimination reaction (E_2) is carried out with different halogen leaving groups. The per cent yield of the two products (2-hexene and 1-hexene) for each leaving group is listed below.



Leaving group	Conj. Acid pK_a	%-yield of 2-hexene	%-yield of 1-hexene
X = I	− 10	81%	19%
X = Br	− 9	72%	28%
X = Cl	− 7	67%	33%
X = F	3.2	30%	70%

Which of the following statement is (are) true concerning this series of E_2 reactions ?

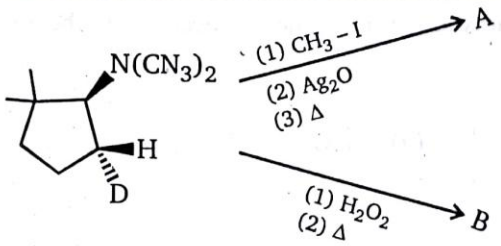
(a) Based on the pK_a's of the conjugate acid, I^- is the best leaving group and F^- is the poorest leaving group

(b) When I^-, Br^- and Cl^- are used as leaving groups, Zaitsev's rule is followed

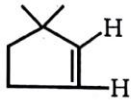
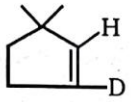
(c) F^- is the strongest base (and therefore the poorest leaving group) and the transition state for reaction with fluoride as the leaving group has the least double bond character

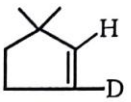
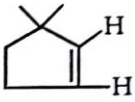
(d) a, b, c are true

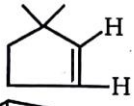
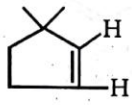
33.

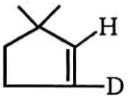
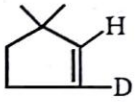


Product (*A*) & (*B*) respectively are :

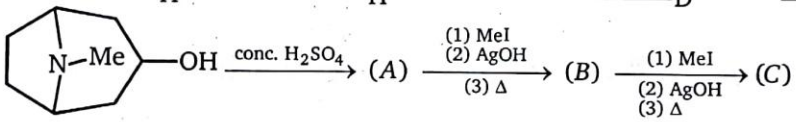
(a)  & 

(b)  & 

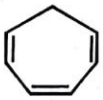
(c)  & 

(d)  & 

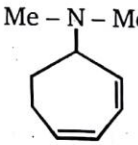
34.



Product in above reaction is :

(a) 

(b) 

(c) 

(d) 

35. Major product obtained in the reaction of 1-phenyl-2-bromobutane with NaOMe is :

(a) (E)-1-phenylbut-1-ene
(b) (E)-1-phenylbut-2-ene
(c) 1-phenyl-2-ethoxybutane
(d) (Z)-1-phenylbut-2-ene

36. Which of the following alkyl halides give most complex mixture of alkene in an E_2 reaction ?

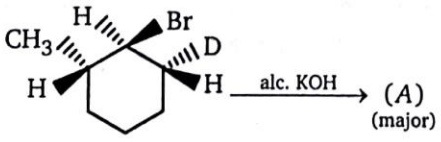
(a) $CH_3-CH_2-CH_2-CH_2-Br$

(b) $CH_3-CH_2-CH_2-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_3$

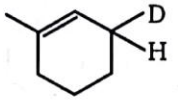
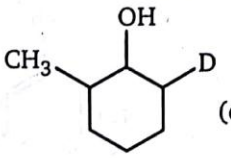
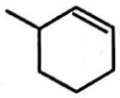
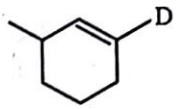
(c) $CH_3-CH_2-\underset{\displaystyle Br}{\underset{|}{CH}}-CH_2-CH_3$

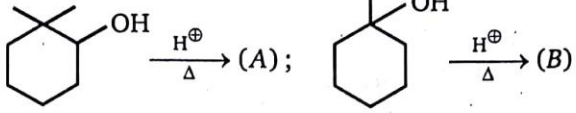
(d) $CH_3-\underset{\displaystyle Br}{\underset{|}{\overset{\displaystyle CH_3}{\overset{|}{C}}}}-CH_2-CH_3$

37.



Product (*A*) is :

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

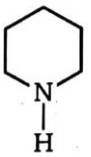
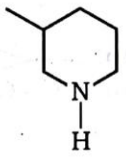
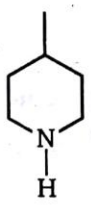
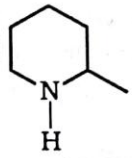
38. 

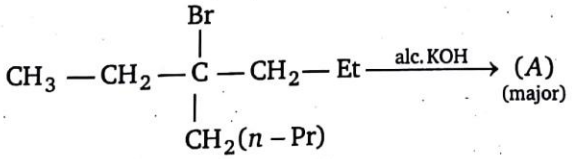
Sum of number of α-hydrogen present is compound $A + B$ is :

(a) 18 (b) 19 (c) 20 (d) 21

39. $(A) \xrightarrow[(2)\,Ag_2O/H_2O \\ (3)\,\Delta]{(1)\ \text{excess}\ CH_3I/K_2CO_3} (B) \xrightarrow[(iii)\,\Delta]{(i)\ \text{excess}\ CH_3I/K_2CO_3 \\ (ii)\ Ag_2O} H_2C=CH-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH=CH_2$

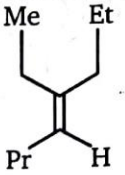
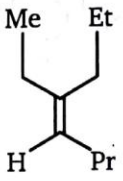
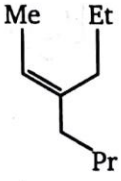
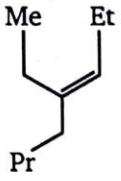
Identify A :

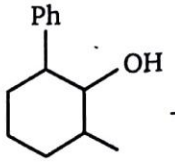
(a)  (b)  (c)  (d) 

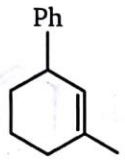
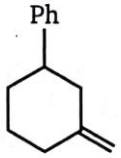
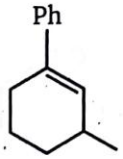
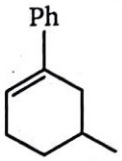
40. 

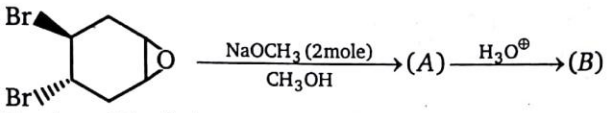
n - Pr = n - propyl

Product (A) is :

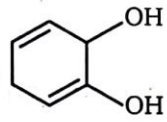
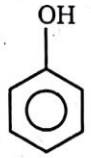
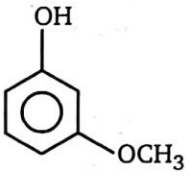
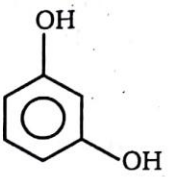
(a)  (b)  (c)  (d) 

41.  $\xrightarrow[\Delta]{H_3PO_4}$ Major product obtained by dehydration of given alcohol is :

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

42. 

Product (*B*) of above reaction is :

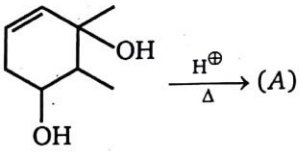
(a)  (b)  (c)  (d) 

43. $Ph-\underset{Br}{CH}-CH_2-\underset{Br}{CH_2} \xrightarrow[\Delta]{Zn-Cu} Product$

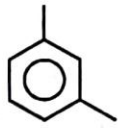
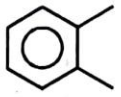
Product of the above reaction is :

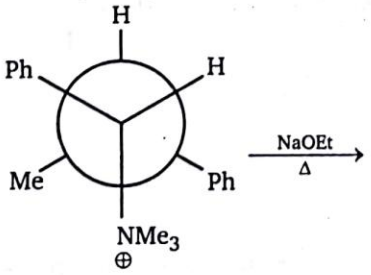
(a) $Ph-CH=CH-CH_2-Br$ (b) 

(c) $PH-CHBr-CH=CH_2$ (d) $Ph-C\equiv C-CH_3$

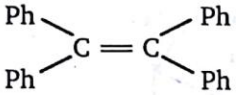
44. 

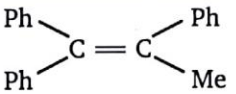
Product (*A*) is :

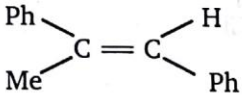
(a)  (b)  (c)  (d) 

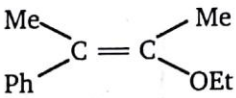
45. 

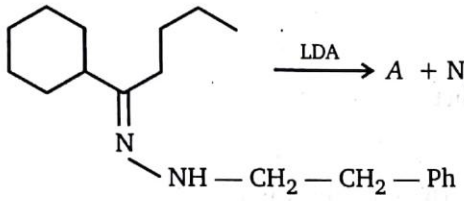
Major product of the above reaction is :

(a) 

(b) 

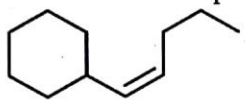
(c) 

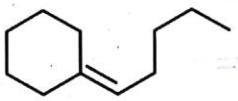
(d) 

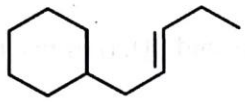
46. 

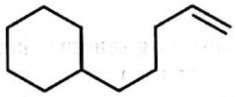
$\xrightarrow{LDA}$ $A + N_2 + Ph - CH = CH_2$, Product A is:

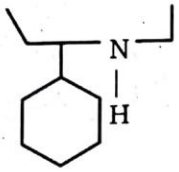
LDA = Lithium di-isopropyl amide

(a) 

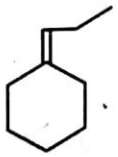
(b) 

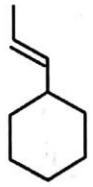
(c) 

(d) 

47. 

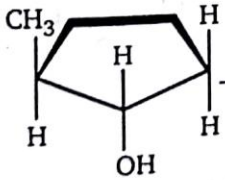
Major product of the reaction, when the given compound undergoes Hoffmann exhaustive methylation is :

(a) 

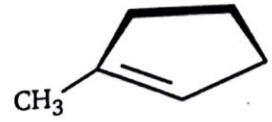
(b) 

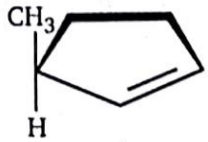
(c) 

(d) $H_2C = CH_2$

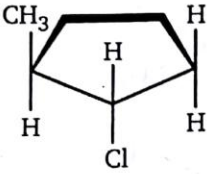
48. 

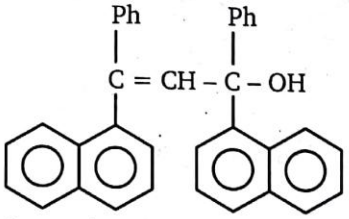
$\xrightarrow[Pyridine]{POCl_3}$ Major product of the reaction is :

(a) 

(b) 

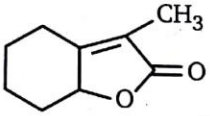
(c) 

(d) 

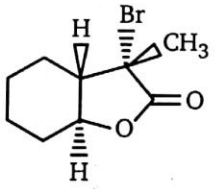
49. 

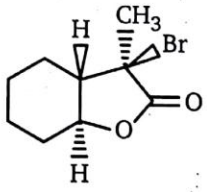
Stereochemistry of the product is :

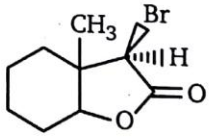
(a) Meso compound
(b) Racemic mixture
(c) Diastereomer
(d) Optically pure enantiomers

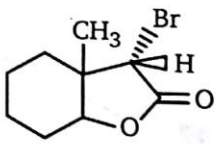
50. 

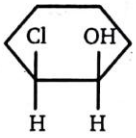
Which of the following reactant is used to obtain above compound (*A*). (Assume that EtO^- is used in all the reaction)

(a) 

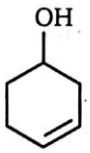
(b) 

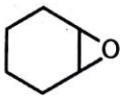
(c) 

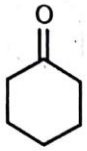
(d) 

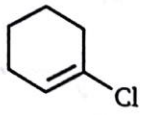
51. 

alc. KOH → (*A*), Product *A* is :

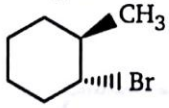
(a) 

(b) 

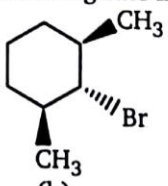
(c) 

(d) 

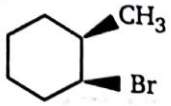
52. Rank the following in order of decreasing rate in an E_2 reaction:



(a)

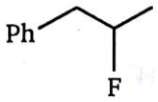


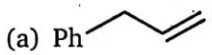
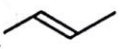
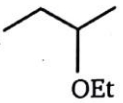
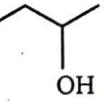
(b)

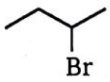


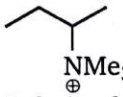
(c)

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

53.  $\xrightarrow[EtOH,\Delta]{KOH}$ (*A*), (major) Product (*A*) is :

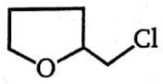
(a) 
(b) 
(c) 
(d) 

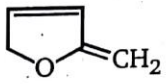
54.  $\xrightarrow[\Delta]{EtO^{\ominus}}$ (*A*) Major

 $\xrightarrow[\Delta]{EtO^{\ominus}}$ (*B*) Major

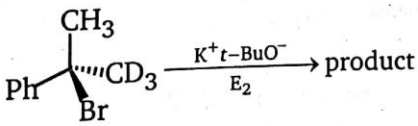
Relation between (*A*) and (*B*) is :

(a) G.I.
(b) Positional isomer
(c) Enantiomer
(d) Chain isomer

55.  $\xrightarrow[liq.\,NH_3]{3NaNH_2}$ Product ; The Product is :

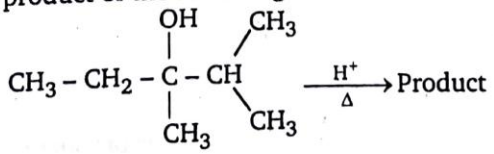
(a) 
(b) $HC \equiv C-(CH_2)_3ONa$
(c) $NaC \equiv C-(CH_2)_3ONa$
(d) $H-C \equiv C-(CH_2)_3OH$

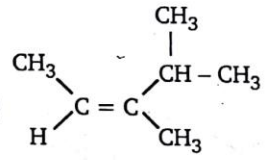
56. Which best describes the product of the following reaction ?

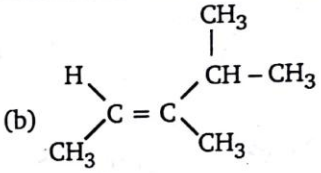


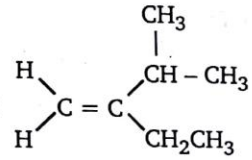
(a) Absolute configuration has been inverted
(b) Absolute configuration has been retained
(c) Racemization (loss of absolute configuration) has occurred
(d) Loss of chirality has occurred (the product is achiral)

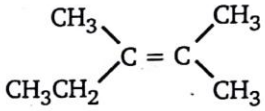
57. What is the major product of the following reaction ?



(a) 

(b) 

(c) 

(d) 

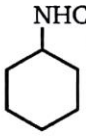
58. What will be the major product of each of the two reaction shown below ?

1. $CH_3CH_2\underset{\underset{{}^+N(CH_3)_3\,^-OH}{|}}{CHCH_3} \xrightarrow{\text{heat}}$

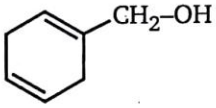
2. $CH_3CH_2\underset{\underset{Br}{|}}{CHCH_3} + CH_3CH_2ONa \xrightarrow{\text{heat}}$

$\longrightarrow \underset{X}{CH_3CH{=}CHCH_3} + \underset{Y}{CH_3CH_2CH{=}CH_2}$

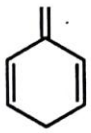
(a) 1 – X, 2 – X (b) 1 – Y, 2 – X (c) 1 – X, 2 – Y (d) 1 – Y, 2 – Y

59.  + CH_3I (excess) $\longrightarrow$ product; The product is :

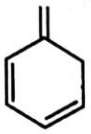
(a) a primary amine (b) a tertiary amine
(c) a secondary amine (d) a quaternary ammonium salt

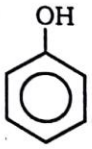
60.  $\xrightarrow[\Delta]{H^+}(A) \xrightarrow{\text{Isomerisation}} (B)$

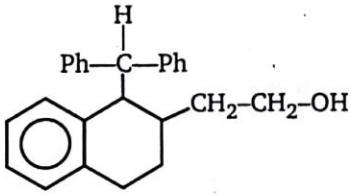
(*A*) on heating isomerizes to (*B*). What is the structure of (*B*) ?

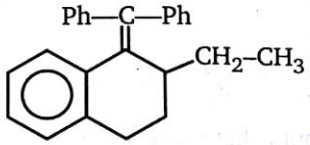
(a) 

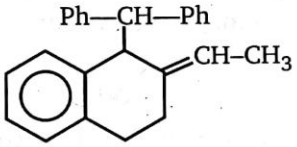
(b) 

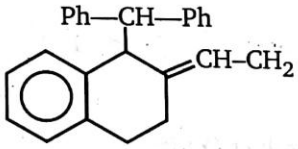
(c) 

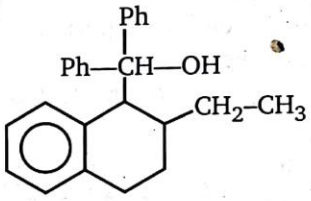
(d) 

61.  $\xrightarrow[\Delta]{H^+}$ (*A*) (major) , major product (*A*) is :

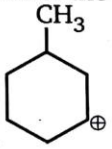
(a) 

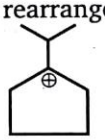
(b) 

(c) 

(d) 

62. Which of the following carbocation will undergo rearrangement ?

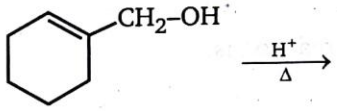
(a) 

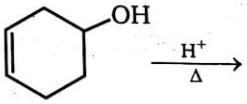
(b) 

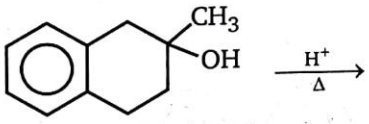
(c) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - \overset{\oplus}{C} = O$

(d) $CH_3 - NH - \overset{\oplus}{C}H - \underset{\underset{CH_3}{|}}{CH} - CH_3$

63. In which of the following reaction resonance stabilized product will form ?

(a) 

(b) 

(c) 

(d) All of these

64. In which of following reaction rearrangement take place with change in carbon skeleton ?

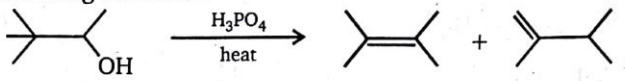
(a) $CH_3 - \underset{\underset{CH_3}{|}}{\overset{CH_3}{\overset{|}{C}}} - \overset{\oplus}{C}H_2$

(b) $CH_3 - CH_2CH_2^{\oplus}$

(c) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - \overset{\oplus}{C}H_2$

(d) $CH_3 - CH^{\oplus} - CH_3$

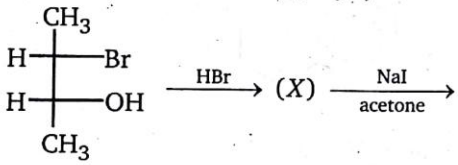
65. Consider the following reaction :



Which response contains all the correct statement about this process ?

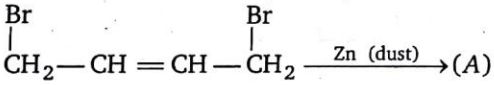
(1) Dehydration
(2) E_2 mechanism
(3) Carbon skeleton migration
(4) Most stable alkene will form
(5) Single-step reaction

(a) 1, 3 (b) 1, 2, 3 (c) 1, 2, 5 (d) 1, 3, 4

66. 

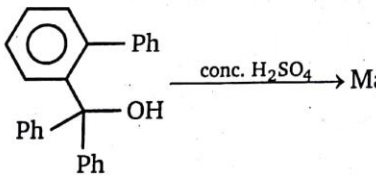
(Major); Product (*Y*) is:

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

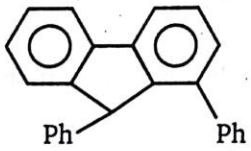
67. 

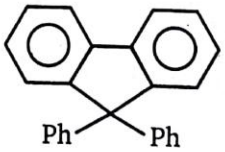
Above reaction is an example of 1,4-elimination. Predict the product.

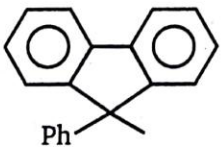
(a) $CH_3-CH=C=CH_2$
(b) $CH_3-C\equiv C-CH_3$
(c) $CH_3-CH_2-C\equiv CH$
(d) $H_2C=CH-CH=CH_2$

68. 

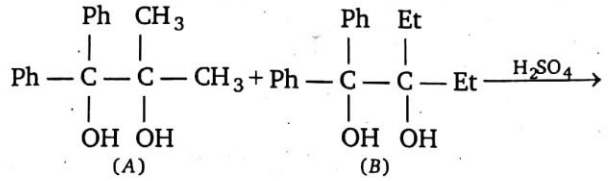
Major product of the reaction is:

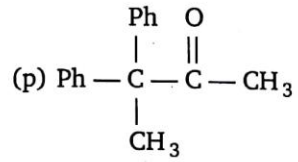
(a) 

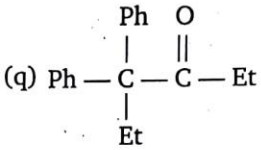
(b) 

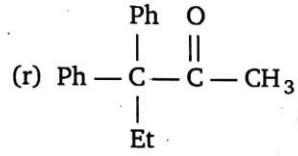
(c) 

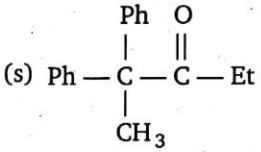
(d) None of these

69. 

(p) 

(q) 

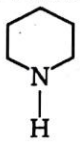
(r) 

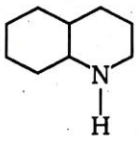
(s) 

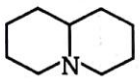
When (*A*) and (*B*) reacts with H_2SO_4 products obtained are :

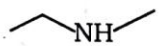
(a) p, q, r, s (b) p, q (c) p, q, r (d) p, q, s

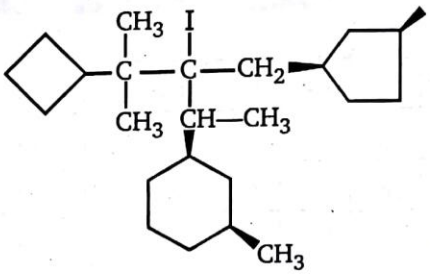
70. Which of the following compound gives even number of Hoffmann's exhaustive methylation and elimination?

(a) 

(b) 

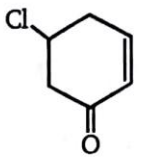
(c) 

(d) 

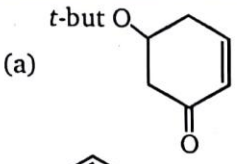
71. 

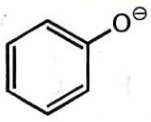
alc.KOH → *X* = Number of chiral products (including stereoisomer).

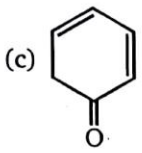
(a) 2 (b) 4 (c) 6 (d) 8

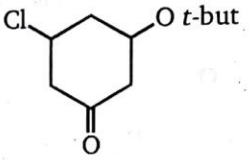
72. 

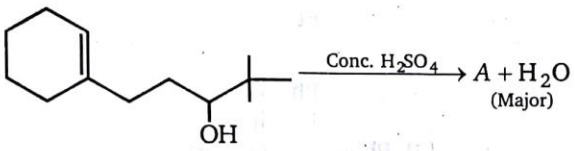
$\xrightarrow[t\text{-butO}]{t\text{-butO}^{\ominus}}$ (*A*) ; "(*A*)" is :

(a) 

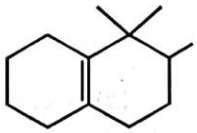
(b) 

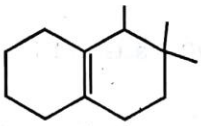
(c) 

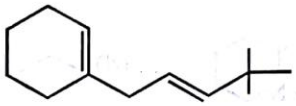
(d) 

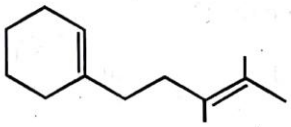
73. 

which of the following is product "A" in the above reaction?

(a) 

(b) 

(c) 

(d) 

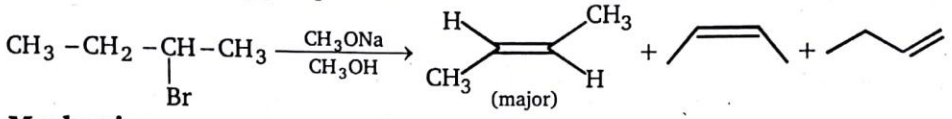
ANSWERS — LEVEL 1															
1.	(d)	**2.**	A – a B – d	**3.**	(a)	**4.**	(c)	**5.**	(b)	**6.**	(b)	**7.**	(d)	**8.**	(b)
9.	(c)	**10.**	(d)	**11.**	(c)	**12.**	(c)	**13.**	(c)	**14.**	(d)	**15.**	(d)	**16.**	(c)
17.	(b)	**18.**	(b)	**19.**	(c)	**20.**	(a)	**21.**	(b)	**22.**	(a)	**23.**	(b)	**24.**	(a)
25.	(b)	**26.**	(a)	**27.**	(d)	**28.**	(c)	**29.**	(b)	**30.**	(c)	**31.**	(d)	**32.**	(d)
33.	(a)	**34.**	(a)	**35.**	(a)	**36.**	(b)	**37.**	(c)	**38.**	(c)	**39.**	(c)	**40.**	(c)
41.	(c)	**42.**	(b)	**43.**	(b)	**44.**	(b)	**45.**	(c)	**46.**	(a)	**47.**	(d)	**48.**	(b)
49.	(b)	**50.**	(a)	**51.**	(c)	**52.**	(b)	**53.**	(b)	**54.**	(b)	**55.**	(c)	**56.**	(d)
57.	(d)	**58.**	(b)	**59.**	(d)	**60.**	(b)	**61.**	(a)	**62.**	(b)	**63.**	(d)	**64.**	(a)
65.	(d)	**66.**	(b)	**67.**	(d)	**68.**	(b)	**69.**	(b)	**70.**	(a,b)	**71.**	(b)	**72.**	(b)
73.	(a)														

LEVEL-2

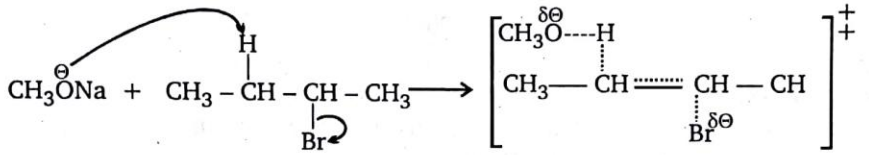
1. Comprehension

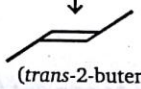
E_2 reaction → Elimination bimolecular

In the general mechanism of the E_2 reaction a strong base abstract a proton on a carbon atom adjacent to the one of the leaving group. As the base abstracts a proton, a double bond forms and the leaving group leaves.



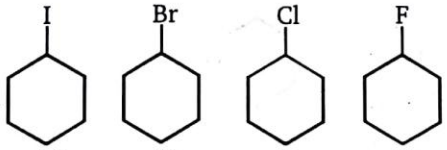
Mechanism :





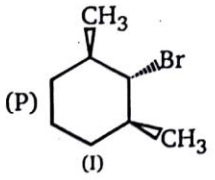
(*trans*-2-butene)

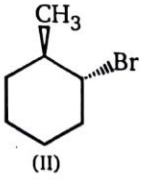
A. Identify the rate of reaction of given compounds in E_2 reaction:



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

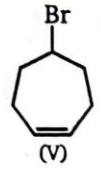
B. In given pairs, which compound is more reactive toward E_2 reaction:



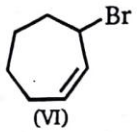


(Q) $CH_3 - \underset{\underset{Br}{|}}{CH} - CH_3$ (III)

$CH_3 - \underset{\underset{Br}{|}}{CH} - CD_3$ (IV)

(R) 

(V)

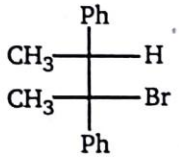


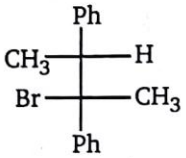
(VI)

(S) $Ph-CH_2-CH_2-Br$ (VII)

$Ph-\underset{\underset{Br}{|}}{CH}-CH_3$ (VIII)

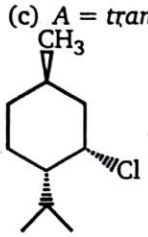
(a) P – II, Q – III, R – VI , S – VII
(b) P – II , Q – III, R – VI , S – VI
(c) P – I, Q – III , R – VI , S – VII
(d) P – I , Q – II , R – V , S – VIII

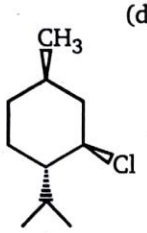
C. 

$\xrightarrow{\text{alc.KOH}}$ (A), 

$\xrightarrow{\text{alc.KOH}}$ (B)

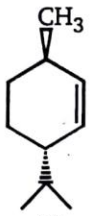
Product (A) and (B) are :
(a) $A = cis, B = cis$
(b) $A = trans, B = cis$
(c) $A = trans, B = trans$
(d) $A = cis, B = trans$

D. 

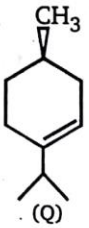
$\xrightarrow[\Delta]{\text{NaOEt}}$ (A), 

$\xrightarrow[\Delta]{\text{NaOEt}}$ (B)

Select the products (A) and (B) from the compounds (P) and (Q) given below:



(P)

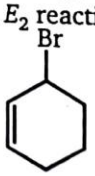


(Q)

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

E. Which of the following compound is inert toward E_2 reaction.

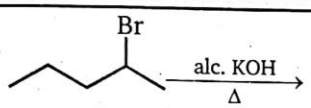
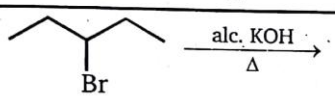
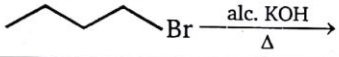
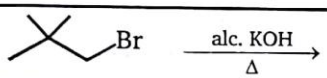
(a) $CH_3-\underset{\underset{Br}{|}}{CH}-CH_2-CH_3$

(b) 

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

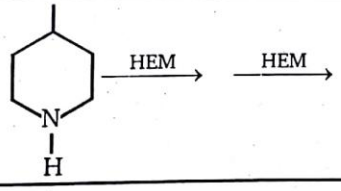
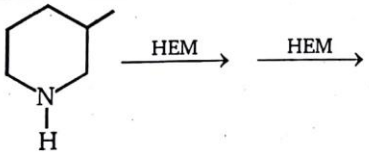
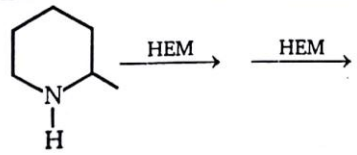
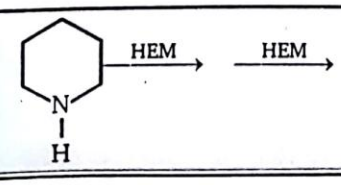
(d) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-\underset{\underset{Br}{|}}{CH}-CH_3$

2. Match the column :

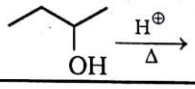
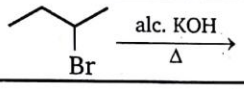
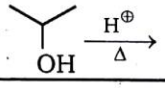
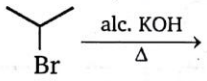
Column (I)		Column (II)	
E_2 reaction (elimination bimolecular)		No. of possible products. (including stereoisomerism)	
(a)		**(p)**	0
(b)		**(q)**	1
(c)		**(r)**	2
(d)		**(s)**	3

3. Match the Column :

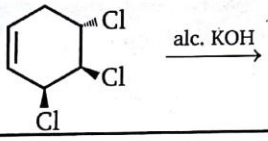
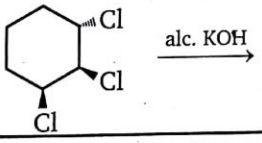
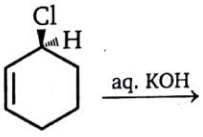
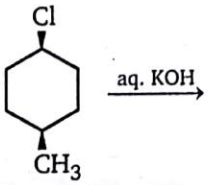
HEM = Hoffmann exhaustive methylation followed by elimination.

Column (I)		Column (II)	
Reaction		Product	
(a)		**(p)**	$H_2C=CH-CH_2-CH=CH_2$
(b)		**(q)**	$H_2C=CH-CH_2-CH_2-CH=CH_2$
(c)		**(r)**	$H_2C=CH-CH_2-\overset{\overset{CH_3}{\vert}}{C}=CH_2$
(d)		**(s)**	$H_2C=CH-\overset{\overset{CH_3}{\vert}}{CH}-CH=CH_2$

4. Match the column :

	Column (I)		Column (II)
(a)		**(p)**	Product are Diastereomers
(b)		**(q)**	Carbocation is intermediate
(c)		**(r)**	2nd order reaction
(d)		**(s)**	Ist order reaction

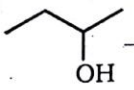
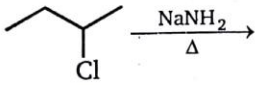
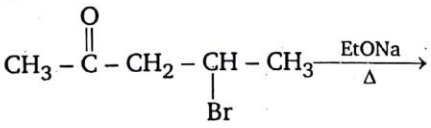
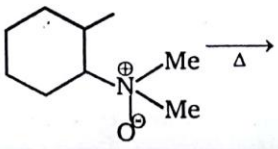
5. Match the column :

	Column (I)		Column (II)
(a)		**(p)**	Optically active product
(b)		**(q)**	Optically inactive product
(c)		**(r)**	2nd order reaction
(d)		**(s)**	unimolecular reaction

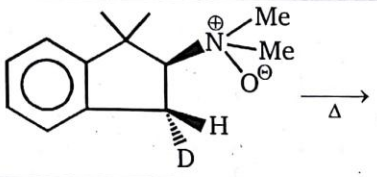
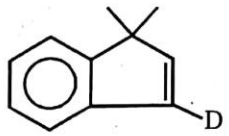
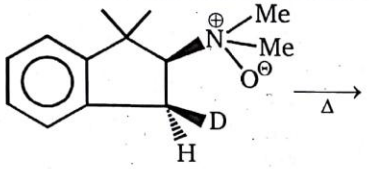
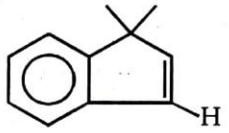
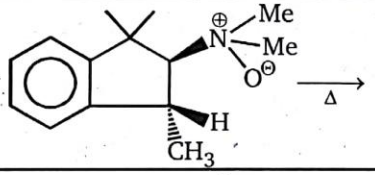
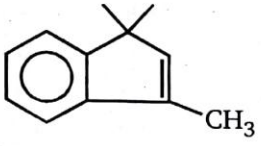
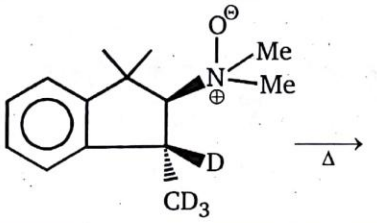
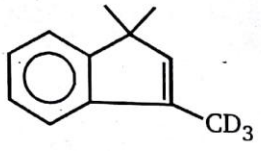
6. Match the column :

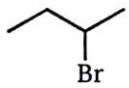
Column (I)		Column (II)	
	E_2 reactions (elimination bimolecular)		**Number of products (including stereoisomerism)**
(a)	$CH_3-CH_2-CH_2-CH_2-Br \xrightarrow{\text{alc. KOH}}$	**(p)**	1
(b)	$CH_3-\underset{\underset{Br}{|}}{CH}-CH_2-CH_3 \xrightarrow{\text{alc. KOH}}$	**(q)**	2
(c)	$CH_3-\overset{\overset{CH_3}{|}}{\underset{\underset{Br}{|}}{C}}-CH_2-CH_3 \xrightarrow{\text{alc. KOH}}$	**(r)**	3
(d)	$Ph-CH_2-\underset{\underset{Br}{|}}{CH}-CH_2-CH_3$	**(s)**	4

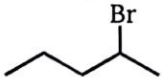
7. Match the column :

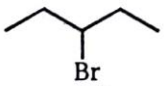
Column (I)		Column (II)	
(a)		**(p)**	E_1
(b)		**(q)**	E_2
(c)		**(r)**	Ei (elimination intramolecular)
(d)		**(s)**	E_{1CB}

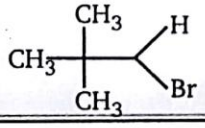
8. Match the column :

Column (I)		Column (II)	
Reaction		**Product**	
(a)		**(p)**	
(b)		**(q)**	
(c)		**(r)**	
(d)		**(s)**	

9. (a)  $\xrightarrow{\text{alc.KOH}}$ (*X*) products

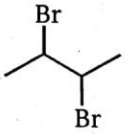
(b)  $\xrightarrow{\text{alc.KOH}}$ (*Y*)

(c)  $\xrightarrow{\text{alc.KOH}}$ (*Z*)

(d)  $\xrightarrow{\text{alc.KOH}}$ (*P*)

Sum of $X + Y + Z + P =$

10. Reaction-1 : $Ph-\overset{\overset{O}{\|}}{C}-CH_3 \xrightarrow{PCl_5} \xrightarrow{\boxed{x}\,NaNH_2} \xrightarrow{CH_3I} Ph-C\equiv C-CH_3$

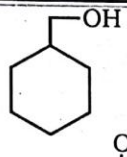
Reaction-2 :  $\xrightarrow{\boxed{y}\,NaNH_2} CH_3-C\equiv C-CH_3$

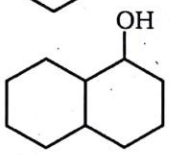
Reaction-3 : $Ph-\underset{Cl}{CH}-\underset{Cl}{CH_2} \xrightarrow{\boxed{z}\,NaNH_2} \xrightarrow{Et-I} Ph-C\equiv C-Et$

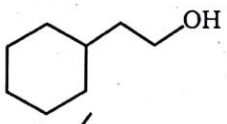
x, y, z are moles used.

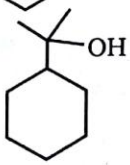
Sum of $[\,x+y+z=\,]$

11. Sum of α-hydrogen in major product of the reaction.

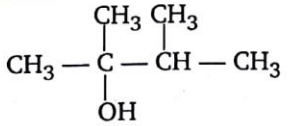
Reaction-1  $\xrightarrow[\Delta]{H^+}$ (A)

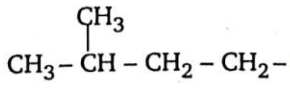
Reaction-2  $\xrightarrow[\Delta]{H^+}$ (B)

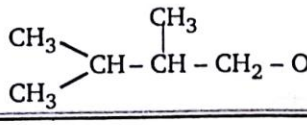
Reaction-3  $\xrightarrow[\Delta]{H^+}$ (C)

Reaction-4  $\xrightarrow[\Delta]{H^+}$ (D)

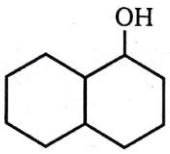
Sum of α-hydrogen is $A+B+C+D=$

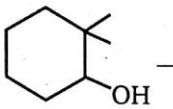
12. Reaction-1  $\xrightarrow[\Delta]{H^+}$ (A)

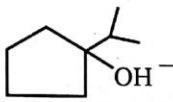
Reaction-2  $\xrightarrow[\Delta]{H^+}$ (B)

Reaction-3  $\xrightarrow[\Delta]{H^+}$ (C)

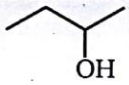
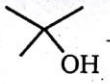
Sum of α-hydrogen is $(A+B+C=\quad)$

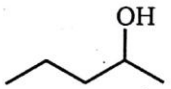
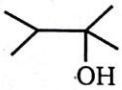
13. Reaction-1  $\xrightarrow[\Delta]{H^+}$ (A) (major)

Reaction-2  $\xrightarrow[\Delta]{H^+}$ (B) (major)

Reaction-3  $\xrightarrow[\Delta]{H^+}$ (C) (major)

Sum of α-hydrogen $(A + B + C) =$

14. (a)  $\xrightarrow[\Delta]{H^+}$ (x) (b)  $\xrightarrow[\Delta]{H^+}$ (y)

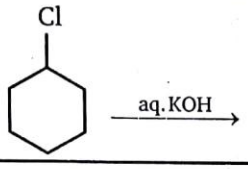
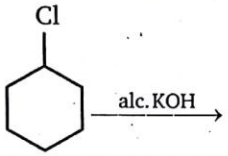
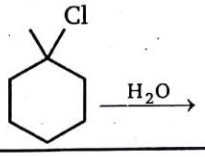
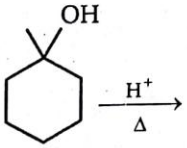
(c)  $\xrightarrow[\Delta]{H^+}$ (z) (d)  $\xrightarrow[\Delta]{H^+}$ (p)

Total number of products obtained in above reactions including minor products is (including stereoisomer)

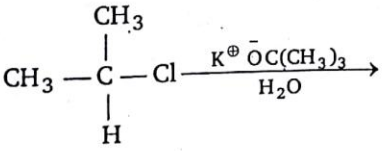
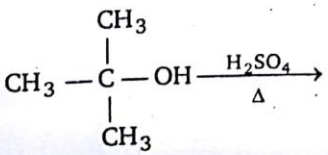
15. Match the column (I) and (II).

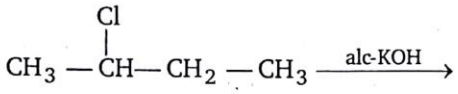
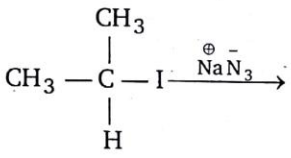
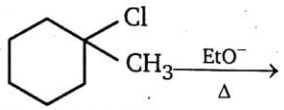
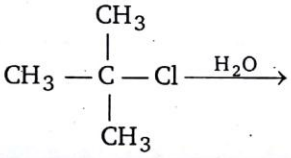
Column (I)		Column (II)	
Reaction		**Type of Reaction**	
(a)	R -2 -chlorobutane $\xrightarrow[\text{acetone}]{\text{KSH}}$	**(p)**	S_{N^1}
(b)	R - 2- chlorobutane $\xrightarrow[\text{EtOH}]{EtO^{-}\overset{\oplus}{Na}}$	**(q)**	S_{N^2}
(c)	2 - bromo- 2- methyl propane $\xrightarrow{H_2O}$	**(r)**	E_1
(d)	2- butanol $\xrightarrow[\Delta]{H_2SO_4}$	**(s)**	E_2

16. Match the column (I) and (II).

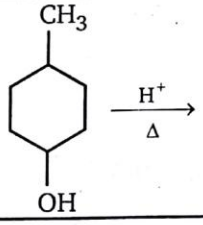
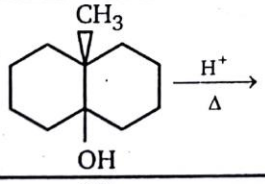
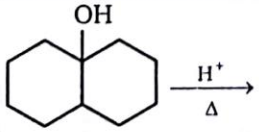
Column (I)		Column (II)	
Reaction		**Type of Reaction**	
(a)		**(p)**	S_N1
(b)		**(q)**	S_N2
(c)		**(r)**	E_1
(d)		**(s)**	E_2

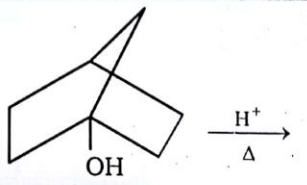
17. Select whether the following reagent combination will result in elimination or substitution reactions leading to the major product.

Reaction		Substitution	Elimination
(a)			
(b)			

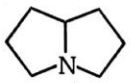
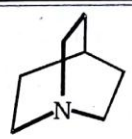
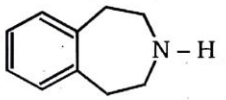
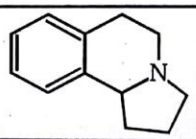
(c)			
(d)			
(e)			
(f)			

18. Match the Column (I) and (II) (Matrix).

Column (I)		Column (II)	
	Reaction		**Comment on product**
(a)		(p)	Racemic mixture
(b)		(q)	Major product consist of even number of α-hydrogen
(c)		(r)	Will not undergo dehydration

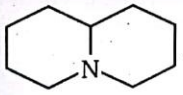
(d)		(s)	Major product consist of odd number of α-hydrogen

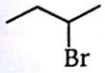
19. For each of the following amines (A through D), exhaustive methylation (treatment with excess methyl iodide), followed by Hoffmann elimination (heating with AgOH), repeated as necessary, removes the nitrogen atom in the form of trimethylamine. Indicate the number of repetitive Hoffmann eliminations required to remove the nitrogen by a number (1 to 4) in the designated answer sheet.

A.		**B.**		**C.**	
D.		**E.**		**F.**	

a.		**b.**		**c.**	
d.		**e.**		**f.**	

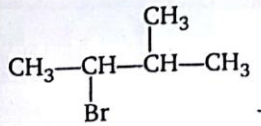
20.

 → x is total number of HEM (Hoffman Exhaustive Methylation and eliminations) to remove nitrogen from given compound.

 $\xrightarrow{\text{alc.KOH}}$ y is total number of possible E_2 product (including stereoisomer)

Sum of $x+y$= ?

21.



$\xrightarrow{\text{EtOH}}$ (x) ($S_{N^1} + E_1$) products. (including stereoisomer)

consider all products

Total number of products are :

ANSWERS — LEVEL 2

1. A – a; B – a; C – b; D – c; E – c;

2. a – s; b – r; c – q; d – p

3. a – s; b – r; c – q; d – p

4. a – p, q, s; b – p, r; c – q, s; d – r

5. a – p, r; b – p, r; c – p, r; d – q, r

6. a – p; b – r; c – q; d – s

7. a – p; b – q; c – s; d – r

8. a – p; b – q; c – r; d – s

9. $X = 3,\ Y = 3,\ Z = 2,\ P = 0 \Rightarrow 3 + 3 + 2 + 0 = 8$

10. $x = 3,\ y = 2,\ z = 3 \Rightarrow 3 + 2 + 3 = 8$

11. 32

12. 33

13. 28

14. $x = 3,\ y = 1,\ z = 3,\ p = 2$
Sum = 9

15. (a – q), (b – s), (c – p), (d – r)

16. (a – q), (b – s), (c – p), (d – r)

17. Substitution – d, f
Elimination – a, b, c, e

18. a – p, q; b – p, q; c – q; d – r

19. a – 3; b – 2; c – 3; d – 1; e – 2; f – 3

20. 6

21. 6