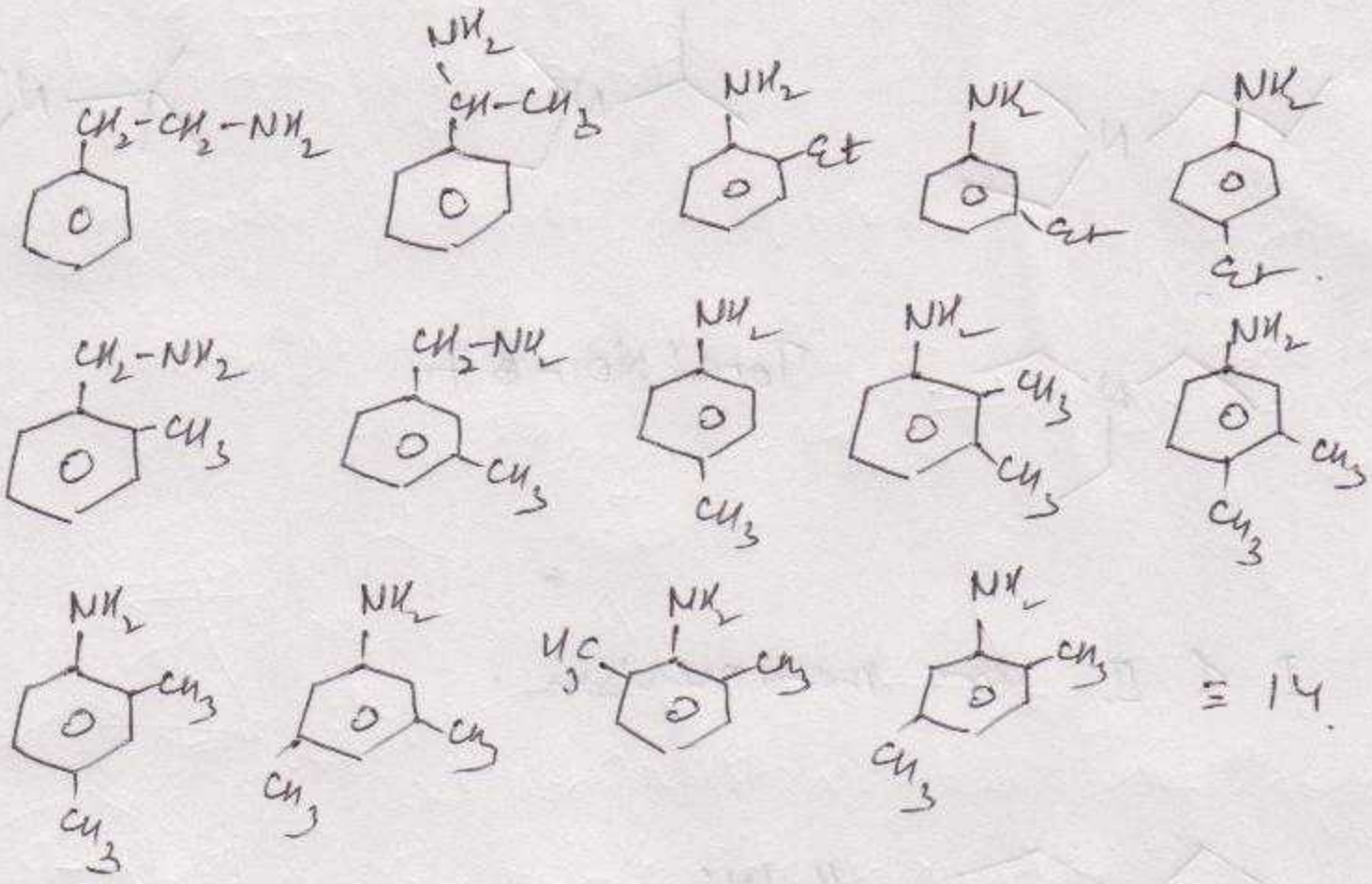
ISOMERS

HOME ASSIGNMENT-1

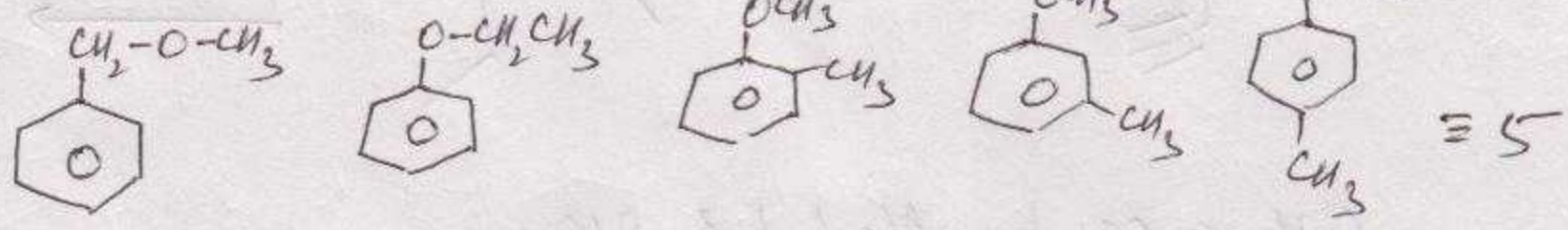
1. (B) Alkane, (C_nH_{2n+2}) can exibit only position and chain isomers.

2. (D)



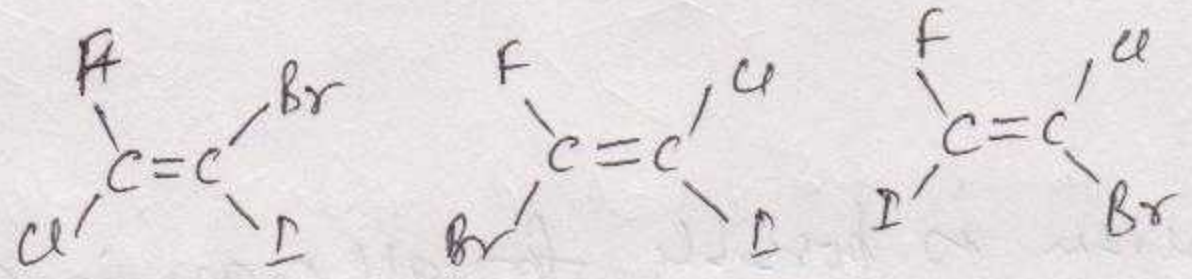
≡ 14.

3. (D)



≡ 5

4 (D)

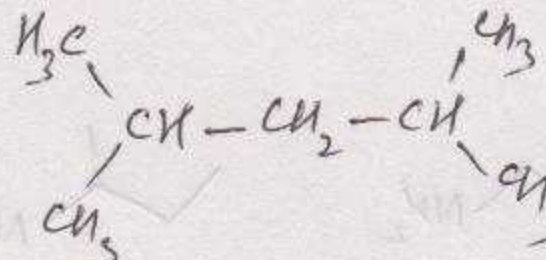


≡ 3.

5. (D) Total No. of monochloroderivatives are possible for

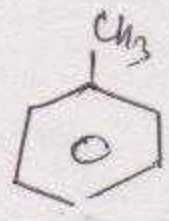
$CH_3-CH_2-CH_2-CH_2-CH_3$ — 3

n-pentane



— 3

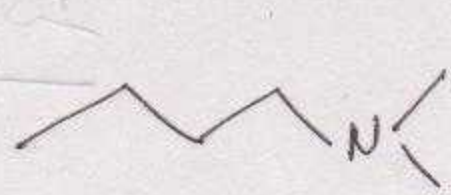
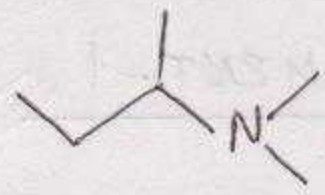
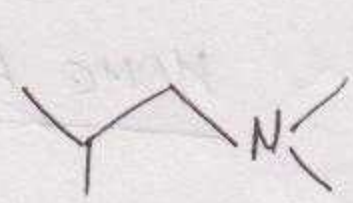
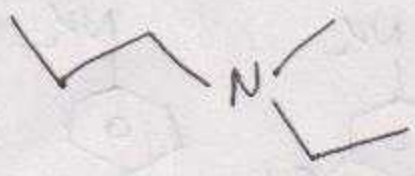
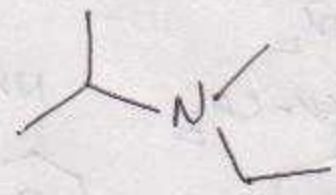
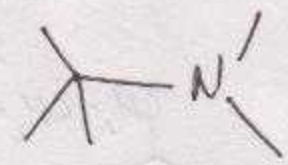
2,4 dimethylpentane



Toluene — 4

$CH_3-CH(CH_3)-CH(CH_3)-CH_3$ — 2.

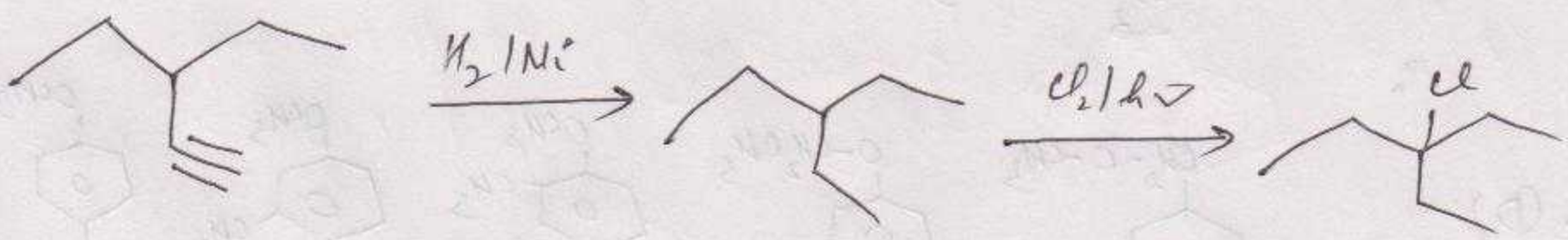
6. (D)


Total No - 07

7. (B) I & II are metamerism.

8. (A)



9 (D) $C_6H_{14}O$ can be Alcohol & Ether

10. (D)

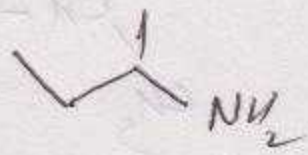
11 (D) Chain isomerism is possible for all organic compound having no. of carbon atom more than '4'

12. (A)

13. (C) $CH_3-CH=CH-CH_2-CH_3$ Consist 14 sigma and 1 π bond.
(2-Pentene)

14. (D)






Total No - 4

15. (A) Both Propanal & Propanone having same molecular formula as C_3H_6O.

16. (B)

total No. - 3

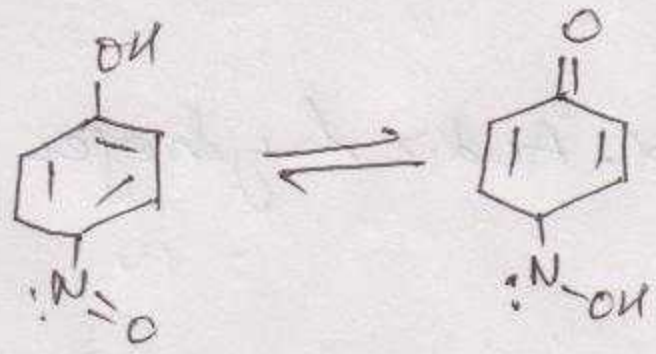
17. (A)

18. (C) only (3) statement is wrong.

19. (B) & (C) consist both α-Acidic hydrogen.

20. (D) $RCH_2-\overset{+}{N}(=O)-O^-$ consist α-Acidic hydrogen.

21. (A)



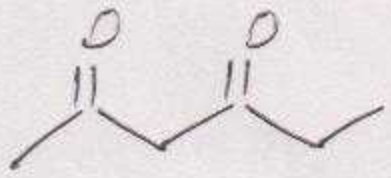
22. (A, C, D)

can't exibit tautomerism.

23. (A)

24. (A, C, D) don't consist α-Acidic hydrogen.

25. (B)



2,4 Hexanedione having more stable conjugate base.

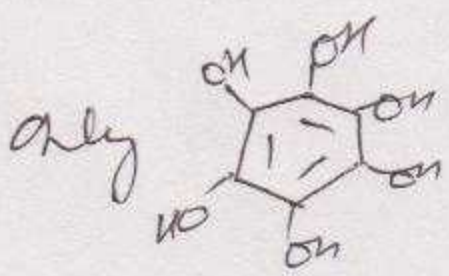
26. (A, B) I & II are tautomers.

I, III & IV are functional isomers.

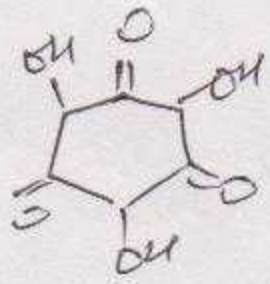
27. (C)

28. (C)

only

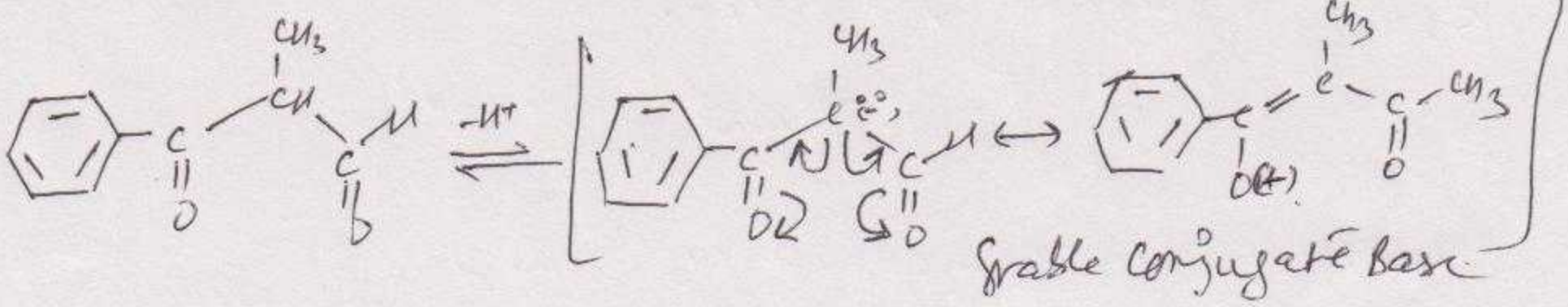


&



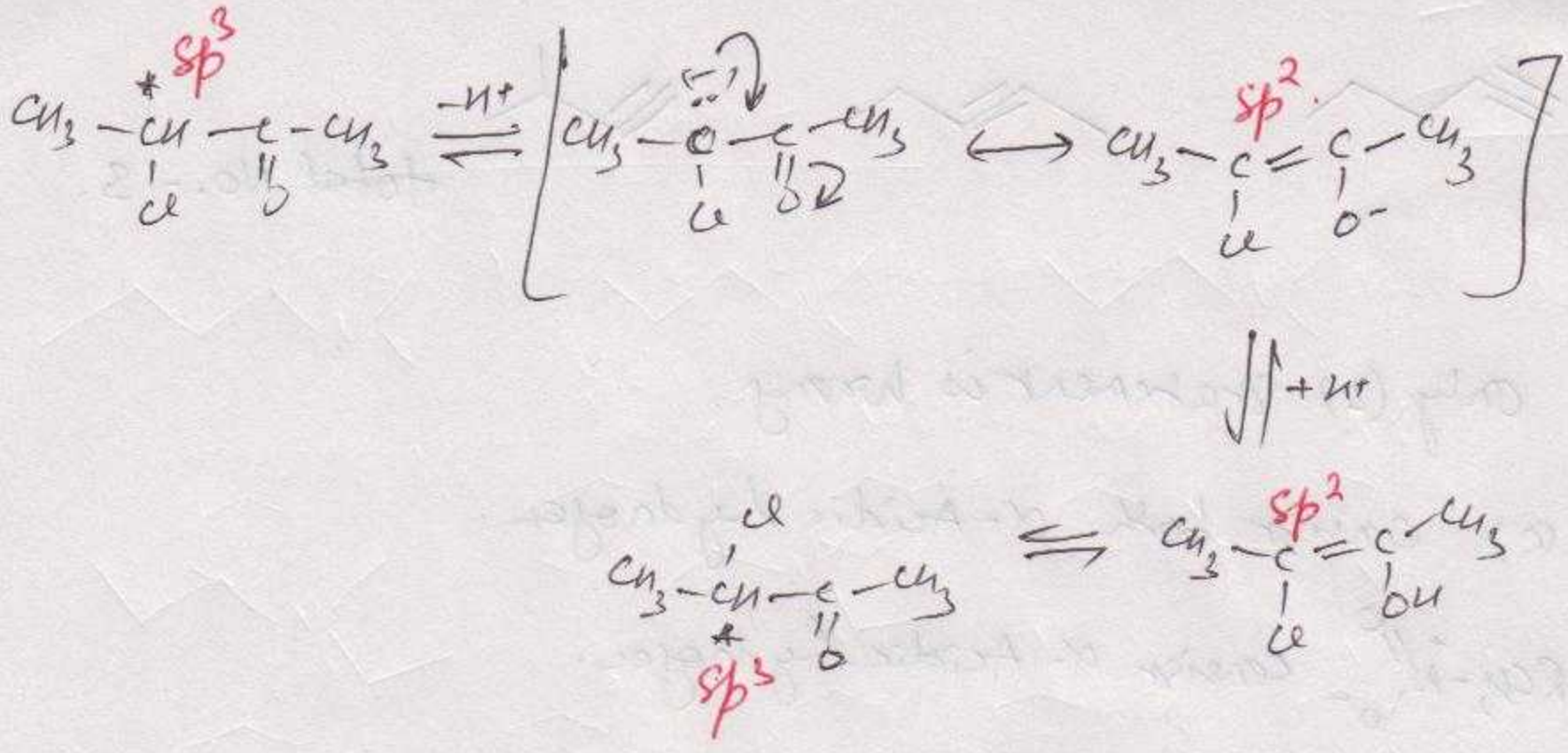
having same molecular formula.

29. (B)

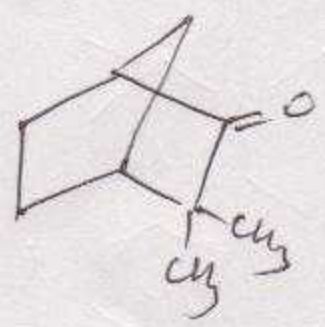


Stable Conjugate Base

30 (B)

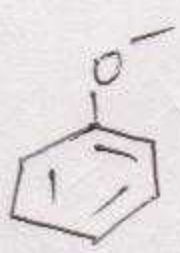


31. (B)



does not consist α-Acidic hydrogen.

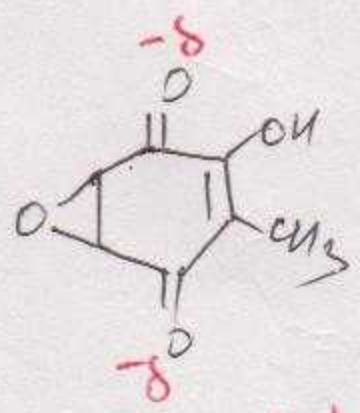
32. (D)



and

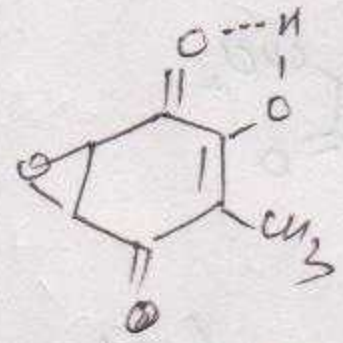
are pair of resonating structure.

33. (D)



Less Repulsion

and

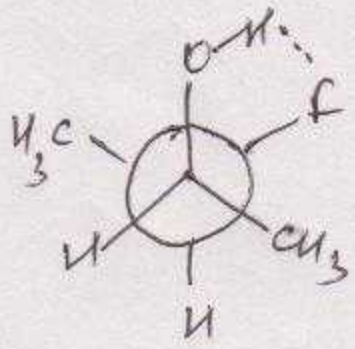


H-Bonding & resonance Stabilisation

HOME ASSIGNMENT-2

PART-A

1. (C)



(Gauche)

Stabilised through H-Bonding.

2. (D)

3. (B) Both (I) & (II) belongs to same Homologous series.

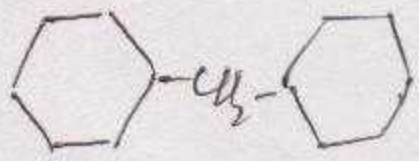
4. (A) I & II are Conformational isomers, as they can be Convert into each without breaking any bonds.

5. (A) I & II are positional isomers

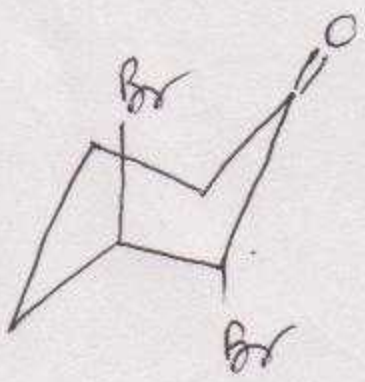
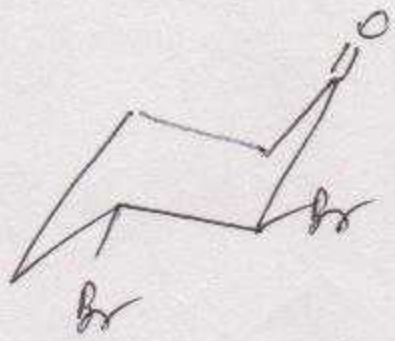
6. (D) It consist three membered cyclic ring.

7. (B) It consist minimum torsional Strain.

8. (C)

9. (C)  having same molecular formula as given compound

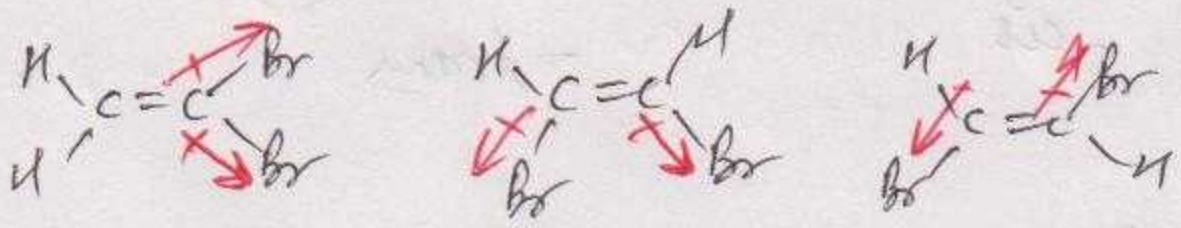
PART-B

7.  and  are conformational isomers. and they can't be Separated by distillation or Recrystallisation

8. Bulkier group should not be present on axial position as it is unstable due 1,3 diaxial interaction.

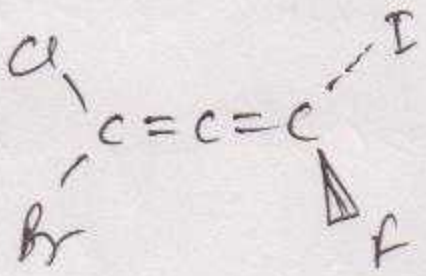
8. (B) Given Compound consist two stereocenter and thus total number of diastereomers $= 2^2 = 4$.

9. (C) Order of dipole moment (C) > (A) > (B)



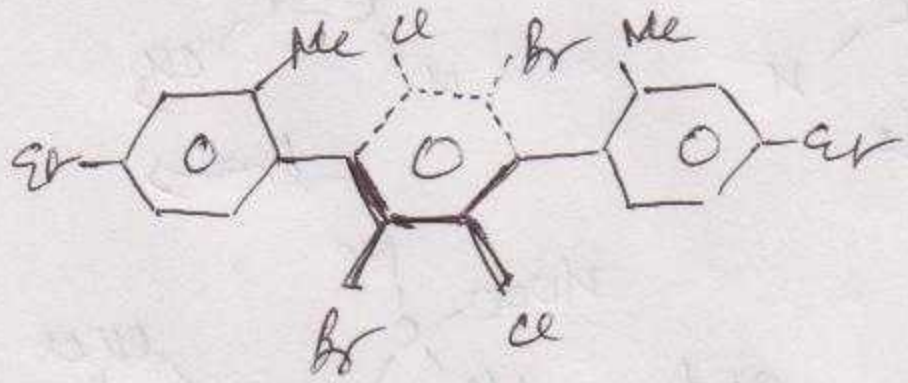
(C) (A) (B)

10. (A)

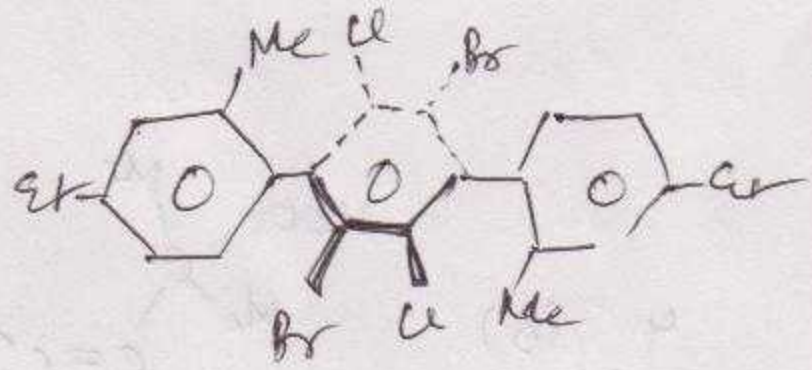


is non-planar, thus can't exibit geometrical Isomerism.

11. (D)



and

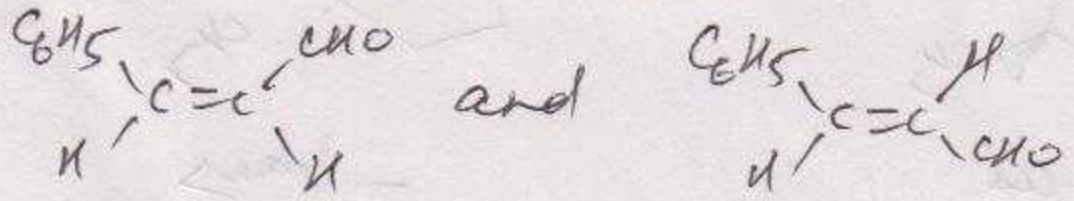


- cis - trans

12. (B) they are geometrical isomers.

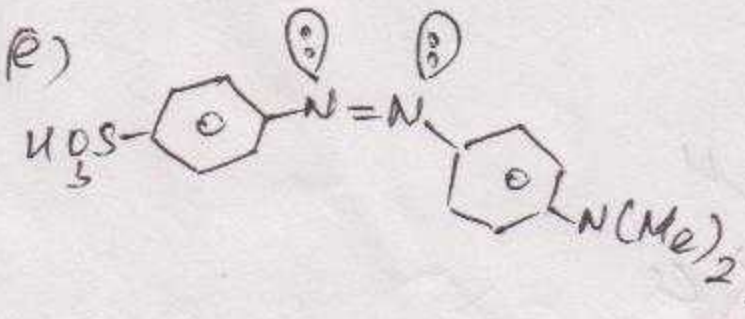
PART-B

1. (b)

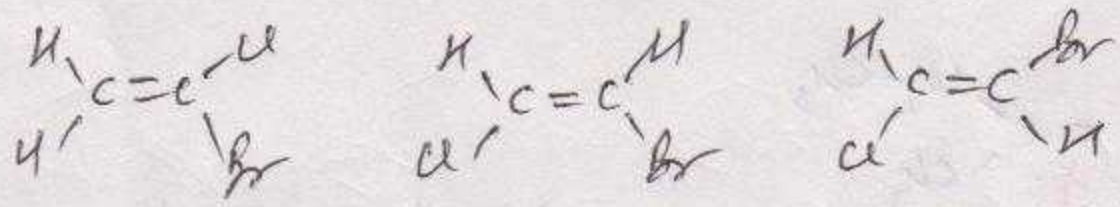


and

(C) and (E)

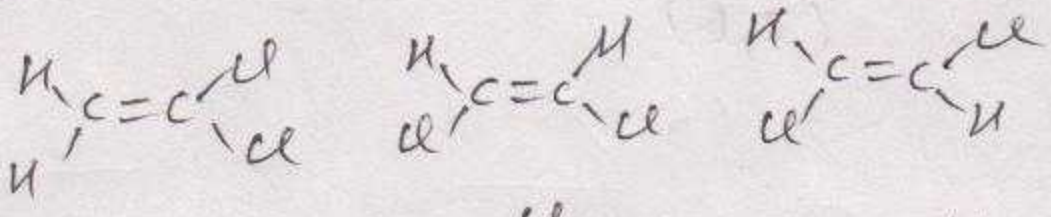


2. (i) C_2H_2ClBr



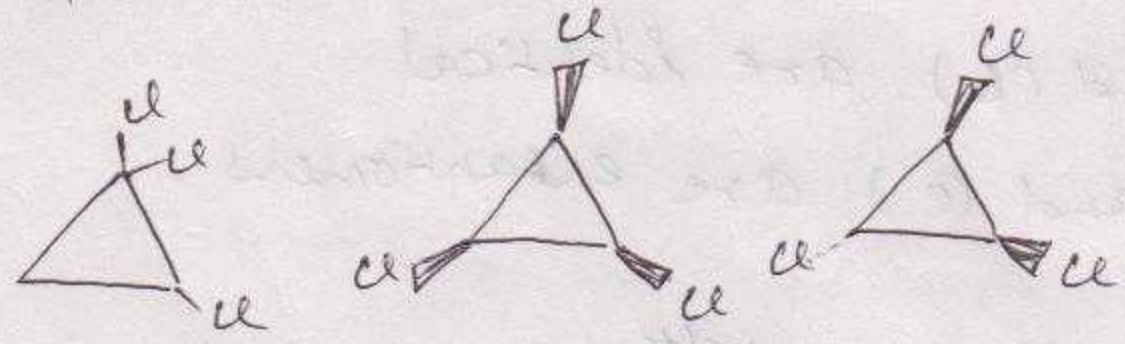
Total No - 3

(ii) $C_2H_2Cl_2$



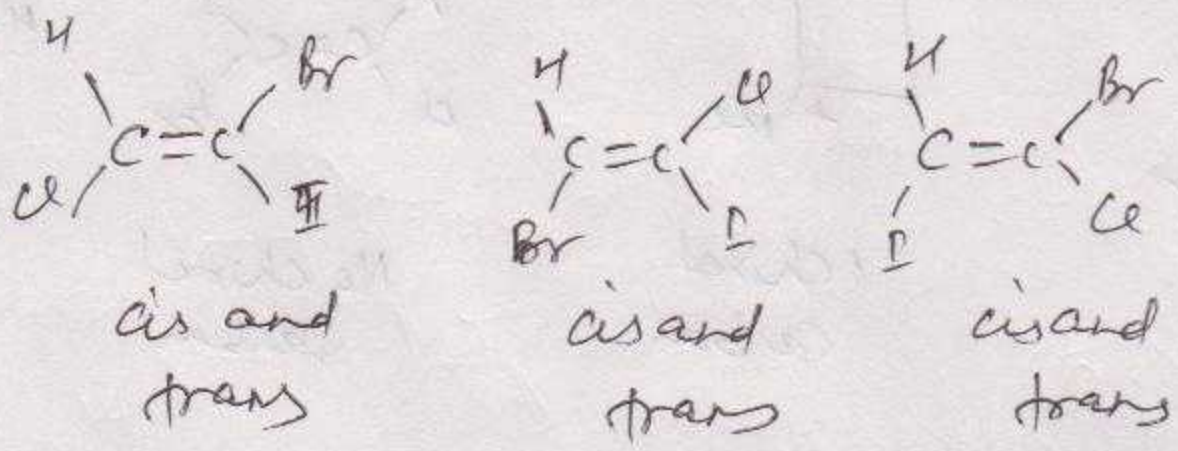
Total no - 3

(iii)



Total No - 3

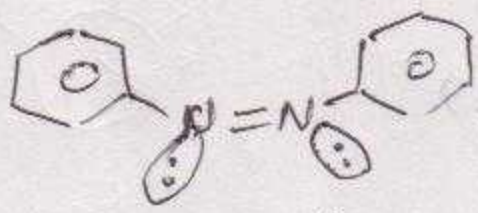
(iv)



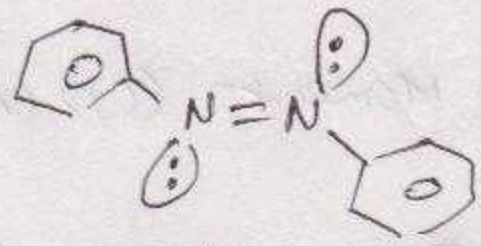
HOME ASSIGNMENT-3

PART-A

1. (B)

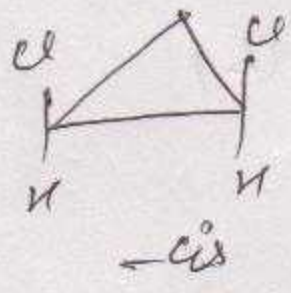


-cis

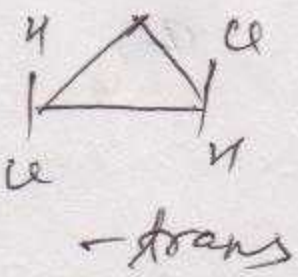


-trans

2. (D)

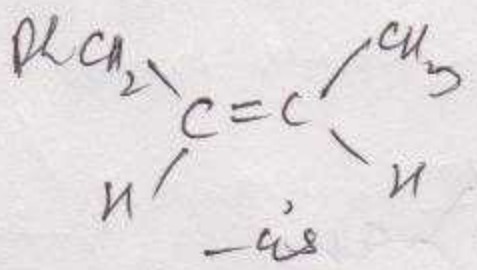


-cis

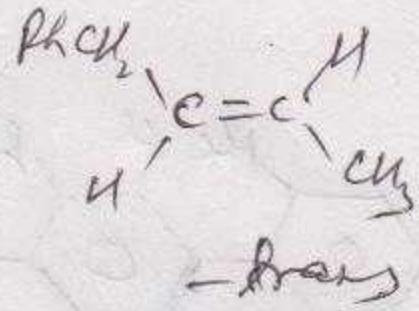


-trans

3. (B) 1-Phenyl-2-butene

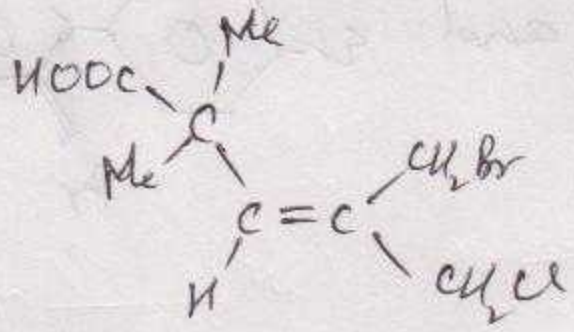


-cis



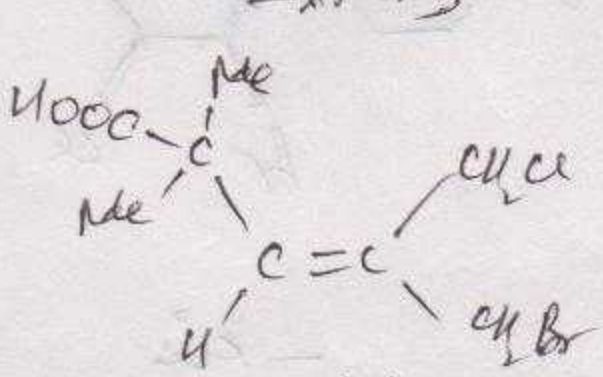
-trans

4. (B)



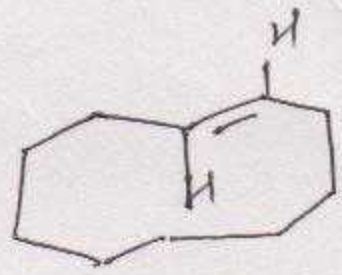
(Z)

and



(E)

5. (D)



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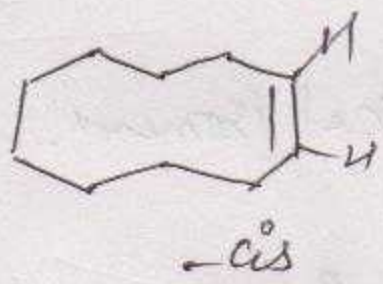
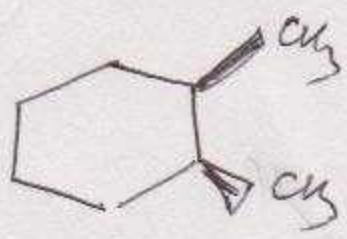


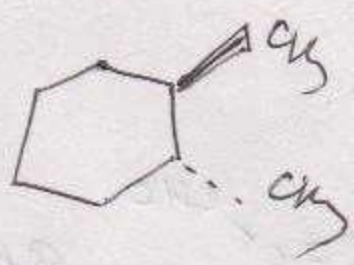
-cis

6. (A)



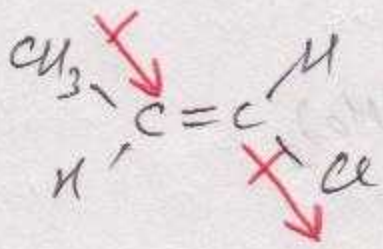
-cis

and



-trans

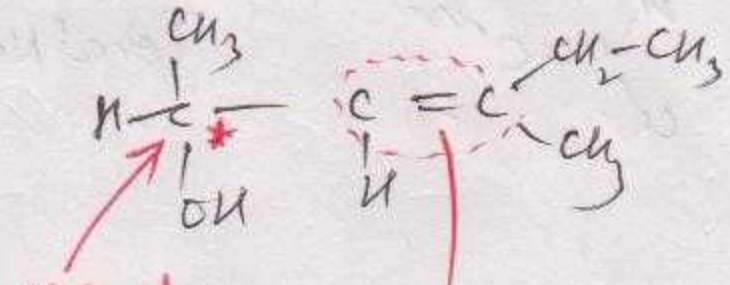
7. (B) Cahn-Ingold-Prelog



trans-1-chloroprop-1-ene

HOME ASSIGNMENT-4

1. (D)



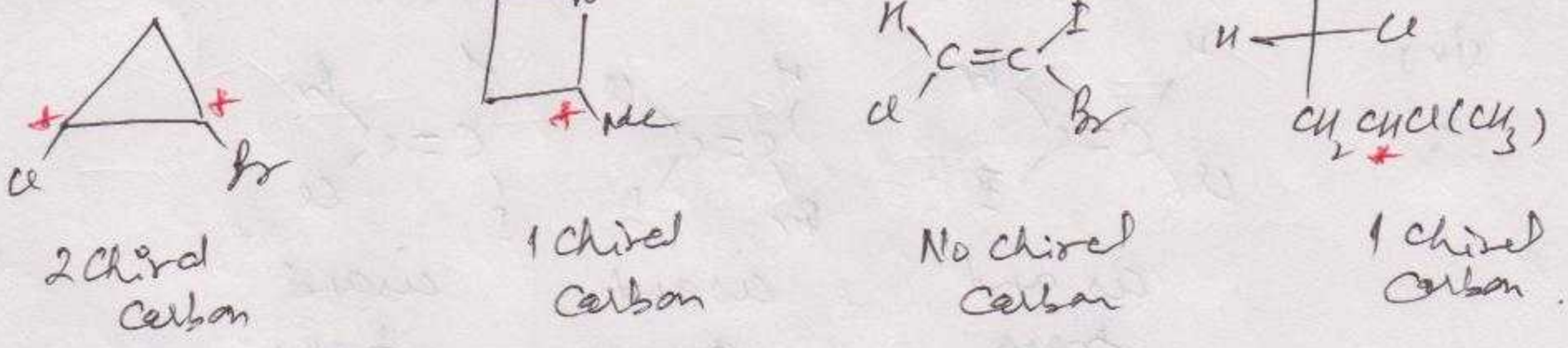
total no. of isomers
$= 2^2 = 4$

2. (C)

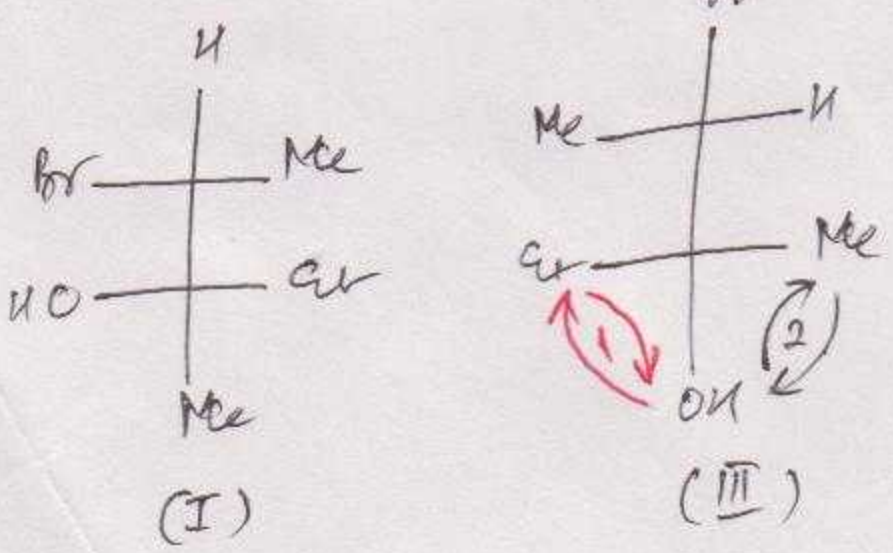
(A) and (B) are identical

(A) and (C) are enantiomers.

3. (C)

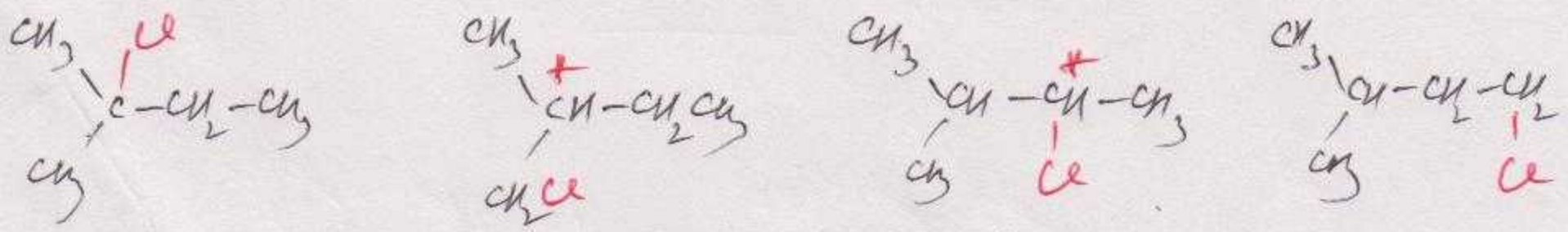


4. (C)



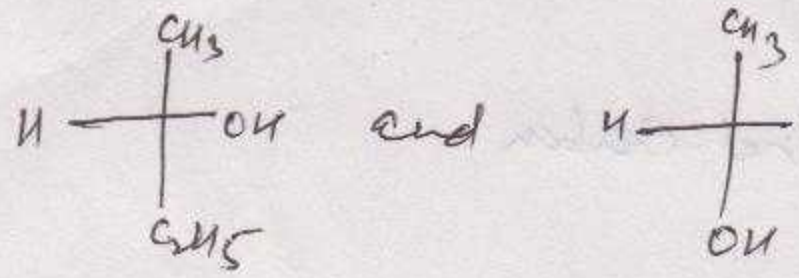
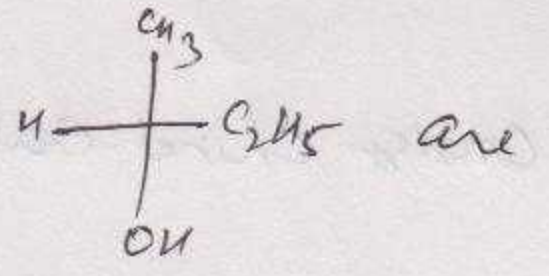
On exchange no. of exchange on same chiral carbon III & I will be identical.

5. (D)



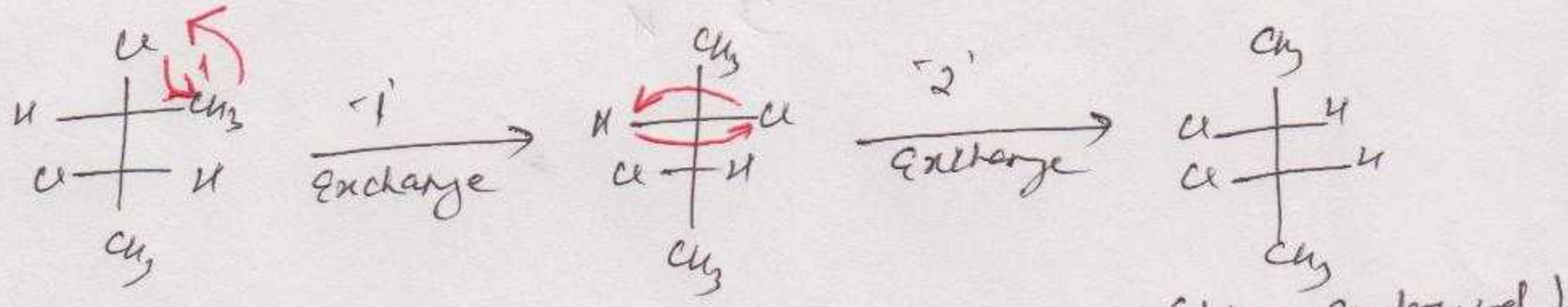
6. (D) I & III are same compound and they have same optical Activity.

7. (C) Given compounds are structural isomers.

8. (B)  and  are pair of enantiomers.

9. (C) I & III are non-superimposable mirror image and thus they are enantiomers.

I & II are structural isomers.

10. (B) 

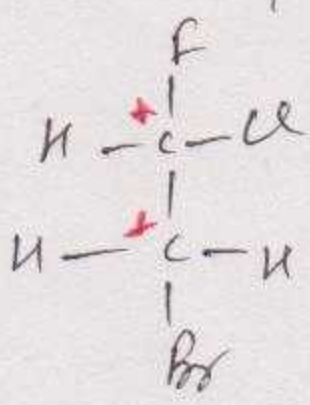
(Meso compound)

11. (B) Relative Configuration

12. (B) $CH_2=CH-\overset{*}{\underset{\underset{CH_3}{|}}{CH}}-CH_2-CH_3 \xrightarrow{KMnO_4} CH_3-CH_2-\underset{\underset{CH_3}{|}}{CH}-CH_2-CH_3$

Optically Active — Optically Inactive

13. (C) The resultant product is



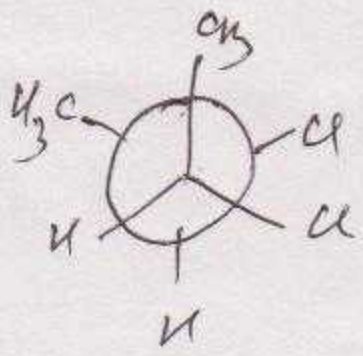
Consist two chiral carbon

Total No. of isomers

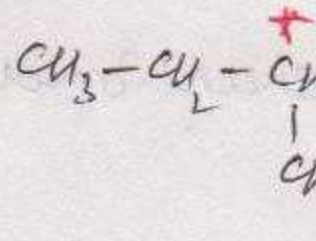
$= 2^2 = 4$

14. (C) 'a' is meso compound but 'b' is chiral.

15. (A) Given compound are not mirror image

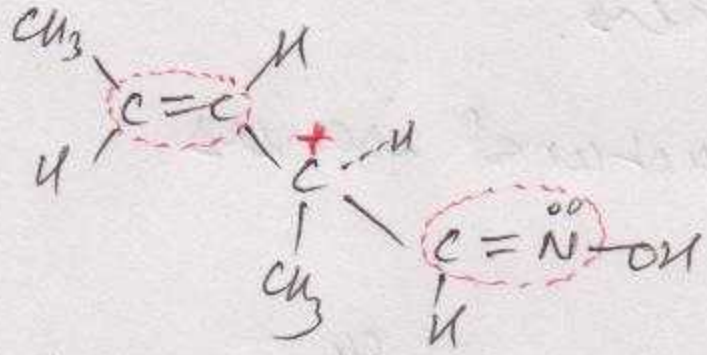
16. (A)  is meso compound.

17. (D)



Consist Chiral Carbon.

18. (D) Resultant Oxime is



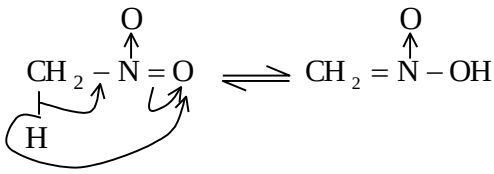
3 Stereocenters'

Total No. of Isomer = 2^3

= 8.

EXERCISE - 2 [C]

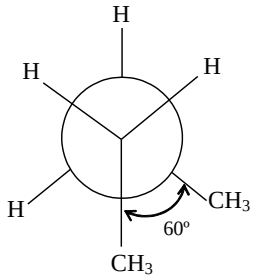
1. **(D)**



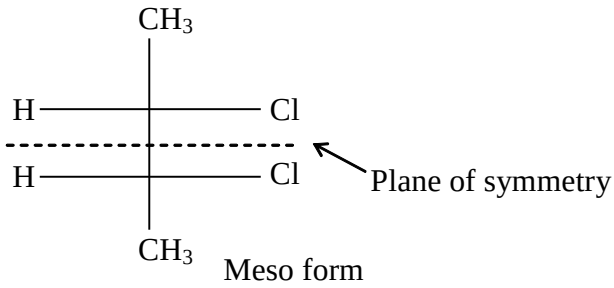
2. **(D)**

These contain –C = C–

3. **(D)**

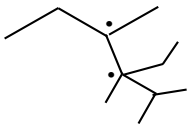


4. **(C)**



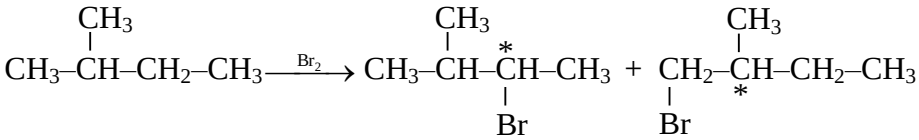
Meso form

5. **(B)**

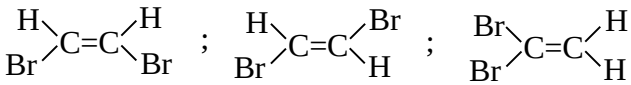


Note: chiral centre are marked.

6. **(B)**



7. **(A)**

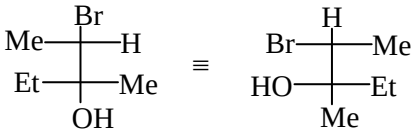


8. **(D)**

9. **(D)**

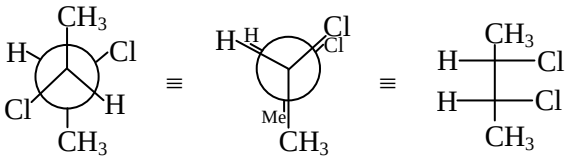
The molecule has a plane of symmetry, so optically inactive.

10. **(D)**



2 exchanges on each chiral atom

11. (A)



Presence of plane of symmetry and center of symmetry

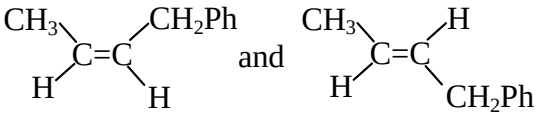
12. (B)

They are non superimposable mirror images

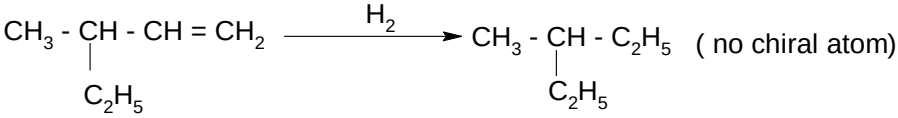
13. (B)

Meso compounds have got the plane of symmetry.

14. (A)



15. (C)



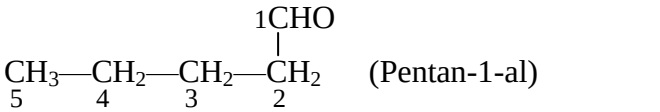
16. (A)

Let, 1 mole of sucrose be taken. On hydrolysis, one mole of glucose and one mole of fructose are formed.

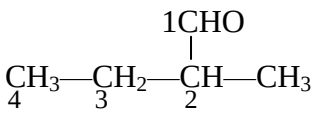
Optical rotation of 2 moles of mixture = $1 \times 52° + 1 \times (-92)° = -40°$

Hence optical rotation of 1 mole of mixture = $-\frac{40}{2}$ = **–20°**

17. (D)

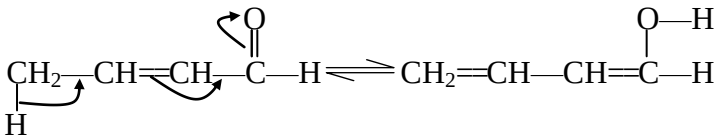


(Pentan-1-al)

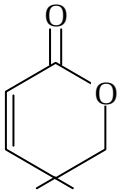


(2-methyl butan-1-al)

18. (B)



19. (D)



does not undergo tautomerism as it does not have acidic hydrogen.

20. (B)

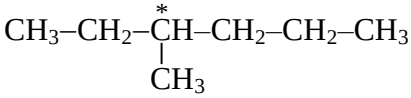
Due to presence of one chiral carbon

21. (C)

2 double bond are capable of showing geometrical isomerism and one chiral center is present

22. (C)

23. (C)



24. (D)

Butanone ($CH_3COCH_2CH_3$) and diethyl ether ($C_2H_5OC_2H_5$) do not have same molecular formula and hence are not isomers.

25. (B)

Both the carbon have individually two different groups and rotation is restricted due to double bond.

26. (A)

They are non super imposible mirror images

27. (D)

Stability order of various conformers follows:
Anti > gauche > partially eclipsed > fully eclipsed
a – gauche
b – fully eclipsed
c – partially eclipsed
d – anti

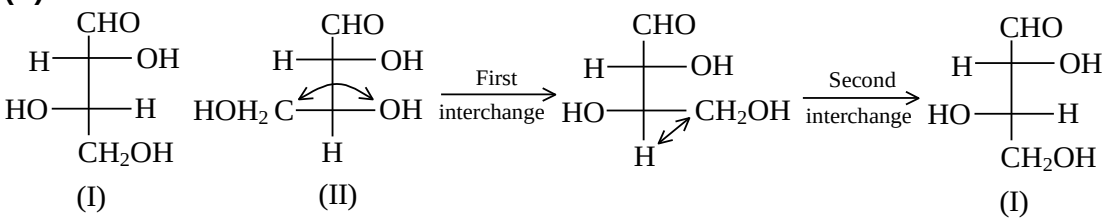
28. (D)

In the given compounds, there is restricted rotation about 'C–C' bond C–N bonds.

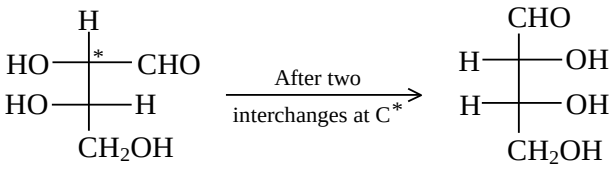
29. (C)

The given compounds are $CH_3CH_2CH(OH)CH_3$ and $CH_3CH_2CH_2CH_2OH$. They are position isomers.

30. (A)



Similarly



(III) (III)

∴ (I) and (II) are identical; (I) and (III) are diastereomers.

31. (D)
Alkyne and diene are different fuctional group

32. (D)

33. (D)

34. (C)
Alcohols and aldehydes are not functional isomers due to different molecular formula

35. (C)
The various isomers possible are:
n–hexane, 2–methylpentane, 3–methylpentane, 2,2–dimethylbutane, 2,3–dimethylbutane.

36. (B)
The given stereoisomers are diastereomers.

37. (C)
In a compound having n double bonds and two different terminals, the number of geometrical isomers is 2^n. The given compound has n = 2. Therefore, number of geometrical isomers = 2^2 = **4**.

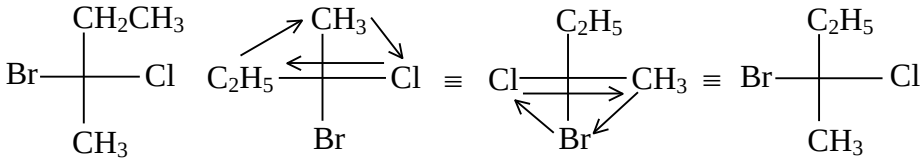
38. (D)
No plane of symmetry and no center symmetry

39. (D)
No acidic hydrogen

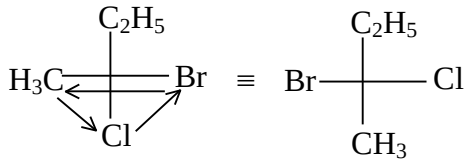
40. (A)
$CH_3CH_2CH_2CH_2\underset{\underset{H}{|}}{C}=\underset{\underset{CH_3}{|}}{C}-CH_3$ does not show cis –trans isomerism.

41. (B)
H^+ will be replaced by D^+ during enolization but not T^+. This is because heavier isotope forms stronger bond

42. (D)

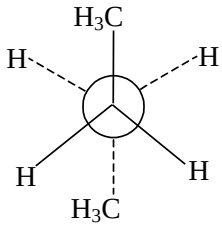


(1) (2) (same as 1)



(3) (same as 1)

43. (D)



Minimum steric repulsion and minimum dihedral strain. Therefore, most stable conformation.

44. (B)

$H–C\equiv N \rightleftharpoons \overset{-}{C} \equiv \overset{+}{N} – H$ (Shifting of H^+ occurs)

45. (D)

By rotation on the plane of the paper, (1) produces a mirror image of (2).

46. (B)

It shows optical isomerism as the molecule does not possess any element of symmetry.

47. (B)

Dipole moment is a vector quantity. It gets cancelled in the case of trans but–2–ene.

48. (A)

They are non superimpasible mirror image of each other

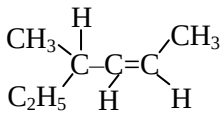
49. (D)

All enolizable H^+ will be replaced by D^+

50. (C)

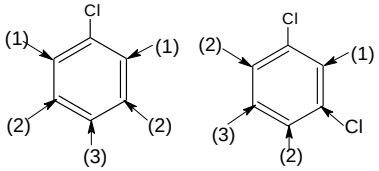
Three chiral atoms. Number of stereoisomers = $2^3 = 8$

51. (C)

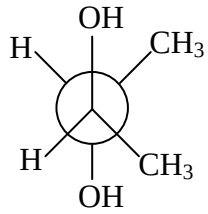


has got a double bond which can show geometrical isomerism and has got a chiral carbon to show optical isomerism.

52. (D)



53. (D)



No intramolecular hydrogen bonding and more steric repulsion

54. (C)

55. (C)

56. (B)

Due to presence of two chiral atoms

57. (A)

One or more options may correct :

58.	(B, D)	59.	(B, D)	60.	(A, D)	61.	(A, B, D)	62.	(B, C)
63.	(A, B, D)	64.	(A, B, C, D)	65.	(A, C)	66.	(A, C)	67.	(A, B, C)
68.	(A, B, C, D)	69.	(A, B)	70.	(B, C, D)				

Comprehension Type

71.	(D)	72.	(B)	73.	(C)	74.	(D)	75.	(C)
76.	(C)	77.	(D)	78.	(D)	79.	(C)	80.	(D)

Matrix Match Type

81. (A) – 3 ; (B) – 1, 2 ; (C) – 1 ; (D) – 1, 3, 4
82. (A) – 1, 2, 4 ; (B) – 1, 2, 3 ; (C) – 3, 4 ; (D) – 4
83. (A) – 1, 2, 3, 4 ; (B) – 1, 3, 4 ; (C) – 1, 2, 3, 4 ; (D) – 1
84. (A) – 2, 4 ; (B) – 3 ; (C) – 2 ; (D) – 1
85. (A) – 3, 4 ; (B) – 4 ; (C) – 1 ; (D) – 1,2,3,4
86. (A) – 3 ; (B) – 4 ; (C) – 2 ; (D) – 1
87. (A) – 2 ; (B) – 1, 4 ; (C) – 3 ; (D) – 1

Assertion Reasoning Type

88. (C)

Mirror image of meso is the same compound.

89. (C)

90. (A)

91. (D)

92. (B)

Energy released due to resonance in benzene is not sufficient to convert trione into enol form.

93. (B)

94. (A)

95. (C)

96. (B)

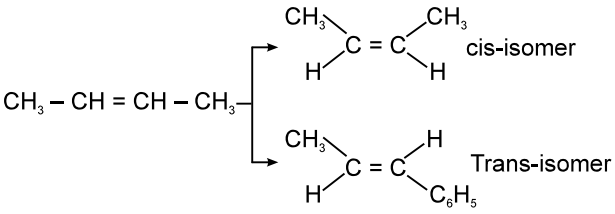
JEE Advanced : PYQ

1. B **2.** D

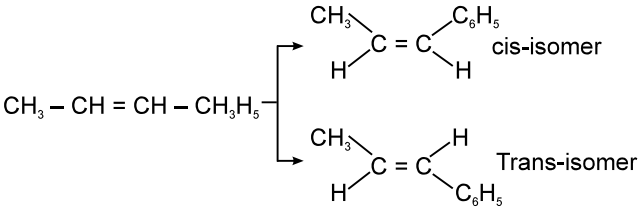
3. (D)

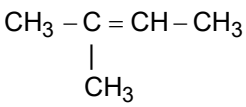
When cyclohexane is poured on water, it floats because cyclohexane is less dense than water.

4. (A,C)



$CH_3 – CH = CH_2$ does not show the property of geometrical isomerism.



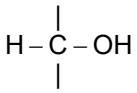


does not show the property of geometrical isomerism.

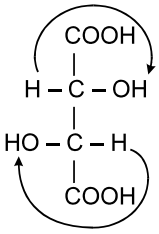
5. B

6. C.

D-word is used to represent the arrangement of – OH group in right side as in glyceraldehyde.

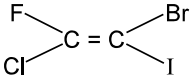


and + sign is used to represent the rotation in right side. Hence in D-(+) – tartaric acid

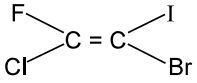


7. D,

Molecule $C_2BrClFI$ shows geometrical isomerism as E & Z-isomers.

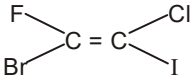


I (Z-isomer)

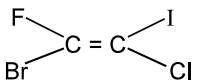


II (E-isomer)

= 2

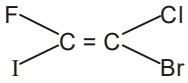


I (Z-isomer)

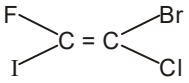


II (E-isomer)

= 2



I (Z-isomer)

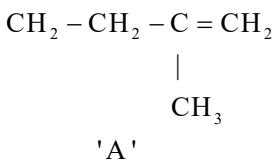


II (E-isomer) = 2

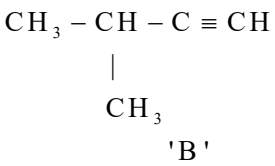
Hence total isomers are six.

8. Enantiomeric pair ≡ (I & III)
Diastereomeric pairs ≡ (I & II), (II & III)

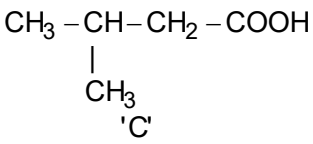
9. D,
In compounds



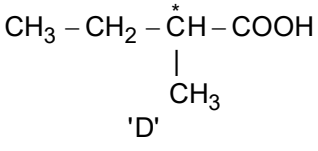
'A'



'B'



'C'

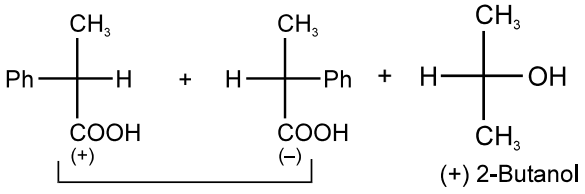


'D'

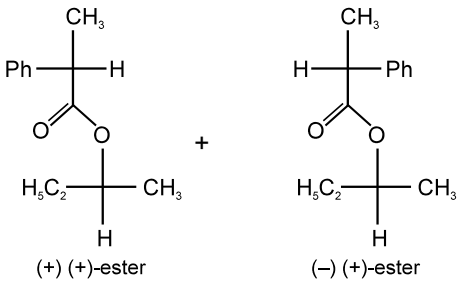
In 'D' (2-Methylbutanoic acid) asymmetric C-atom is present. So, it shows the property of stereoisomerism.
(Compound 'A' does not show the property of geometrical isomerism)

10. (A)
When optically active acid reacts with racemic mixture of an alcohol, it forms two types of isomeric esters. In each the configuration of the chiral centre of acid will remain the same. So the mixture will be optically active.

11.

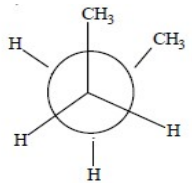


± or Racemic mixture of
2-phenylpropanoic acid



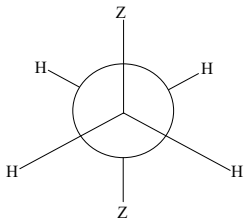
These two esters are diasteromers.

12. (a)

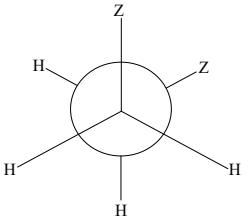


b) Less stability is due to Vander Waal's strain

13. (a)



(Anti)



(Gauche)

Mole fraction of anti form = 0.82
Mole fraction of Gauche form = 0.18

$$\mu_{ob.} = 1$$

$$1 = \mu_{(anti)} \times 0.82 + \mu_{(Gauche)} \times 0.18$$

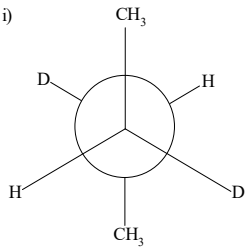
$$\mu_{(anti)} = 0$$

$$\therefore 1 = \mu_{(Gauche)} \times 0.18$$

$$\mu_{Gauche} = \frac{1}{0.18} = 5.55 \text{ D}$$

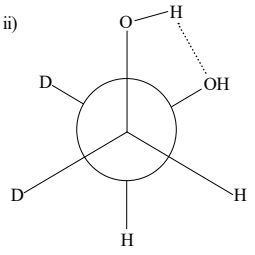
b)

i)



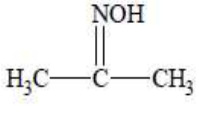
(Anti)

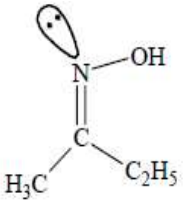
ii)

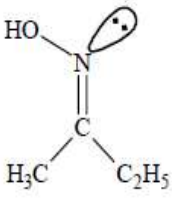


(Gauche)

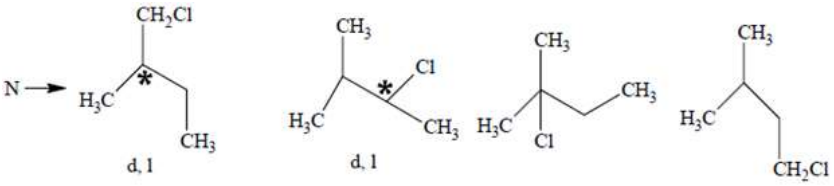
14. (B)





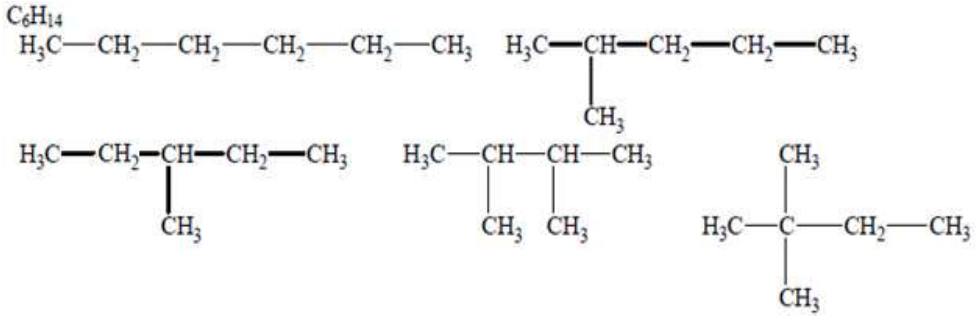


15. **(B)**



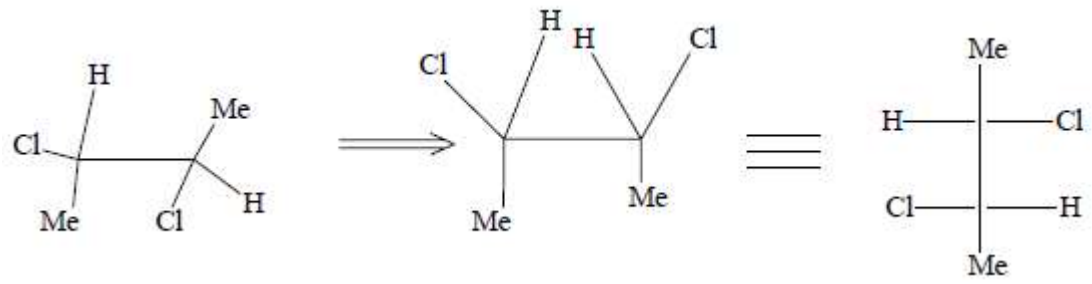
$M \rightarrow d, l$ cannot be separated by fractional distillation.

16. **(C)**

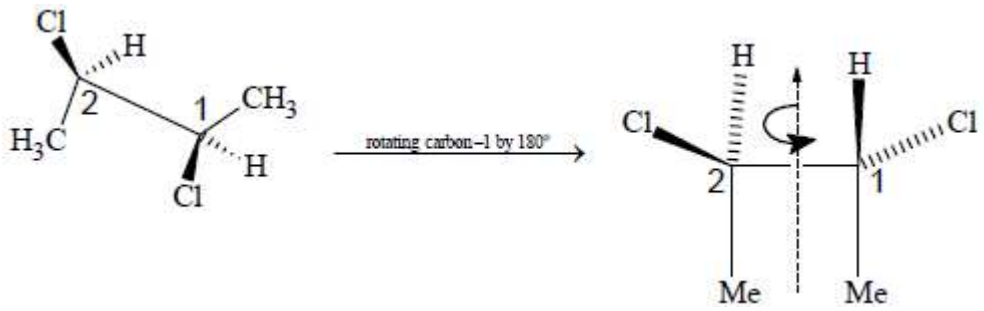


17. **(C)**

18. **(A, D)**



The molecule is optically active.



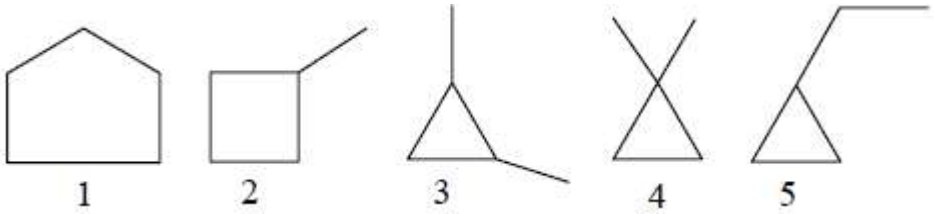
The molecule possesses an axis of symmetry (C_2) perpendicular to the C – C bond.

19. **(B), (C), (D)**

20. **(A, D)**

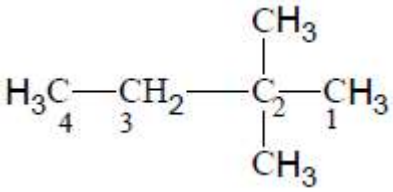
21. **7**

Cyclic C_5H_{10}



For 3rd structure 2 cis – trans and 1 optical isomer are possible.
Total 7 isomers.

22. **(B, D)**



On $C_2 - C_3$ bond axis

$X = CH_3$

$Y = CH_3$

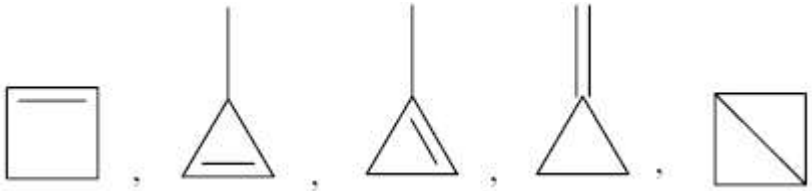
On $C_1 - C_2$ bond axis

X = H

$Y = C_2H_5$

23. **5**

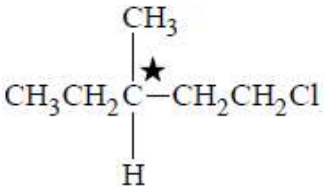
In C_4H_6, possible cyclic isomers are



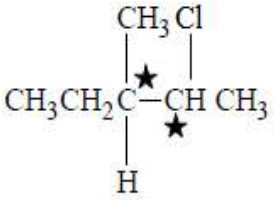
24. **(B, C)**

Along C-C single bond conformations are possible in butadiene in which all the atoms may not lie in the same plane.

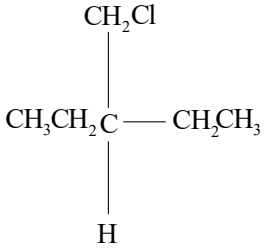
25. **(8)**



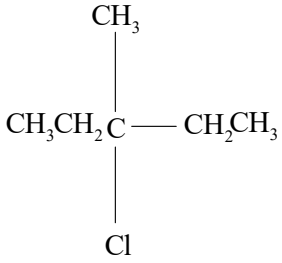
Enantiomeric pair = 2



Two Enantiomeric pairs = 4



1

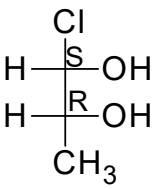


1

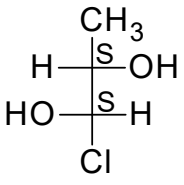
Total = 2 + 4 + 1 + 1 = 8

26. **(A,B)**

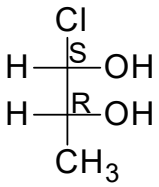
Converting all the structure in the Fischer projection



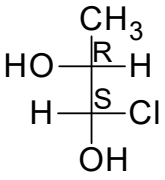
M



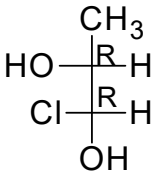
N



O



P



Q

M and N are diastereoisomers
M and O are identical
M and P are identical
M and Q are diastereoisomers
Hence, the correct options are A, B, C.

27. **(D)**

pK_a of PhOH (carbonic acid) is 9.98 and that of carbonic acid (H_2CO_3) is 6.63 thus phenol does not give effervescence with HCO_3^- ion.

28. **(C)**

29. **(ACD)**

Draw strcuture of each compound and write IUPAC name of the given compound.

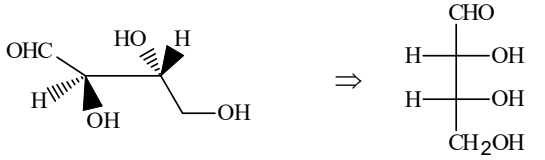
Match the molecular formula of given compound with molecular formula of compound given in choices.

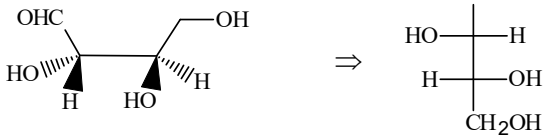
The combination of names for possibles alchohols with molecular formula $C_4H_{10}O$ is/are

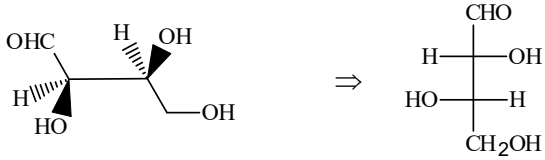
Formula	Names
$CH_3CH_2CH_2CH_2OH$	*n*-butyl alcohol / *n*-butanol / buan-1-ol
$CH_3-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-CH_2-OH$	*Iso*-butyl alcohol / 2-methyl propan-2-ol
$CH_3-CH_2-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-OH$	Secondary butyl alcohol / butan-2-ol
$CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{\vert}{\underset{\vert}{C}}}}-OH$	Tertiary butyl alcohol / *tert* butanol / 2-methyl propan-2-ol

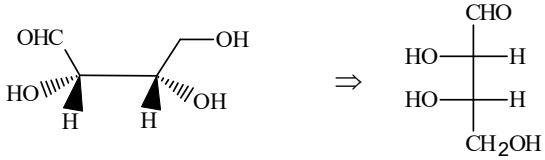
Hence, choices (a), (c) and (d) are correct.

30. (C)

P. 

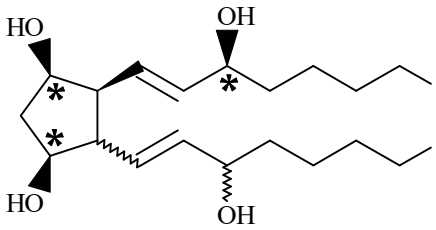
Q. 

R. 

S. 

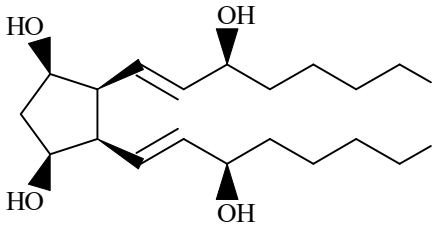
31. (7)

As given in the question 3 stereocenters are visible, i.e.



Hence, the total nummber of stereoisomers = $2^3 = 8$

But out of these the following one is optically inactive due to symmetry



Hence, total number of optically active stereoisomers = 7