

+1

GRAND TEST-6

TEST-30

**IUPAC Naming, Isomerism
General Organic Chemistry**

Date: 12.01.2020 (Sunday)

Time: 11:30 AM to 01:30 PM

Test Venue:

**Lajpat Rai Bhawan, Madhya Marg,
Sector 15-B, Chandigarh.**

Empowered By:

TEST SERIES

PCB

QUANTUM⁺ Plus

PCM

INTELLIQUEST



Dr. Sangeeta Khanna, Ph.D

S.C.O. 208 (TF) Sector 24-D, Chandigarh. Ph. No. 0172-2713289 (O), 09888007880 (M).

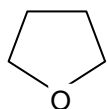
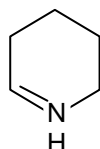
READ THE INSTRUCTIONS CAREFULLY

1. The test is of **2 hour** duration.
2. The maximum marks are **241**.
3. This test consist **55 questions**.

Section – A (Single Correct Choice Type) Negative marking

This Section contains **40 multiple choice questions**. Each question has four choices A), B), C) and D) out of which **ONLY ONE** is correct. (Mark only one choice) **(40 × 4 = 160 Marks)**

1. Which class of the organic compounds do the following belong to?

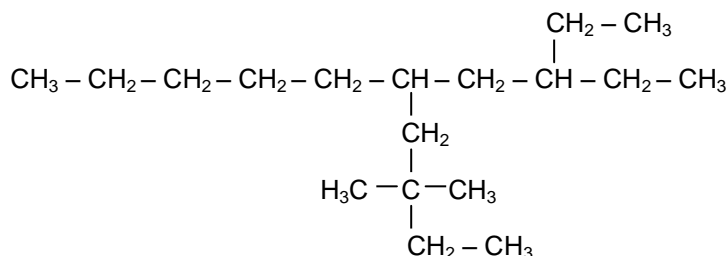


- a. Alicyclic b. Acyclic c. Benzenoid d. Heterocyclic

D

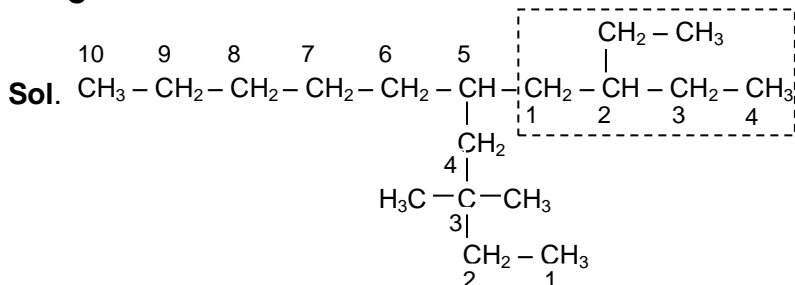
Sol. All are heterocyclic compounds because these have N, O and S as hetero-atoms with carbon in ring.

2. Select the correct IUPAC name of:



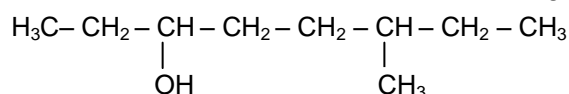
- a. 3-Ethyl-5-(2,2-dimethylbutyl) decane b. 5-(2,2-Dimethylbutyl) -3-ethyl decane
c. 5-(2-Ethylbutyl) -3,3-dimethyl decane d. All are correct

C



From lower part and right side both give longest carbon chain of 10C – atom, but lower part gives more number of side chains.

3. Select the correct IUPAC name of the following compound

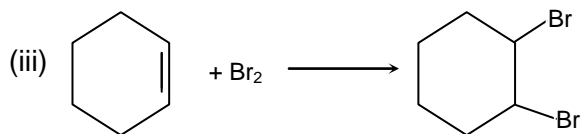
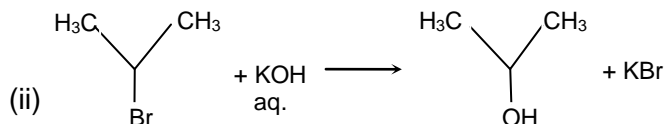
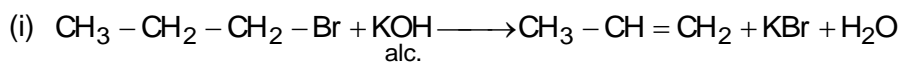


- a. 3-Hydroxy-6-methyloctane b. 3-Methyl-6-hydroxyoctane
b. 6-Hydroxy-3-methyloctane d. 6-Methyloctan – 3 – ol

D

Sol. OH is alcoholic group – ol, the lowest location of OH is '3'. So, methyl is at locant '6'

4. For the following reactions:



Which of the following statement is correct?

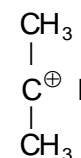
- (i) is elimination, (ii) is substitution and (iii) is addition
- (i) is elimination, (ii) and (iii) are substitution
- (i) is substitution, (ii) and (iii) are addition reactions
- (i) and (ii) are elimination reactions and (iii) is addition reaction

A

5. The species $\text{CH}_3 \overset{+}{\text{C}}\text{HCH}_3$ is less stable than

- $(\text{CH}_3)_3\text{C}^+$
- $\text{CH}_3\text{CH}_2\overset{+}{\text{C}}\text{H}_2$
- $\text{CH}_3\overset{+}{\text{C}}\text{H}_2$
- CH_3^+

A

Sol.  has 9 α - H and more electron donating group.

6. Arrange in the order of decreasing pK_a .

P. $\text{F} - \text{CH}_2\text{CH}_2\text{COOH}$

Q. $\text{Cl} - \text{CH}_2 - \text{CH}_2 - \text{COOH}$

R. $\text{F} - \text{CH}_2 - \text{COOH}$

S. $\text{Br} - \text{CH}_2 - \text{CH}_2 - \text{COOH}$

Correct answer is:

- $\text{Q} > \text{S} > \text{P} > \text{R}$
- $\text{P} > \text{R} > \text{S} > \text{Q}$
- $\text{R} > \text{Q} > \text{P} > \text{S}$
- $\text{S} > \text{Q} > \text{P} > \text{R}$

D

7. Consider the following species:

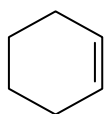
- OH^-
- $\text{CH}_3 - \text{O}^-$
- CH_3^-
- NH_2^-

Arrange these species in their decreasing order of nucleophilicity.

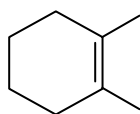
- $\text{C} > \text{D} > \text{B} > \text{A}$
- $\text{B} > \text{A} > \text{C} > \text{D}$
- $\text{A} > \text{B} > \text{C} > \text{D}$
- $\text{C} > \text{A} > \text{B} > \text{D}$

A

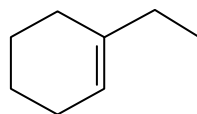
8. Arrange the following in increasing order of stability.



(I)



(II)

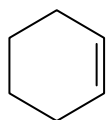


(III)

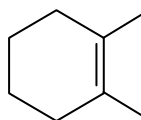
- $\text{I} < \text{II} < \text{III}$
- $\text{II} < \text{I} < \text{III}$
- $\text{I} < \text{III} < \text{II}$
- $\text{II} < \text{III} < \text{I}$

C

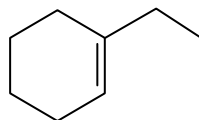
Sol. As number of α - H increases stability increases



4 α - H

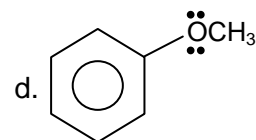
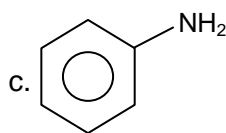
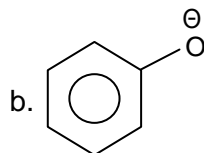
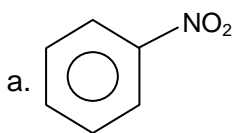


10 α - H



6 α - H

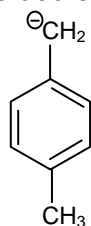
9. In which of the following molecules π -electron density in ring is maximum?



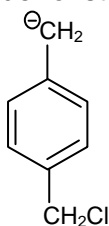
B

Sol. O is better donor than $-NH_2$ and $-OCH_3$

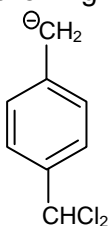
10. The decreasing order of stability of following is



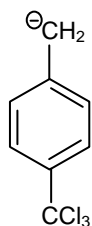
(P)



(Q)



(R)



(S)

a. P > Q > R > S

b. S > R > Q > P

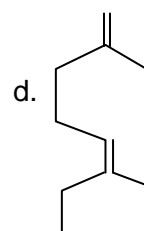
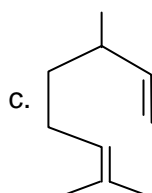
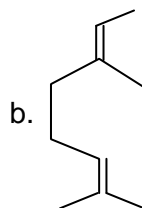
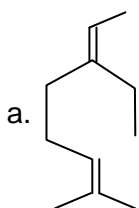
c. Q > S > R > P

d. Q > R > S > P

B

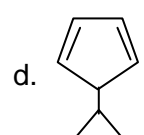
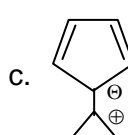
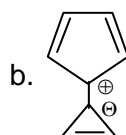
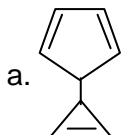
Sol. Stability of anion increases with $-I$ effect.

11. The structure of 2,6-Dimethyl octa-2,6-diene is



B

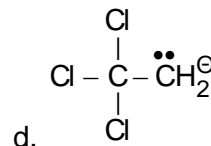
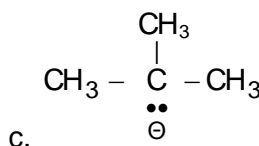
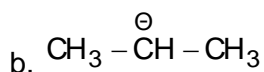
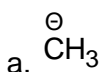
12. Which of the following resonating structures is most unstable?



B

Sol. (b) is most unstable because both parts of cycle are Anti aromatic

13. The least stable carbanion among the following is



C

Sol. Due to maximum +I effect

14. Identify the strongest nucleophile.

- a. F^- b. Cl^- c. Br^- d. I^-

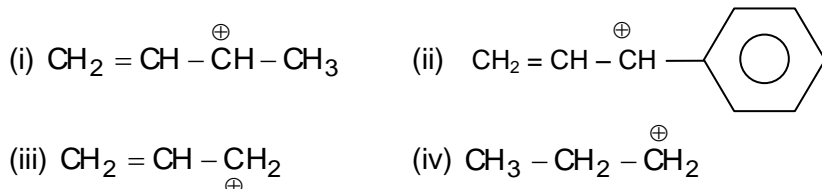
D

15. The groups which can exert both + M and – M effect

- a. nitro b. cyano c. ester d. All

C

16. Which of the following is correct order of stability?



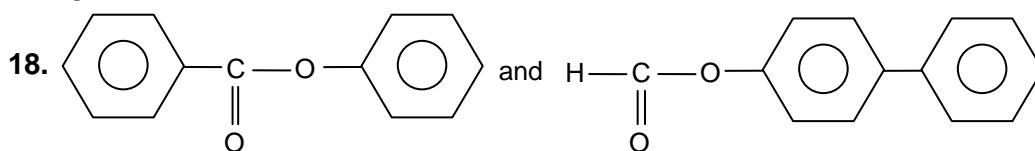
- a. (i) > (ii) > (iii) > (iv) b. (ii) > (i) > (iii) > (iv)
c. (iv) > (iii) > (ii) > (i) d. (ii) > (iii) > (i) > (iv)

B

17. The most stable conformation of cyclohexane is:

- a. Boat b. Half-chair c. Chair d. Twist-boat

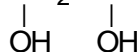
C



- a. position isomers b. chain isomers c. functional isomers d. metamers

D

19. In ethylene glycol $CH_2 - CH_2$ which conformation is more stable?



- a. Anti staggered b. Gauche c. Partially eclipsed d. Eclipsed

B

20. Phenol exists in 100% enol form. The reason is

- a. Phenol is more stable than its keto form as phenol is aromatic
b. Phenol has high b.p.
c. Phenol is stabilized by H-bonding.
d. Keto form is non planar

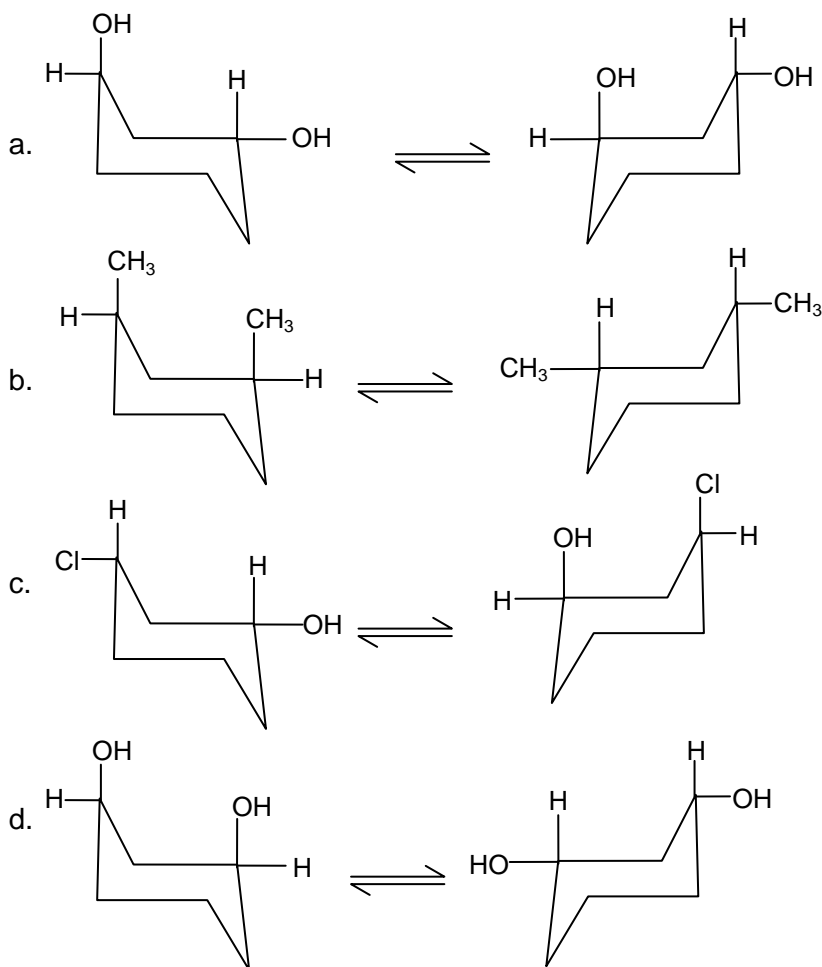
A

21. Which of the following exhibits geometrical isomerism?



A

22. In which of the following $K_{eq} > 1$



B

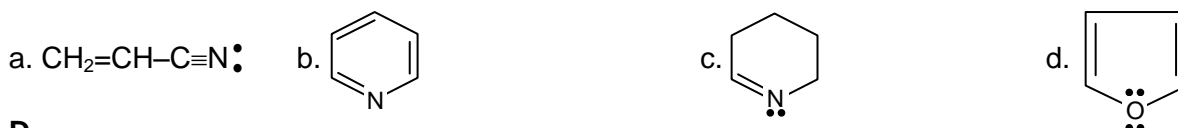
23. C – C single bond length would be minimum in:



D

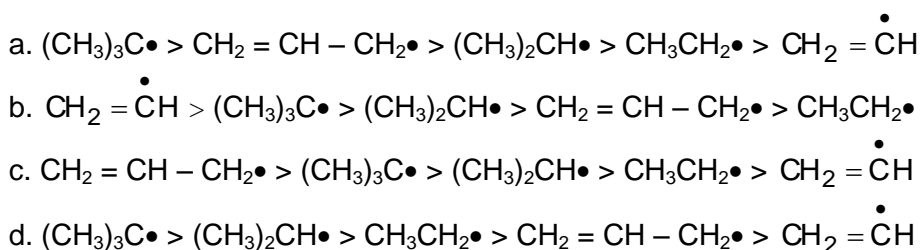
Sol. Both carbon atoms are sp hybridized.

24. In which of the following lone-pair shown is involved in resonance.



D

25. Among the following carbon radicals, the stability decreases in the order



C

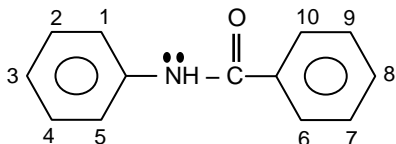
26. Which of the following is the correct order of decreasing stability?

- a. $\text{CH} \equiv \text{C}^\ominus > \text{CH}_2 = \text{CH}^\ominus > \text{CH}_3^\ominus$ b. $\text{CH}_3^\ominus > \text{CH}_2 = \text{CH}^\ominus > \text{CH} \equiv \text{C}^\ominus$
 c. $\text{CH}_3^\ominus > \text{CH} \equiv \text{C}^\ominus > \text{CH}_2 = \text{CH}^\ominus$ d. $\text{CH}_2 = \text{CH}^\ominus > \text{CH} \equiv \text{C}^\ominus > \text{CH}_3^\ominus$

A

Sol. negative charge on more electronegative atom is more stable.

27. Which of the following position is reactive for electrophilic attack



- a. 1, 3, 8 b. 1, 3, 5 c. 10, 8, 6 d. 1, 3, 6

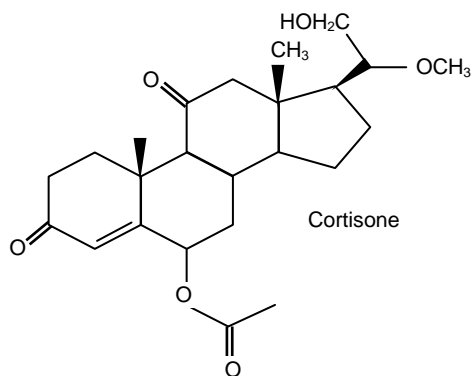
B

28. The compound $\text{CH}_3 - \underset{\text{CH}_3}{\text{CH}} - \underset{\text{CH}_3}{\text{CH}} - \text{CH}_3$ have

- a. Twelve 1° hydrogen atoms only b. Two 2° and twelve 1° hydrogen atoms
 c. Two 3° hydrogen atoms only d. Twelve 1° - and Two 3° -hydrogen atoms

D

29. All the functional groups present in given compound are



- a. Ether, alkene, alcohol b. Alcohol, ketone, alkene, ether, ester
 c. Alcohol, ketone, ester, alkene d. Ether, amine, keton, ester

B

30. Which of the following alkenes is the most stable?



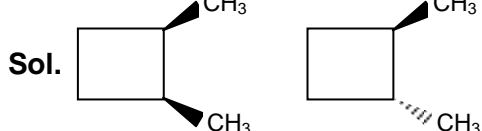
C

Sol. Conjugated dienes are most stable

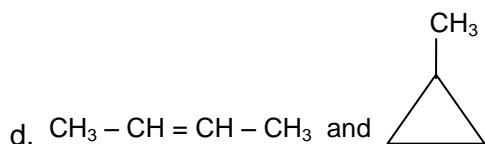
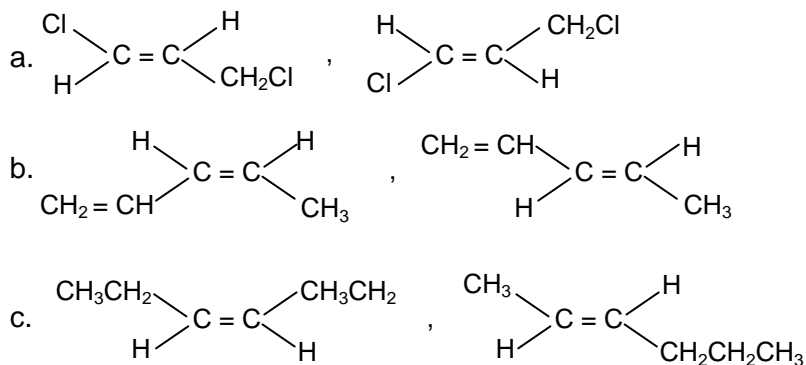
31. Which of the following can exhibit geometrical isomerism:-

- a. Ethene b. Propane c. 1-Butene d. Dimethyl cyclobutane

D



32. Which of the following pair of structures represent the same compound?

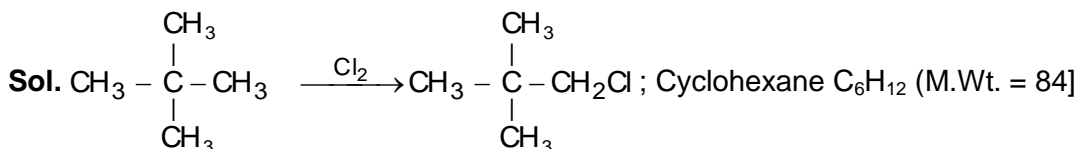


A

33. An alkane (molecular weight 72) upon chlorination gives one monochlorination product. The alkane is

- a. 2-Methylbutane
b. n-Pentane
c. 2, 2-Dimethylpropane
d. Cyclohexane

C



34. The most stable carbocation among the following



C

Sol. Both C and D are tertiary carbocations but D is less stable than C due to the presence of an electron withdrawing group.

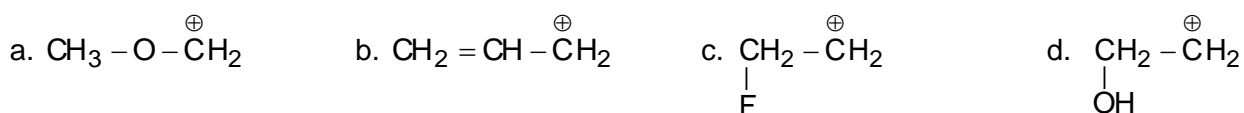
35. The ortho/para directing group for benzene, among the following is:

- a. $-\text{COOH}$ b. $-\text{CN}$ c. $-\text{COCH}_3$ d. $-\text{NHCOCH}_3$

D

Sol. NHCOCH_3 is o, p – directing while all others are m – directing.

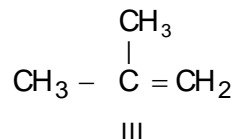
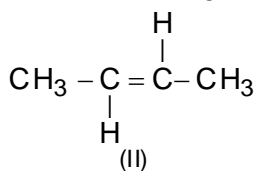
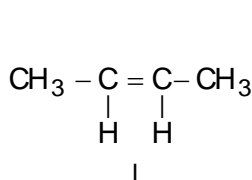
36. Which of the following is most stable?



A

Sol. Back bonding $\text{CH}_3 - \overset{\oplus}{\text{O}} = \text{CH}_2$

37. In the case of following alkenes, the decreasing order of stability



a. I > II > III

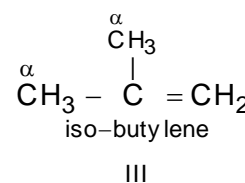
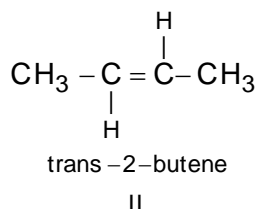
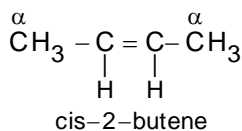
b. III > II > I

c. I = II > III

d. III > I > II

B

Sol.



Number of hyperconjugative structures

6

6

6

◆ Since $\mu_{\text{cis}} > \mu_{\text{trans}}$, trans-2-butene (II) is more stable than cis-2-butene (I).

38. Why does cis-2-butene have a molar heat of hydrogenation of 120 kJ while trans-2-butene has 116 kJ?

- The cis isomer is more stable than the trans due to steric interactions.
- The trans isomer is more stable than the cis due to less steric interactions.
- The double bond in the trans isomer has more potential energy.
- Trans-2-butene has a higher molecular weight.

B

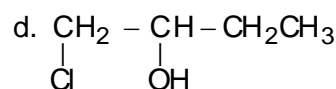
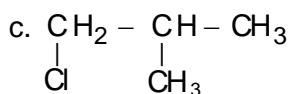
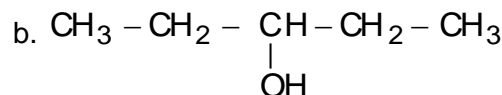
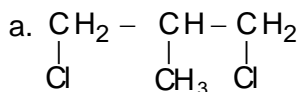
Sol. The lower heat of hydrogenation of the trans isomer indicates that it is more stable ruling out answers A and C. Molecular weight has nothing to do with bond stability and both isomers have the same molecular weight ruling out answer D. Answer B makes sense. When the larger substituents are on the same side of the double bond there is steric interaction which decreases the stability of the molecules.

39. Which of the following statement is not true for Benzyne intermediate?

- Its triple bond is formed by P – P and $sp^2 - sp^2$ lateral overlapping along with a σ -bond ($sp^2 - sp^2$).
- Triple bond have sp hybridised carbon
- It has 6 delocalised π electron.
- Its formula is C_6H_4

B

40. Which of the following has chiral carbon

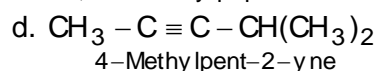
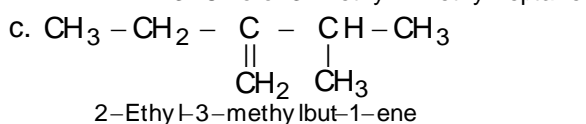
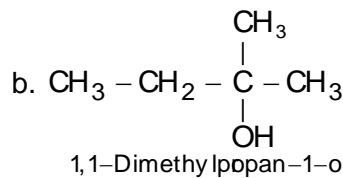
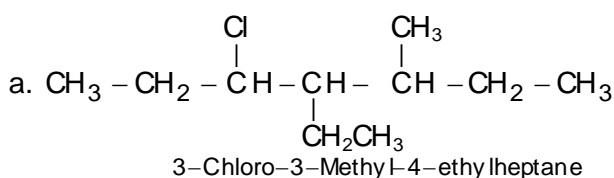


D

SECTION – D More than One Answer (No Negative Marking)

This Section contains **6 multiple choice questions**. Each question has four choices A), B), C) and D) out of which **ONE OR MORE** may be correct. **6 × 5 = 30 Marks**

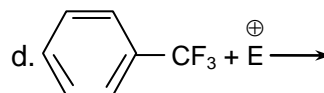
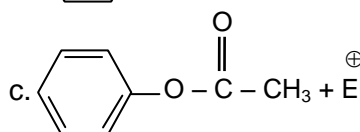
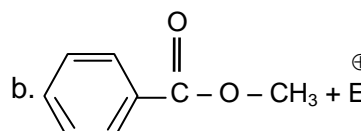
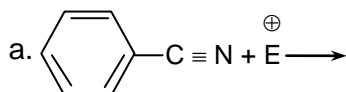
1. The correct statements for alkyl carbocations are
- paramagnetic
 - sp^2 hybridised
 - diamagnetic
 - formed by heterolytic cleavage
- B,C,D**
2. Name of some compounds are given which one is not correct in IUPAC system?



A,B

Sol. (a) Ethyl should be written first (b) 2-Methylpropan-2-ol

3. Which of the following statement is correct:-
- Alkene and Benzene act as Nucleophile
 - Addition of electrophile on alkene is faster than alkyne due to formation of stable intermediate carbonium ion.
 - NO_2^\ominus is an amphident nucleophile
 - Triplet carbene is paramagnetic
- A,B,C,D**
4. Which of the following is meta directing group for benzene?

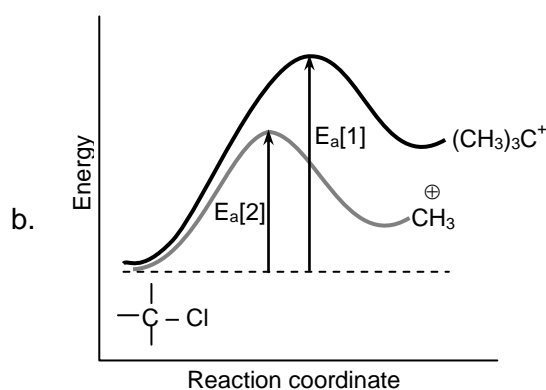
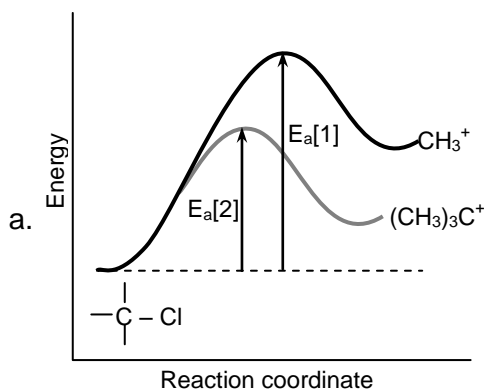


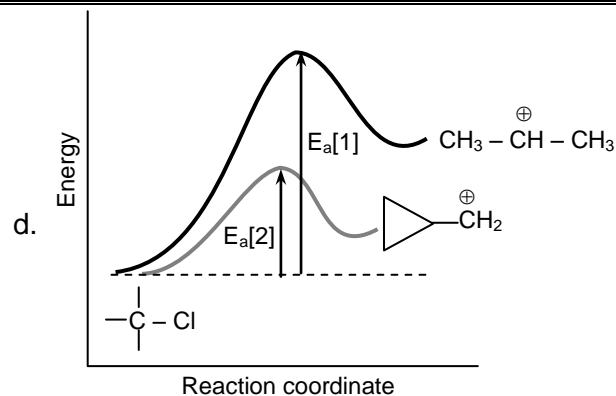
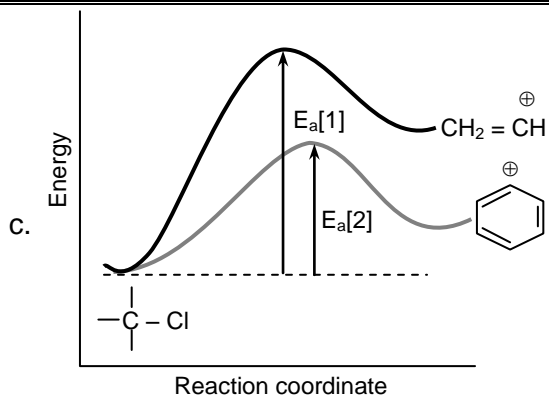
A,B,D

5. Which of the following represents functional isomers?
- Alcohols and ether
 - Nitroalkanes and alkyl nitrites ($\text{R} - \text{O} - \text{N} = \text{O}$)
 - Carboxylic acid and ester
 - Glucose and fructose

A,B,C,D

6. Which of the following is correct?





A, D

SECTION - E (Matrix Type) No Negative Marking

This Section contains **2 questions**. Each question has four choices (A, B, C and D) given in **Column I** and five statements (p, q, r, and s) in **Column II**. (2 × 8 = 16 Marks)

1. Match Column – I with Column – II. (One or More than One Match)

Column – I		Column – II	
(A)	$\text{CH}_3 - \text{CH}_2 - \text{O} - \text{CH}_2\text{CH}_3$ and $\text{CH}_3 - \text{O} - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$	(p)	Tautomers
(B)	CH_3CHO & $\text{CH}_2 = \text{CH} - \text{OH}$	(q)	Metamers
(C)	CH_3COOH and HCOOCH_3	(r)	Functional Isomers
(D)	$\begin{array}{c} \text{CH}_3 \\ \diagdown \\ \text{C} = \text{C} \\ \diagup \\ \text{H} \end{array}$ CH_3 and $\begin{array}{c} \text{CH}_3 \\ \diagdown \\ \text{C} = \text{C} \\ \diagup \\ \text{H} \end{array}$ H CH_3	(s)	Geometrical Isomers

Sol. A → Q; B → P & R; C → R; D → S

2. Match the column – I with column – II. (One or More than One Match)

Column – I		Column - II	
(A)		(p)	All atoms sp^2 hybridised
(B)		(q)	Heterocyclic
(C)		(r)	Antiaromatic
(D)		(s)	Homocyclic

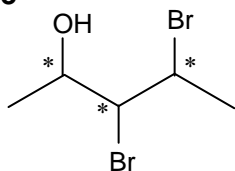
Sol. A → p, q; B → p, s; C → q; D → p, r, s

SECTION – F (Integer Type) No negative Marking

This Section contains **7 questions**. The answer to each question is a **single digit integer** ranging from 0 to 10. **7 × 5 = 35 Marks**

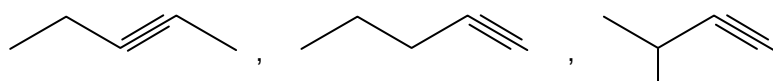
1. The number of chiral centers present in 3, 4-dibromo-2-pentanol is:

Sol.3



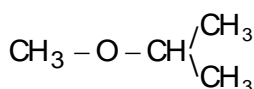
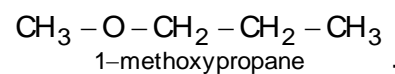
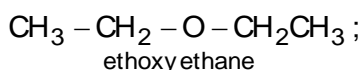
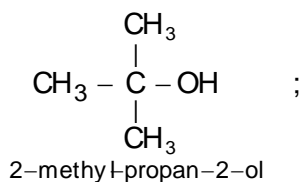
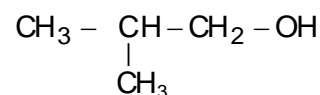
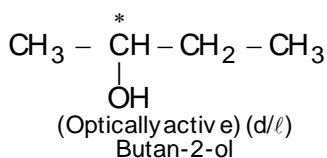
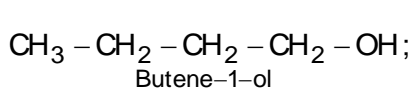
2. The number of alkynes possible with molecular formula C_5H_8 is:

Sol.3



3. Total number of isomers excluding stereoisomers of $C_4H_{10}O$.

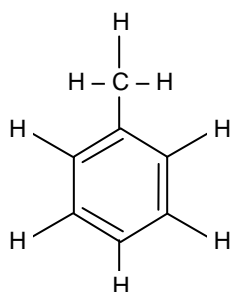
Sol.7



4. What is the ratio of σ and π bond in methyl Benzene.

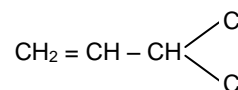
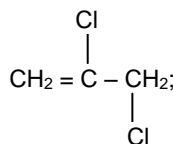
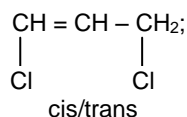
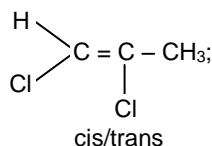
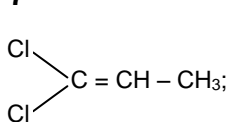
Sol.5

$$\frac{15}{3} = 5$$

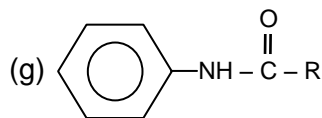
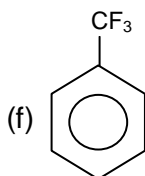
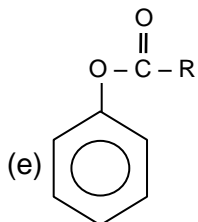
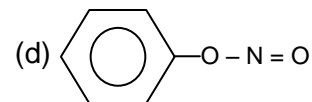
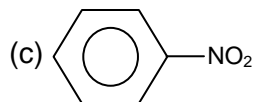
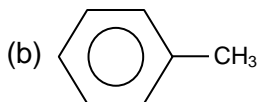
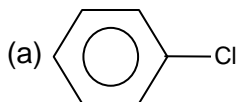


5. How many dichloropropene can exist? (including stereoisomer)

Sol.7



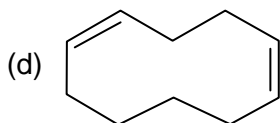
6. How many of the following compounds are more reactive than Benzene for electrophilic substitution reaction.



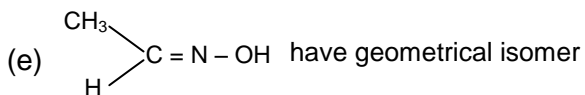
Sol. 4 (b, d, e, g)

7. How many of the following statements are correct

- (a) Heat of hydrogenation of trans alkene is less than cis alkene.
- (b) cis alkene is generally more polar than Trans alkene
- (c) Both cis & Trans alkene have same Boiling point.



Both the double bond have cis-arrangement



- (f) 1,3-Dichlorobutane have cis/trans Isomers
- (g) Both cis & trans alkene are diastereomers
- (h) Both cis and Trans alkene have same solubility

Sol. 5

a, b, d, e, g

8. Which of the following alkenes is the most stable?

- a. Ethylene b. cis-2-butene c. 2-methyl-2-butene d. 2, 3-dimethyl-2-butene

D

Sol. According to the table 2, 2, 3-dimethyl-2-butene is the most stable alkene because it has the lowest heat of hydrogenation. This follows the rule that the most substituted alkene is the most stable.