IUPAC Nomenclature and Common Names

SOLUTIONS

EXERCISE - O

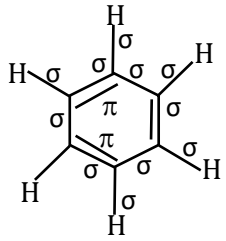
1. **Ans. (C)**

Urea is an organic compounds which was very first syntheszed in laboratory.

2. **Ans. (B)**

Alicyclic compound $\Rightarrow$ (Aliphatic & cyclic).

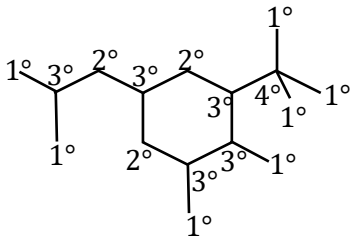
3. **Ans. (C)**



no. of π bonds = 3

no. of σ bonds = 12

4. **Ans. (C)**



no. of 1° C-atoms = 7

no. of 2° C-atoms = 3

no. of 3° C-atoms = 5

no. of 4° C-atoms = 1

5. **Ans. (B)**

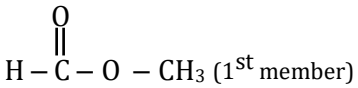
Homologous series – A series of members in which two successive members of same family (same functional group) are differed by "CH_2" or 14 molecular weight known as homologous series.

6. **Ans. (C)**

Homologous series have same functional group in it's all members.

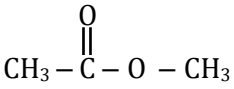
$$\underset{\text{(2° Amine)}}{CH_3—NH—CH_3} \xrightarrow{+CH_2} \underset{\substack{\text{(Higher Homologue)}\\\text{(2° Amine)}}}{CH_3—NH—CH_2—CH_3}$$

7. **Ans. (C)**



$H-\overset{\overset{O}{\|}}{C}-O-CH_3$ (1^{st} member)

Methylmethanoate



$CH_3-\overset{\overset{O}{\|}}{C}-O-CH_3$

Methyl ethanoate

8. **Ans. (A)**

Olefinic bonds are π–bonds present in unsaturated hydrocarbon or their derivatives. Only the π– bonds which are present between two carbon atoms will be called olefinic bonds.

9. **Ans. (C)**

Acetylenic bonds are triple bond present between two carbon atoms in a hydrocarbon or their derivatives.

10. **Ans. (C)**

A → 1 ring + 3πbonds

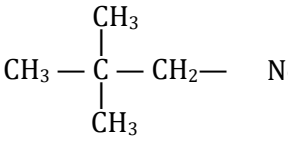
B → 1 ring + 4πbonds

C → 4 rings + 3πbonds

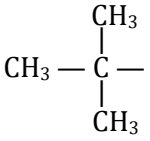
D → 2 rings

11. **Ans. (C)**

Minimum 5 carbon required to form neo prefix in hydrocarbon

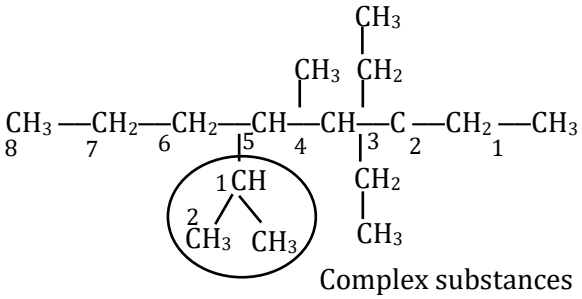


Neopentyl



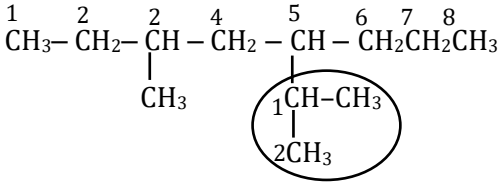
Ter.butyl

12. **Ans. (A)**



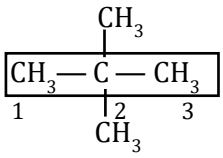
Complex substances

13. **Ans. (B)**



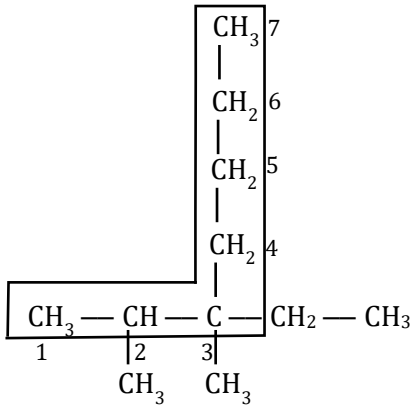
Complex Substitute

14. **Ans. (C)**



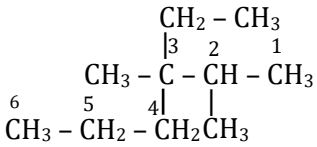
2, 2 Dimethyl propane

15. Ans. (D)



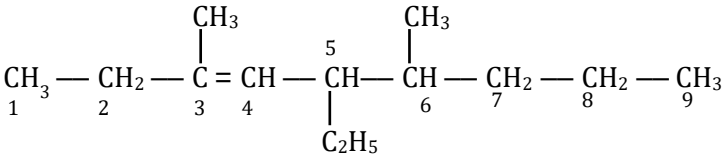
3-ethyl-2,3- dimethyl Heptane

16. Ans. (C)



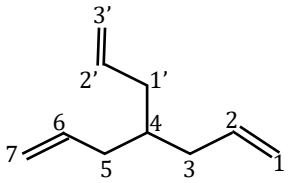
3-Ethyl-2,3- dimethylhexane

17. Ans. (A)



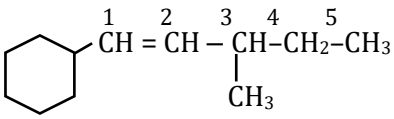
$\Rightarrow$ 5-ethyl-3, 6-dimethyl non-3-ene.

18. Ans. (D)



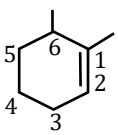
$\Rightarrow$ 4-[prop-2-enyl] hepta-1, 6-diene.

19. Ans. (A)



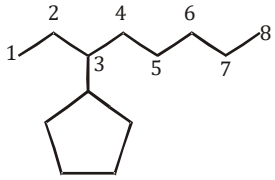
$\Rightarrow$ 1-cyclohexyl-3-methyl pent-1-ene.

20. Ans. (B)



$\Rightarrow$ 1, 6-dimethyl cyclohexene.

21. **Ans. (B)**

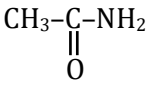


3-Cyclopentyloctane

22. **Ans. (D)**

2° prefix + prefix + word root + suffix + 2° suffix

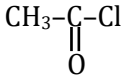
× × Ethan × amide



Ethanamide

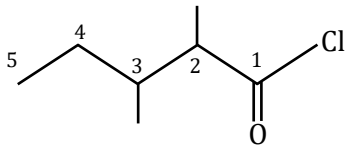
2° prefix + prefix + word root + suffix + 2° suffix

× × Ethan × oylchloride



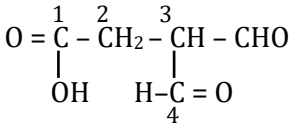
Ethanoylchloride

23. **Ans. (D)**



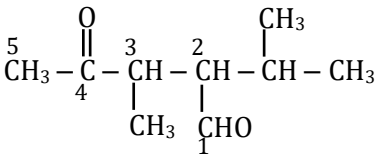
2,3–Dimethylpentanoylchloride

24. **Ans. (B)**



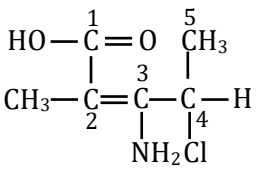
⇒ 3-Formyl-4 – oxo–butanoic acid.

25. **Ans. (C)**



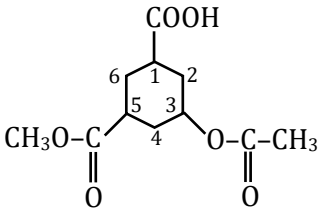
⇒ 2-isopropyl-3-methyl-4-oxopentanal.

26. **Ans. (B)**



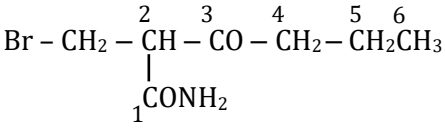
⇒ 3-amino-4-chloro-2-methyl pent-2-enoic acid.

27. Ans. (B)



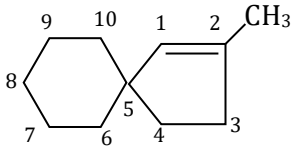
$\Rightarrow$ 3-ethanoyloxy-5-methoxycarbonyl cyclohexane carboxylic acid.

28. Ans. (A)



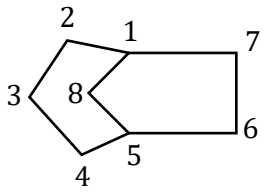
$\Rightarrow$ 2-bromomethyl-3-oxohexanamide.

29. Ans. (A)



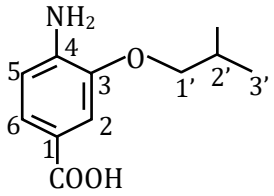
2-Methylspiro[4.5]dec-1-ene

30. Ans. (A)



Bicyclo[3.2.1]octane

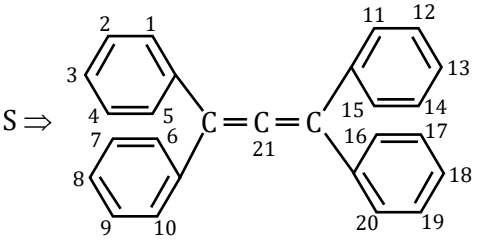
31. Ans. (C)



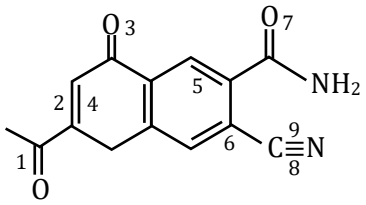
4-Amino-3- (2'-methylpropoxy)benzoicacid

EXERCISE - S

1. **Ans. (21)**



2. **Ans. (11)**



D.B.E. ⇒ Number of ring + Number π bond

⇒ 2 + 9 ⇒ 11

3. **Ans. (13)**

Ring number ⇒ 3

Number of π bond ⇒ 10

Total ⇒ 13

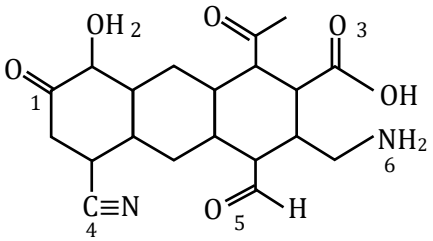
4. **Ans. (13)**

Number of ring ⇒ 4

Number of π bond ⇒ 9

D.O ⇒ 13

5. **Ans. (6)**



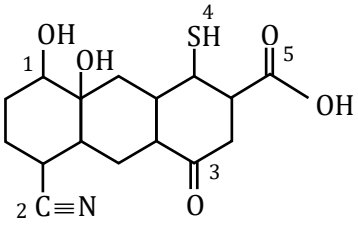
Type of functional group ⇒ 6

DBE ⇒ 10

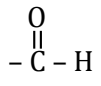
X ⇒ 16−10

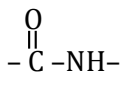
⇒ 6

6. **Ans. (5)**

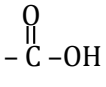


7. **Ans. (6)**

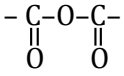
(i)  aldehyde

(ii)  amide

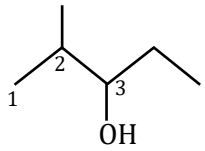
(iii) $-NH_2$ 1° amine

(iv)  Carboxylic acid

(v)  ketone

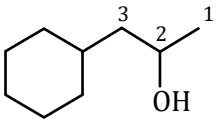
(vi)  acid anhydride

8. **Ans. (4)**

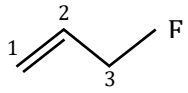


$x + y \Rightarrow 3 + 1 = 4$

9. **Ans. (3)**



10. **Ans. (4)**

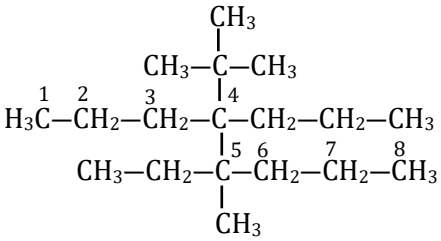


$x \Rightarrow 1$

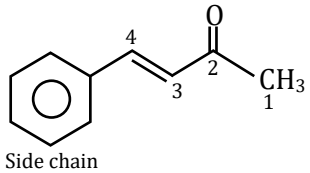
$y \Rightarrow 3$

$x + y \Rightarrow 4$

11. **Ans. (8)**



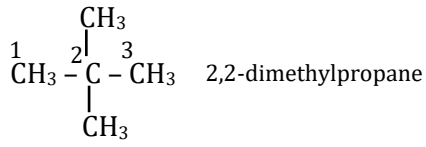
12. **Ans. (4)**



Side chain

EXERCISE - JEE (Main) PYQ

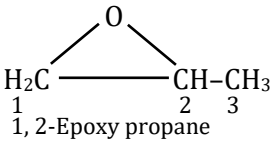
1. **Ans. (4)**



2,2-dimethylpropane

neopentane

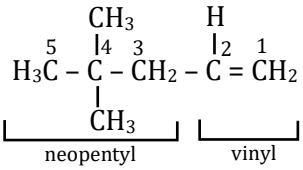
2. **Ans. (1)**



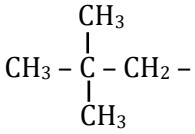
1, 2-Epoxy propane

3. **Ans. (1)**

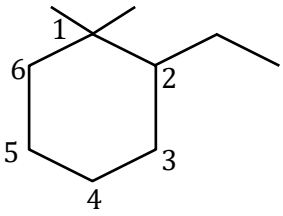
4, 4-Dimethylpentene



vinyl $\Rightarrow CH_2 = CH -$

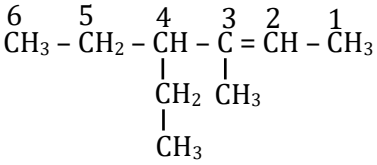
neopentyl $\Rightarrow$ 

4. **Ans. (4)**



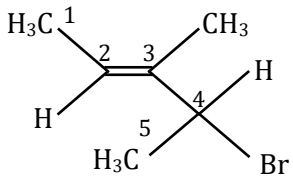
2-Ethyl-1,1-dimethylcyclohexane

5. **Ans. (4)**



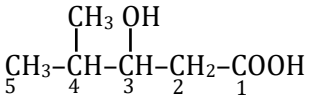
4-Ethyl-3-methylhex-2-ene

6. **Ans. (2)**



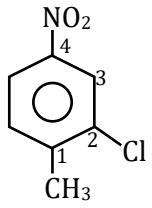
4–Bromo–3–methyplent–2–ene

7. **Ans. (3)**



3–Hydroxy–4–methylpentanoic acid

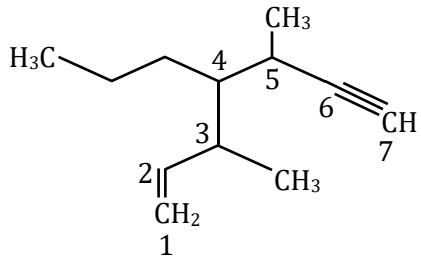
8. **Ans. (4)**



2-Chloro-1-methyl-4-nitrobenzene

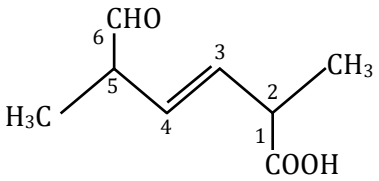
9. **Ans. (4)**

Priority : = > ≡



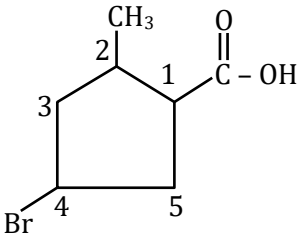
3, 5-Dimethyl-4-propylhept-1-en-6-yne

10. **Ans. (4)**



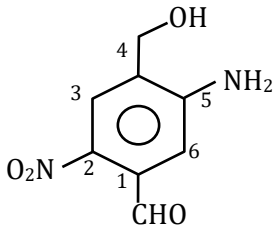
2, 5-Dimethyl-6-oxohex-3-enoic acid

11. **Ans. (1)**



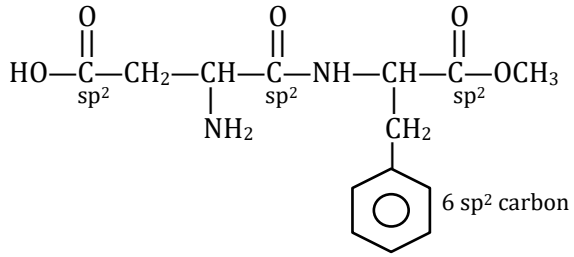
4-Bromo-2-methylcyclopentanecarboxylicacid

12. **Ans. (4)**



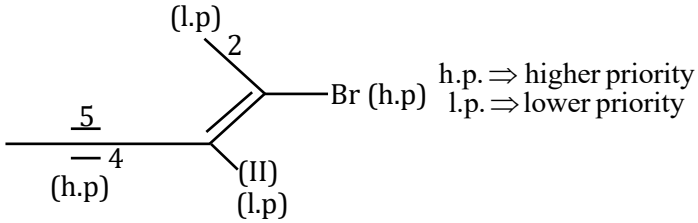
5–Amino-4-hydroxymethyl-2-nitrobenzaldehyde

13. Ans. (9)



no. of sp^2–carbon $\rightarrow$ 9

14. Ans. (3)

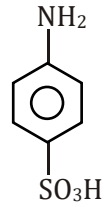


2E –2- bromo hex –2- en–4-yne

15. Ans. (1)

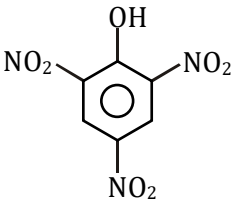
$\rightarrow$ COOH group present in

(1)



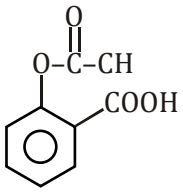
Sulphanilic acid

(2)



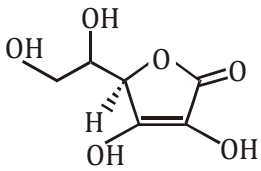
Picric acid

(3)



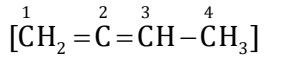
Asprine

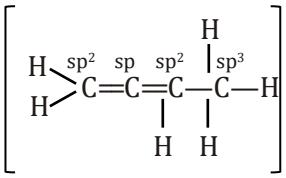
(4)



Ascorbic acid

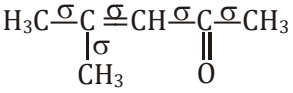
16. Ans. (3)





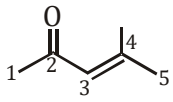
17. **Ans. (5)**

Mesityle oxide



$\therefore$ $C\underset{\sigma}{-}C=5$

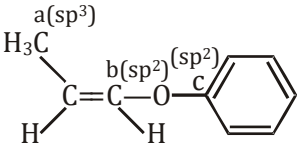
18. **Ans. (4)**



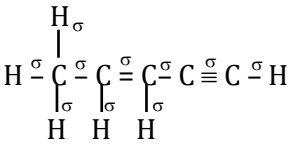
Mesityloxide

IUPAC [4-Methylpent-3-en-2-one]

19. **Ans. (3)**

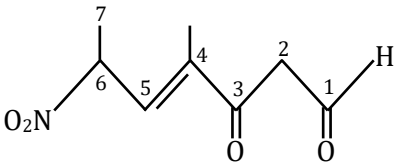


20. **Ans. (10)**



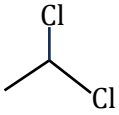
numbers of σ bonds = 10

21. **Ans. (3)**



4-Methyl-6-nitro-3-oxohept-4-enal

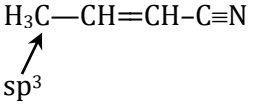
22. **Ans. (4)**



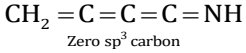
"1, 1-Dichloroethane is Ethylidene chloride"

23. **Ans. (0 or 1)**

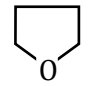
DU = $4+1-\left(\frac{5-1}{2}\right)=3$



or



24. **Ans. (3)**

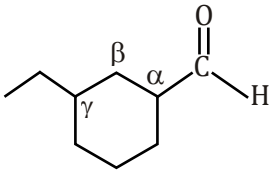

: Non-planar heterocyclic Compound


: Bicyclo Compound


: Spiro Compound

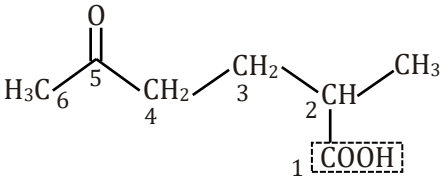

: Aromatic Compound

25. **Ans. (1)**



γ-methyl cyclohexane carbaldehyde

26. **Ans. (2)**

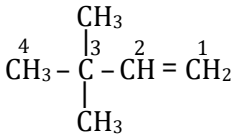


IUPAC NAME

2–Methyl–5–oxohexanoic acid

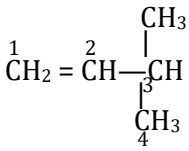
EXERCISE - JEE (Advanced) PYQ

1. **Ans. (C)**



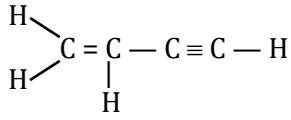
⇒ 3, 3-dimethyl-1-butene

2. **Ans. (B)**



⇒ 3-methyl-1-butene

3. **Ans. (B)**



1-butene-3-yne

⇒ 7 sigma & 3pi bond

4. **Ans. (C)**

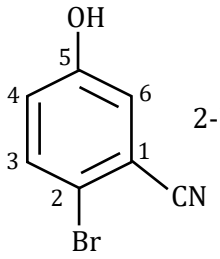
C_6H_5COCl

Benzene carbonylchloride

5. **Ans. (B)**

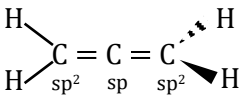
Main F.G. is (–CN) cyanide group

2° suffix with benzene is benzonitrile



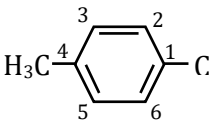
2-Bromo-5-hydroxybenzonitrile

6. **Ans. (B)**

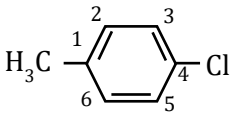
Allene structure 

The type of hybridisation of carbon atoms are sp & sp^2

7. **Ans. (B,C)**

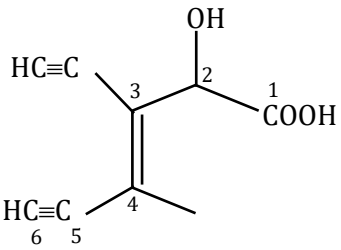


1–Chloro–4–methylbenzene



4–Chlorotoluene

8. **Ans. (D)**

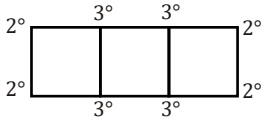


3-ethynyl-2-hydroxy-4-methyl-hex-3-en-5-ynoic acid.

JEE (Main) Practice Paper

SECTION-A

1. Ans. (1)



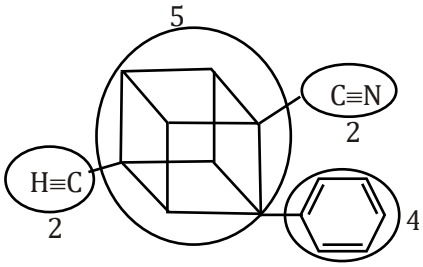
2°C = 4

3°C = 4

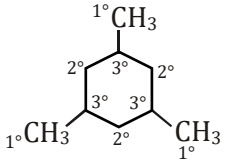
2. Ans. (1)

Homologous members having same functional group and same general moleculer formula.

3. Ans. (2)



4. Ans. (4)

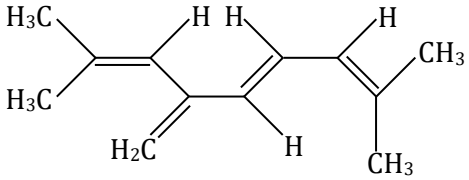


1°C ⇒ 3

2°C ⇒ 3

3°C ⇒ 3

5. Ans. (1)



1π bond = $2e^{\ominus}$

Total no. of π bond's = 4

Total no. of π bond electrons = $4 \times 2 = 8e^{-}$

6. Ans. (3)

Alkenyne Family

$H_2C = CH - C \equiv CH \xrightarrow{+CH_2} C_5H_6 \xrightarrow{+CH_2} C_6H_8$

C_4H_4 (1^{st} Member) (2^{nd} Member) (3^{rd} Member)

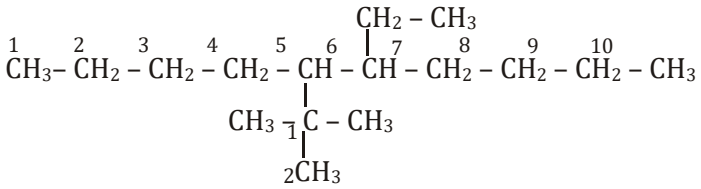
7. Ans. (1)

$\overset{6}{HC}\equiv\overset{5}{C}-\overset{4}{CH}=\overset{3}{CH}-\overset{2}{CH}=\overset{1}{CH_2}$

(sp sp sp^2 sp^2 sp^2 sp^2)

hexa-1, 3-dien-5-yne

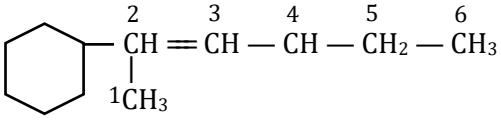
8. **Ans. (1)**



9. **Ans. (2)**

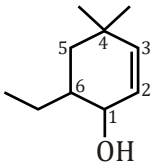
Amine (NH_2) $\rightarrow$ Principle functional group.

10. **Ans. (1)**



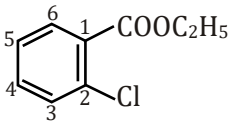
2-Cyclohexylhex-2-ene

11. **Ans. (2)**



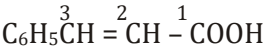
6-ethyl-4,4-dimethylcyclohex-2enol

12. **Ans. (3)**



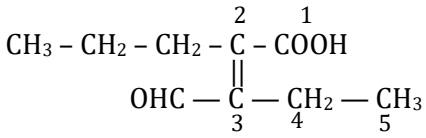
$\Rightarrow$ Ethyl-2-chlorobenzoate

13. **Ans. (3)**



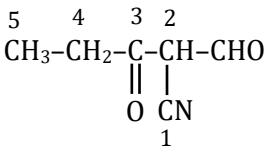
$\Rightarrow$ 3-phenylprop-2-enoic acid.

14. **Ans. (2)**



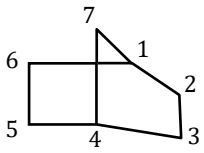
15. **Ans. (2)**

Here the main functional group is – CN, which has nitrile suffix and CHO and CO are taken as substituents.



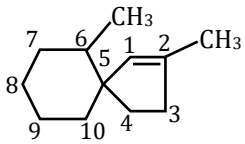
2–Formyl–3–oxopentanenitrile

16. Ans. (3)



Bicyclo[2.2.1]heptane

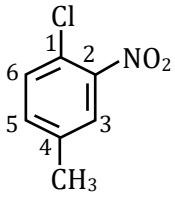
17. Ans. (1)



2,6-Dimethylspiro[4.5]dec-1-ene

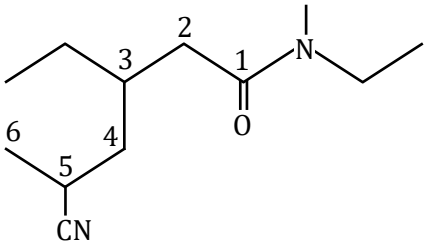
18. Ans. (2)

Functional groups such as halo(chloro, bromo, fluoro, nitroso(–NO), nitro(–NO_2) are considered as substituent.



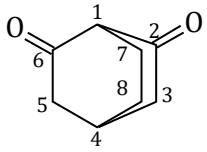
1-Chloro-4-methyl-2-nitrobenzene

19. Ans. (4)



5-Cyano-N, 3-diethyl-N-methylhexanamide

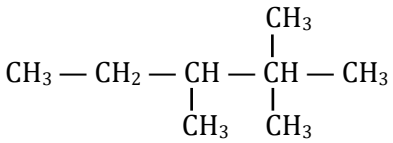
20. Ans. (3)



Bicyclo[2.2.2]octane-2, 6-dione

SECTION-B

1. Ans. (114)



Molecular weight = 114

2. Ans. (19)

σ bonds = 13, rings = 6

DOU = 13 + 6 = 19

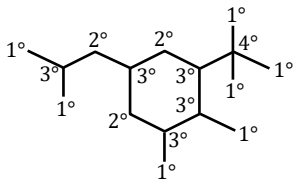
3. Ans. (15)

lowest set of locant is (3, 3, 4, 5) $\Rightarrow$ 3 + 3 + 4 + 5 = 15

4. Ans. (6)

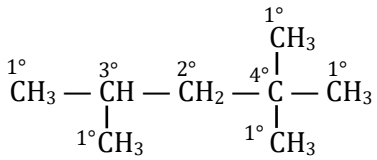
1. –COOH (Carboxylic acid)
2. $-NH_2$ (1° Amine)
3. –CN (Cyanide)
4. –COOMe (Ester)
5. –CHO (Aldehyde)
6. $-\overset{\overset{O}{\|}}{C}-$ (Ketone)

5. Ans. (16)



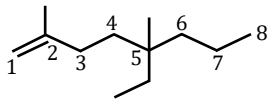
Number of 1°, 2° , 3° and 4°C present in compound are (7, 3, 5, 1) $\Rightarrow$ 7 + 3 + 5 + 1 = 16

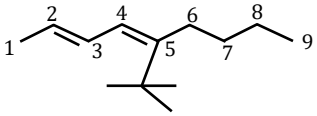
6. Ans. (8)



(5, 1, 1, 1) $\Rightarrow$ 5 + 1 + 1+ 1 = 8

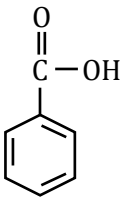
7. Ans. (17)

(a) 

(b) 

a = 8, b = 9 $\Rightarrow$ 8 + 9 = 17

8. Ans. (5)



Number of π bonds = 4

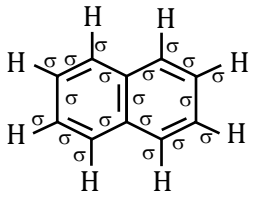
Number of rings = 1

DOU = π bonds + rings

= 4 + 1

= 5

9. **Ans. (19)**



Total sigma bond = 19

10. **Ans. (22)**

A = 5 ; B = 5 ; C = 4 ; D = 3 ; E = 5;

$\Rightarrow$ 5 + 5 + 4 + 3 + 5 = 22

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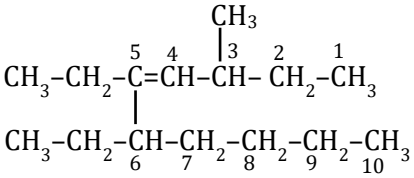
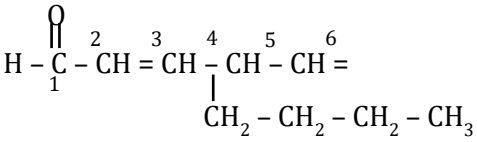
1. **Ans. (B)**



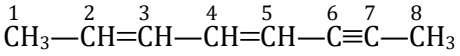
5, 6-Diethyl-3-methyldec-4-ene

2. **Ans. (A)**



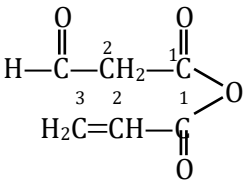
4-Butylhexa-2, 5-dien-1-al

3. **Ans. (B)**



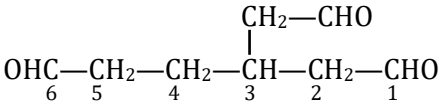
$\Rightarrow$ Octa 2, 4-diene-6-yne.

4. **Ans. (D)**



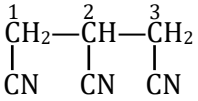
$\Rightarrow$ 2-formyl ethanoic prop-2-enoic anhydride.

5. **Ans. (D)**



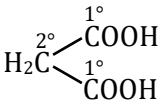
$\Rightarrow$ 3-(formylmethyl) hexane-1, 6-dial.

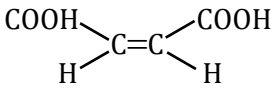
6. **Ans. (D)**

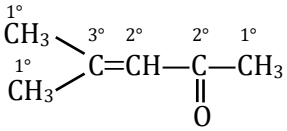


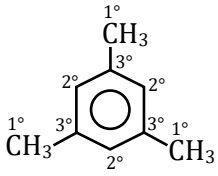
⇒ Propane, 1, 2, 3-tricarbonitrile.

7. **Ans. (B)**

Malonic acid 

Maleic acid (Cis) 

Mesityl oxide ⇒ 

Mesitylene 

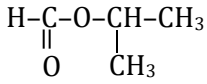
⇒ 2°C ⇒ 3

3°C ⇒ 3

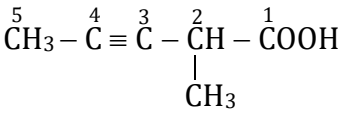
1°C ⇒ 3

8. **Ans. (D)**

Isopropyl methanoate.

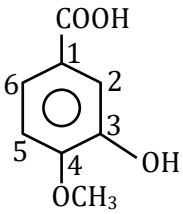


9. **Ans. (B)**



⇒ 2–Methylpent–3–ynoicacid

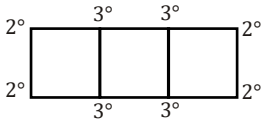
10. **Ans. (A)**



3–Hydroxy-4-Methoxybenzoic acid

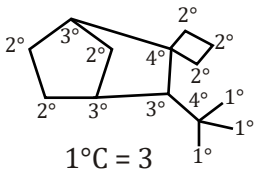
11. Ans. (A,B,C,D)

(I)



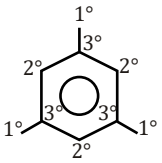
2°C = 4
3°C = 4

(II)



1°C = 3
2°C = 6
3°C = 3
4°C = 2

(III)



1°C = 3
2°C = 3
3°C = 3

12. Ans. (A,B,C)

(A) General formula of alkanes is C_nH_{2n+2}

(B) In homologous series, all members don't have the same physical properties but same chemical properties.

(C) IUPAC means international union of pure and applied chemistry

13. Ans. (A,B,C)

(A) Acetic acid is common name of $H_3C-\overset{\overset{O}{\|}}{C}-OH$

(B) $CH_3-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_3$ Neopentane is a saturated compound.

(C) Used in common naming (n–, iso, sec–, tert–, neo– etc.)

14. Ans. (A,B,C,D)

(A) The trivial names of organic compounds are called common names.

(B) The systematic names of organic compounds are obtained from the IUPAC system.

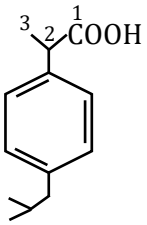
(C) The systematic names of alkanes are based on the number of C atoms in the longest continuous chain of C atoms.

(D) The maximum number of functional groups must be included in the C atom chain selected even if it does not satisfy the longest chain rule.

15. Ans. (B)

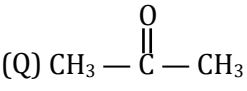
Principal functional group is – COOH group (carboxylic acid)

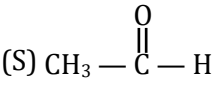
16. Ans. (D)

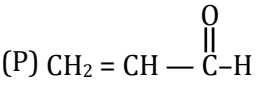


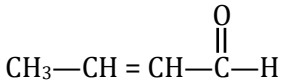
2 – (P – sec butyl phenyl)propanoic acid

17. Ans. (B)

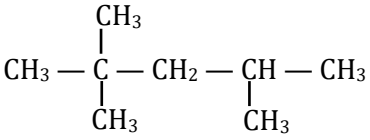
(A) Acetone (Q) 

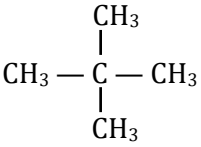
(B) Acetaldehyde (S) 

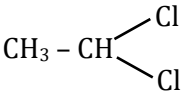
(C) Crotonaldehyde (P) 

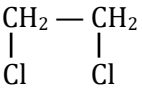
(D) Acrolein (R) 

18. Ans. (D)

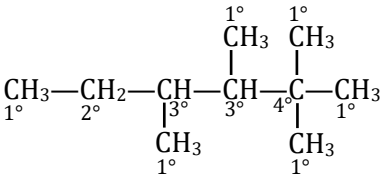
(A) Isooctane → (Q) 

(B) Neopentane → (S) 

(C) Ethylidene chloride (Geminal dihalide) (T) 

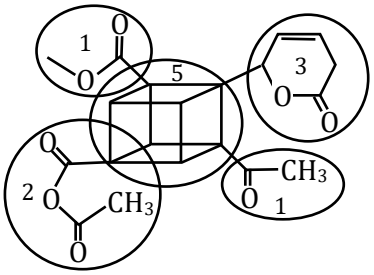
(D) Ethylene Dichloride (vicinal dihalide) (P) 

19. Ans. (612)



1°C=6
2°C=1
3°C=2

20. Ans. (12)



D.U. = 5 + 3 + 2 + 1 + 1 = 12

Or Mol. Formula ⇒ $C_{20}H_{18}O_8$

D.O.U. = $(20 + 1) - \frac{18}{2} = 12$