

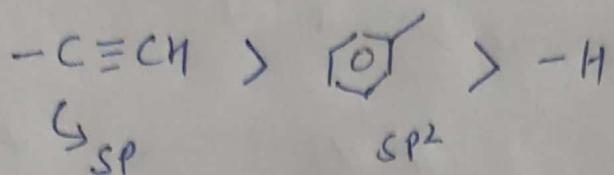
OC SHEET SOLUTION
GOC

ALLEN DIGITAL

**Team
OC
Allen
Kota**

Solution Ex. 1

Ans 1. (O), -I depends on electronegativity of atom.



γ . S character

E.N \propto γ . S character

$$sp > sp^2 > sp^3$$

-I \propto γ . S character.

50%, 33%, 25%.

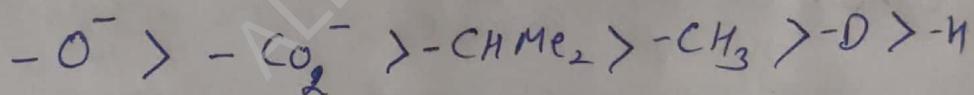
$$-\text{I} \Rightarrow sp > sp^2 > sp^3$$

Ans 2.
③

+I \propto negative charge on atom

\propto no. of carbon atoms

\propto Heavier isotopes.

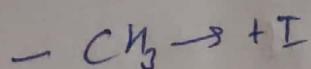
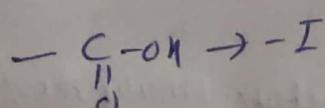
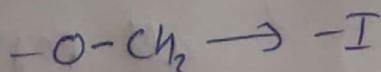


Ans 3.
④

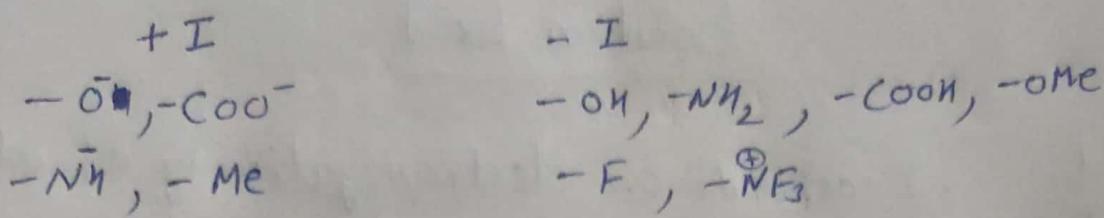
~~Alkyl~~ Alkyl chain without multiple bonds act as +I group.

Ans 4.

(A) (B)
②



Ans 5



Ans 6

(a) True

(b) False, because delocalization of σ bond is not involve in Resonance.

(c) True, (d) True

(e) False, due to delocalization of electron cloud potential energy effect.

(f) False, Hyperconjugation, Inductive like other electronic effect also stabilize molecule.

(g) True

(h) False, Aromatic Compound have resonance but less stable than Non-resonating Structure.

(i) False, No canonical structure do not give all physical property explanation.

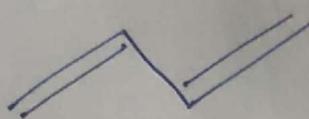
(j) True

(k) False, Resonating structure imaginary, Resonance Hybride is real.

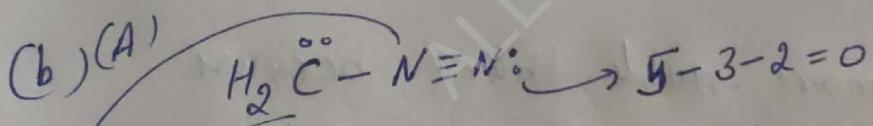
(l) True (m) True.

Ans 7 (A) Resonating structures are imaginarily
Resonance hybrid is real.

Ans 8. (A) Conjugated alkanes are most
stable due to conjugation.



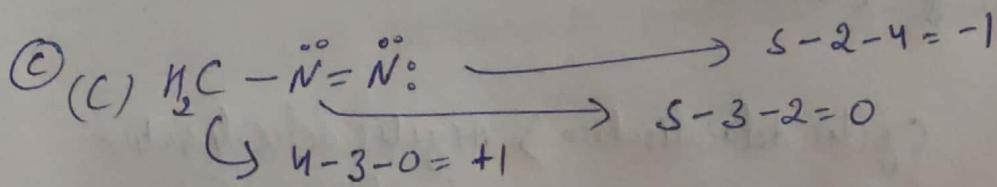
Ans 9 (A) A, B, C have same connectivity of atoms
but different bonding pattern
 \therefore Resonance form.



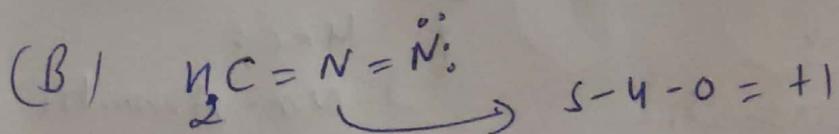
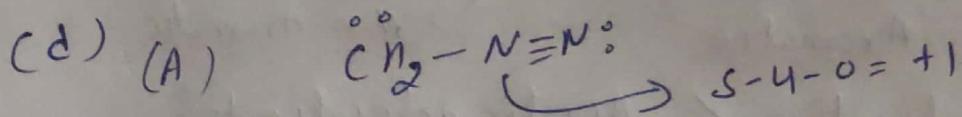
Formal charge = Valence e⁻ of atom - no. of bonds - lone e⁻

$$\rightarrow 4-3-2=-1$$

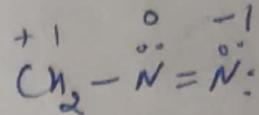
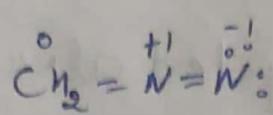
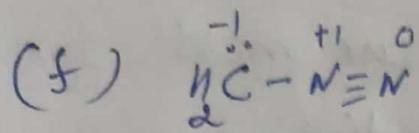
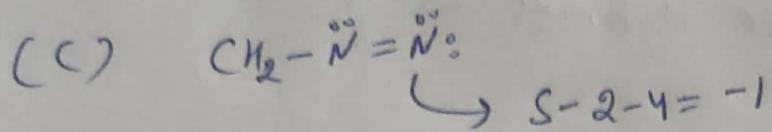
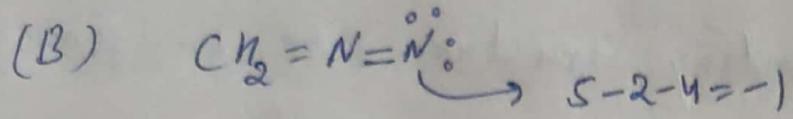
$$\rightarrow 5-4-0=+1$$



$$\rightarrow 4-3-0=+1$$



(c)

 $(-1+1+0) \text{ zero}$ $(0+1-1) \text{ zero}$ $(+1+0-1) \text{ zero}$

(G) B is more stable because -ve charge at N in B and -ve charge at carbon in A. -ve charge is good at more E.N atom.

(H) B is more stable than C because octet of all atoms in B is complete but in C incomplete of carbon.

$\underset{\text{Aromatic}}{\text{A}} \rightleftharpoons \underset{\text{Antiaromatic}}{\text{B}} \rightleftharpoons \underset{\text{Non-Aromatic}}{\text{C}}$

Cyclic delocalization $>$ Acyclic delocalization

$\hookrightarrow (4n+2)e^-$ $\hookrightarrow (4n+2)e^-$

Cyclic delocalization $<$ Acyclic delocalization

$\hookrightarrow 4n e^-$ $\hookrightarrow 4n e^-$

\hookrightarrow Anti-aromatic \hookrightarrow Non-Aromatic

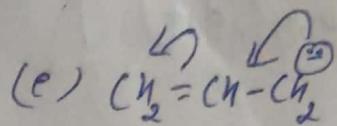
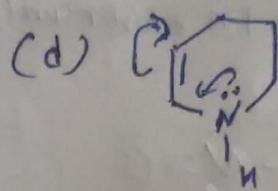
- ve charge at more E.N atom more stable.

Stability Aromatic > Non Aromatic > Anti aromatic

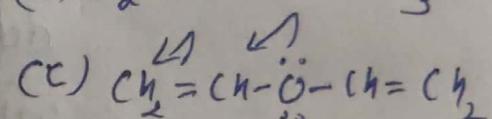
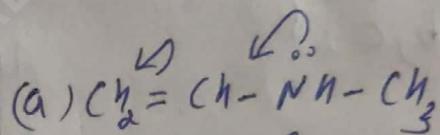
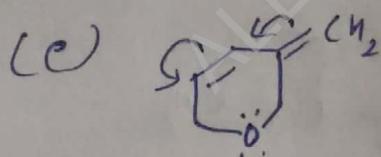
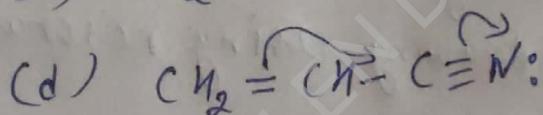
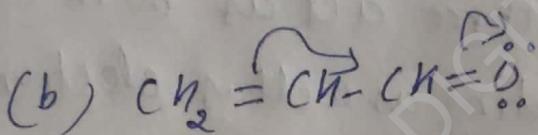
Am 11 (D)

Due to Position of H atom change

Am 12
(b, d, e)



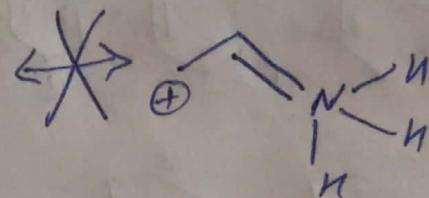
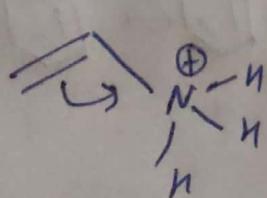
Am 13
b, d, e



()

Am 14
d

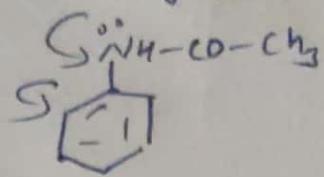
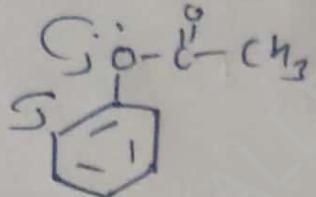
-NH_3^+ can not participate because it can not accommodate 10e^- in Nitrogen due to lack of d-orbital.



Not Possible
because N
have 10e^-

Am 15
(C, f)

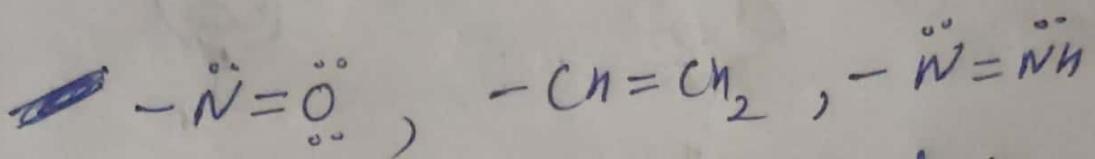
-OCOCH₃ and -NHCOCH₃ can donate
electron in conjugated system



Ans 16
(a, b, c, d, f)

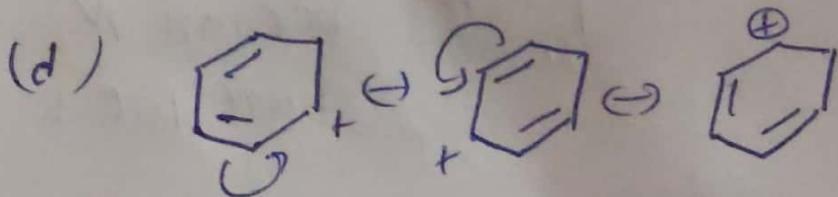
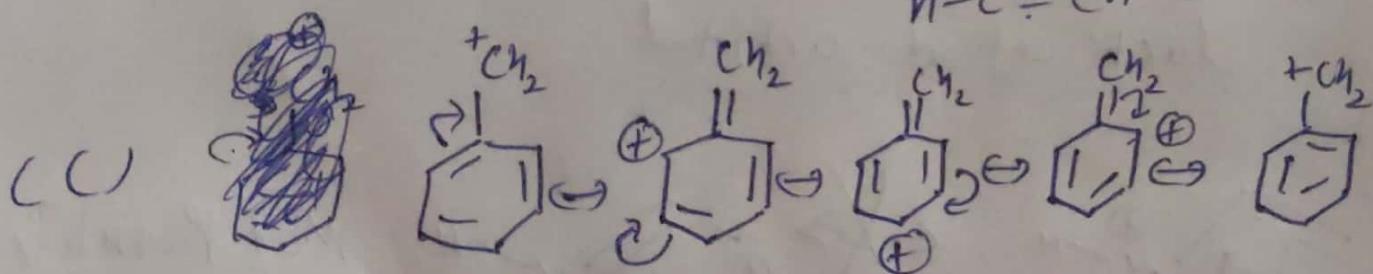
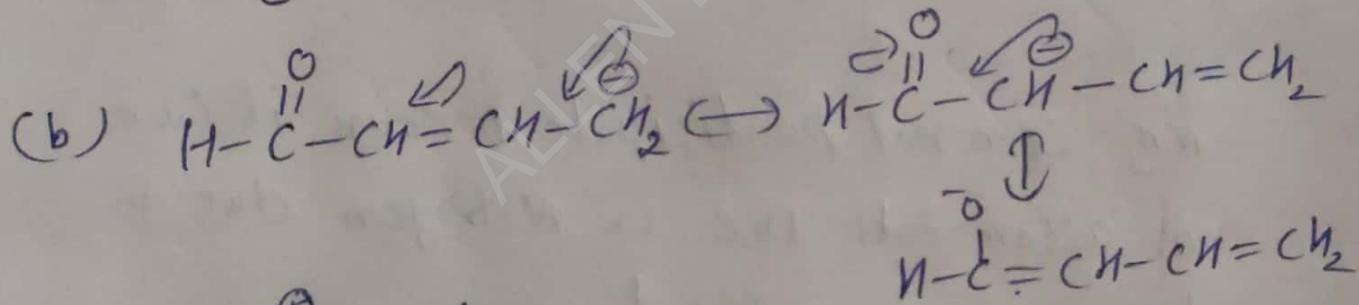
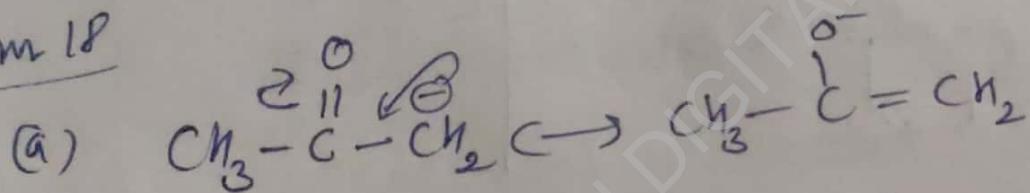
only (c) is electron donating group
in resonance.

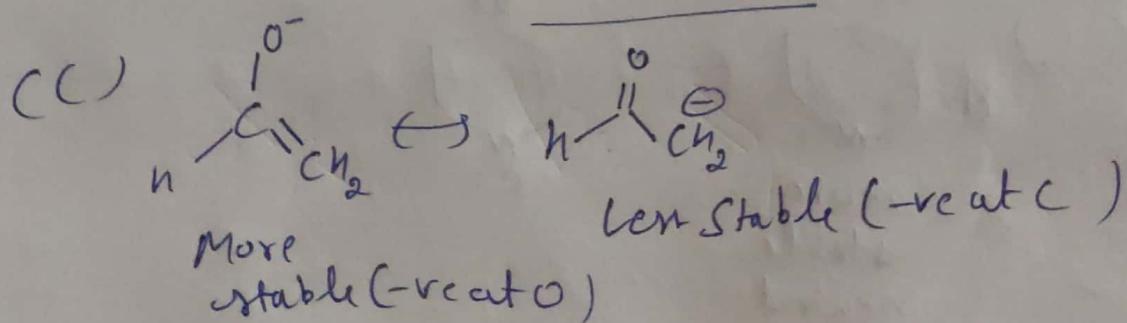
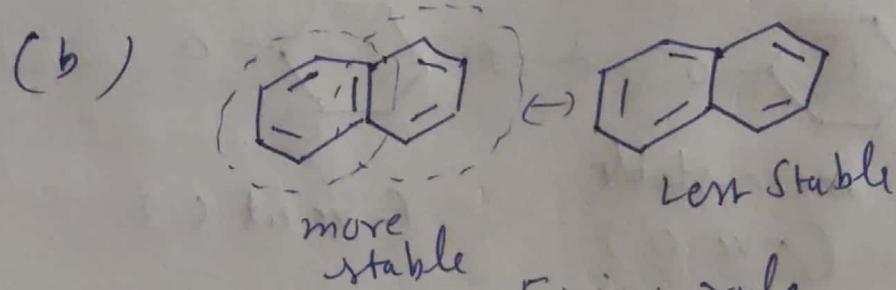
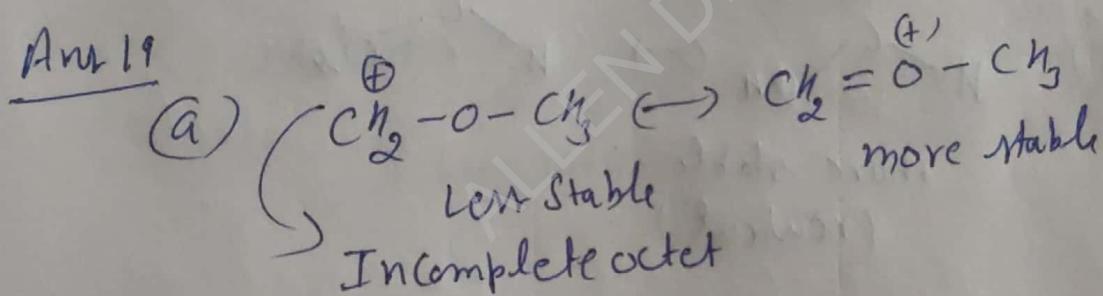
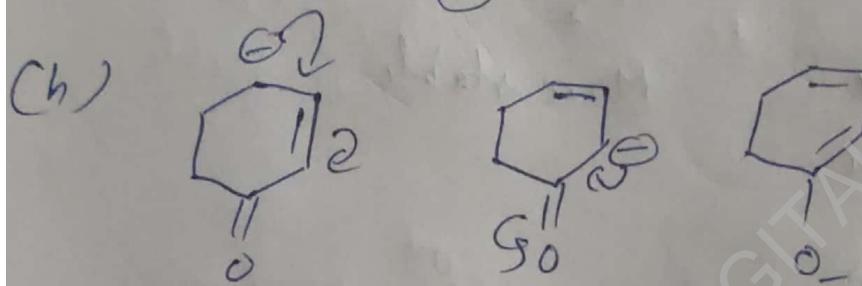
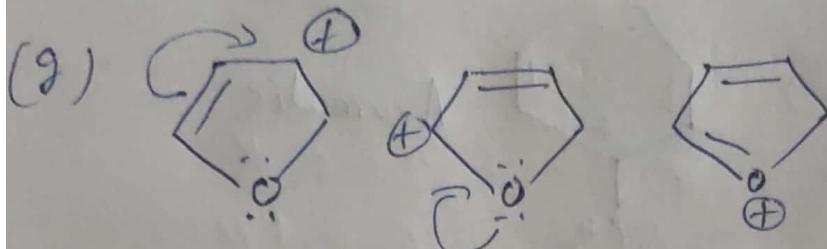
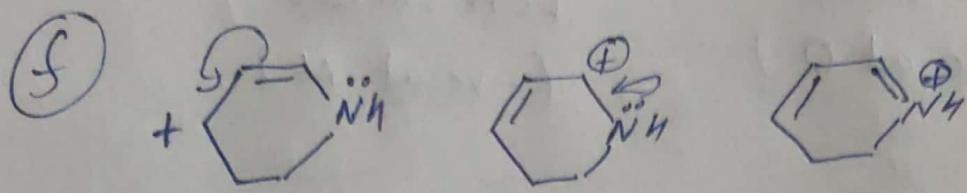
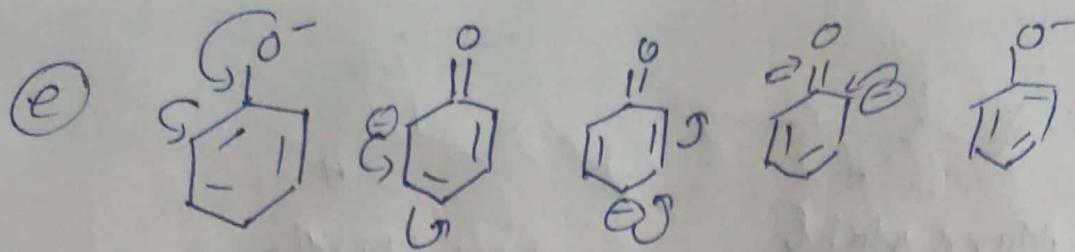
Ans 17
(b, c, f)



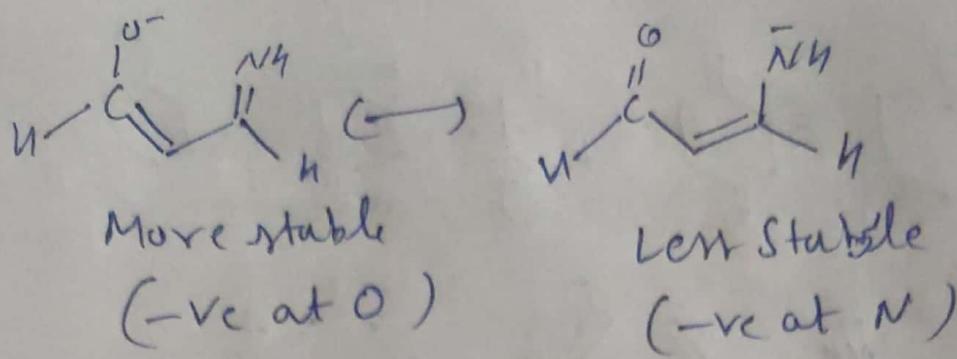
All three act as both electron
donating as well as electron
withdrawing using resonance.

Ans 18

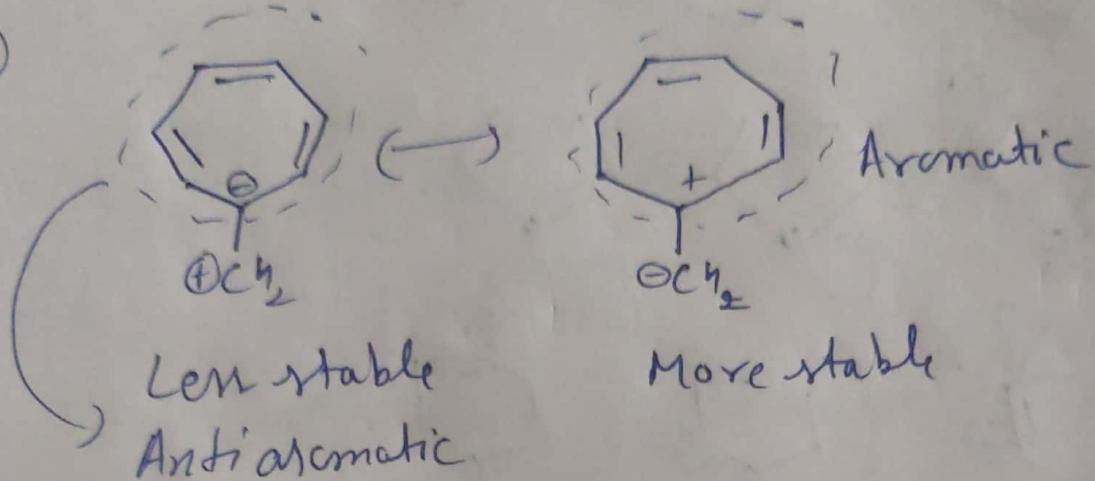




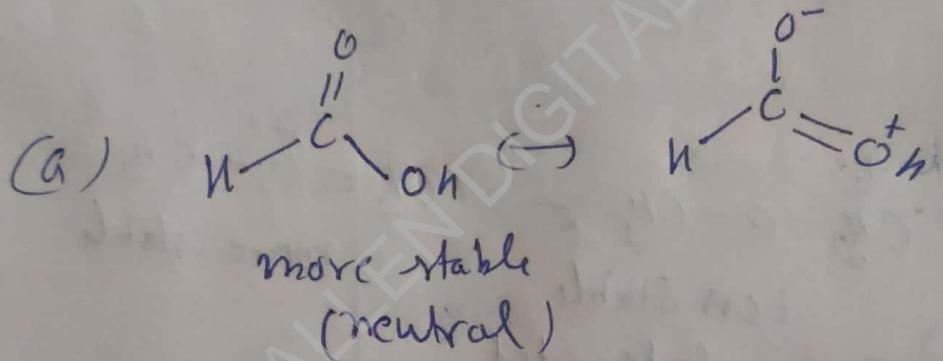
(d)



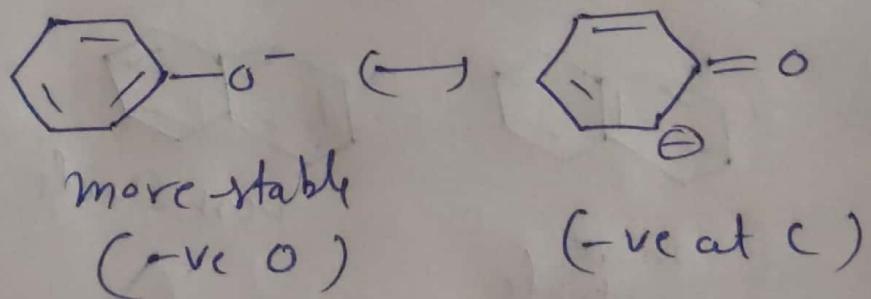
(e)



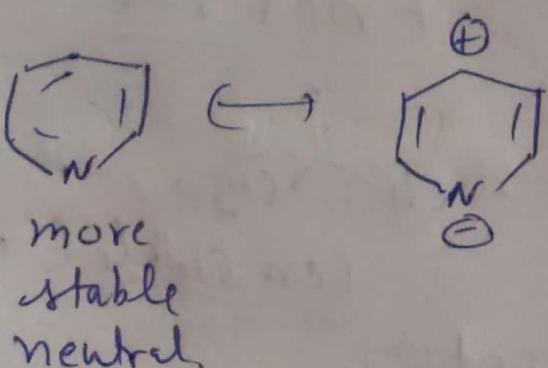
Ans 20

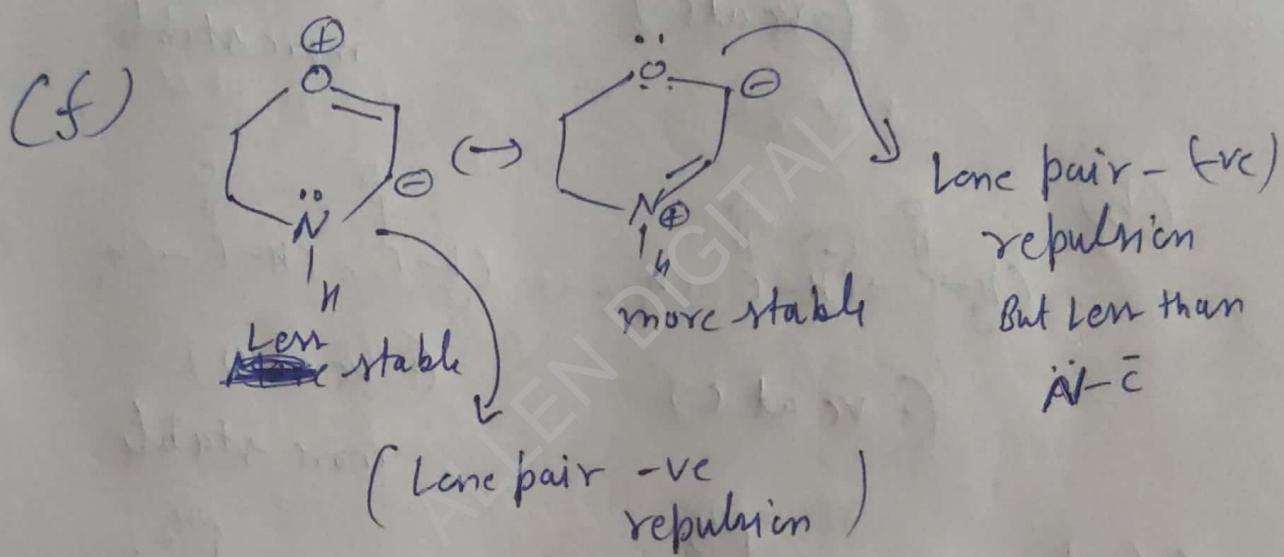
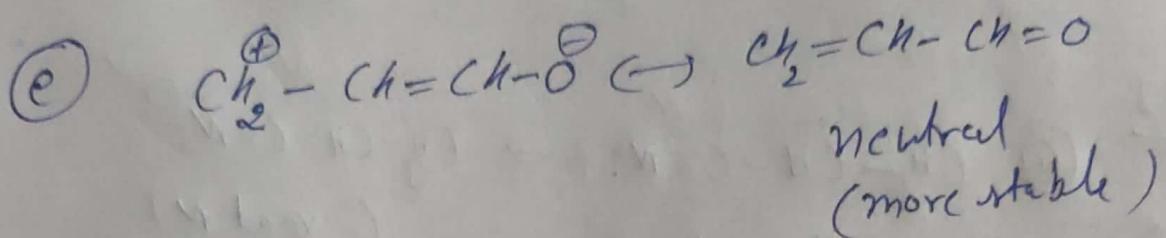
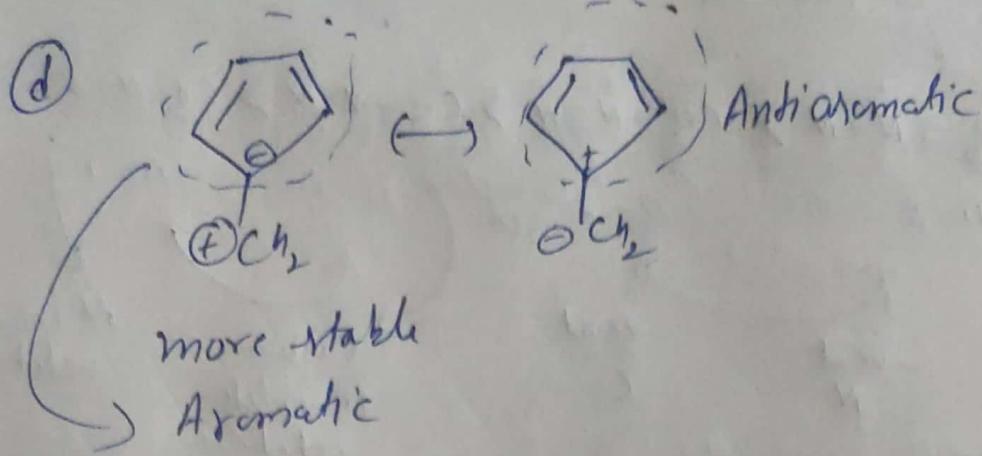


(b)

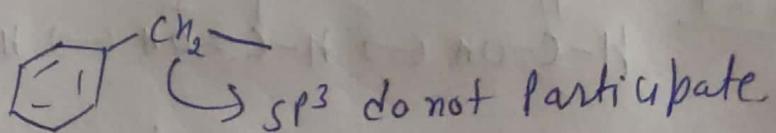
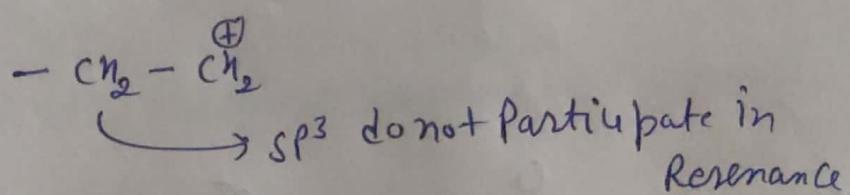
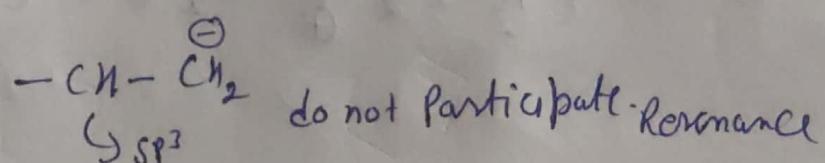


(c)



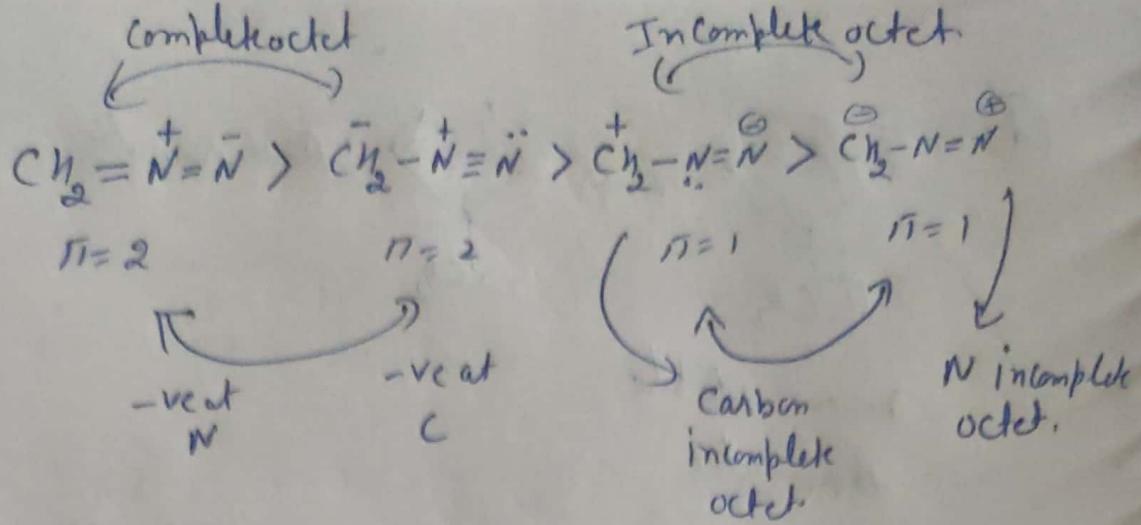


Ans 21
(a, e, f, g)

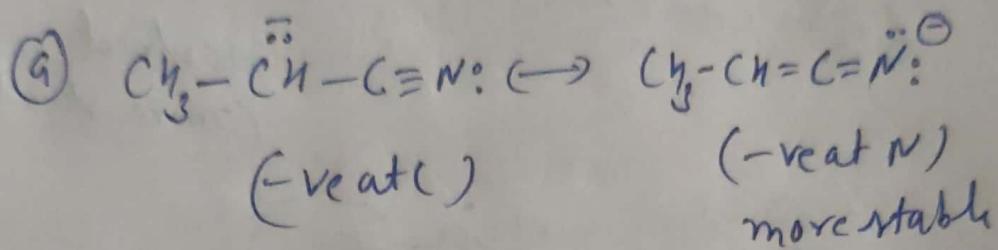


Ans 22

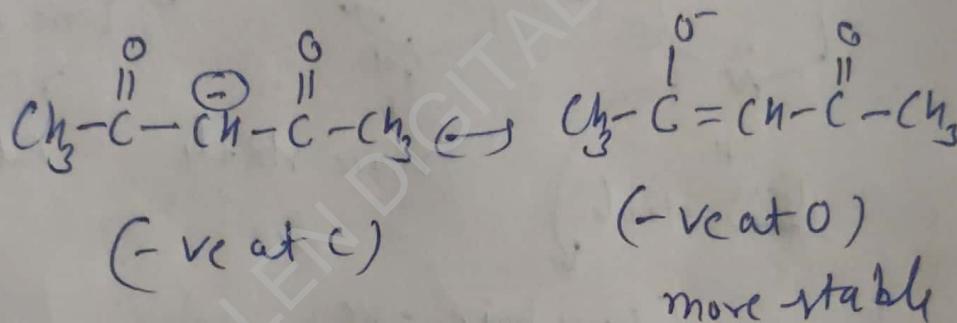
(A)



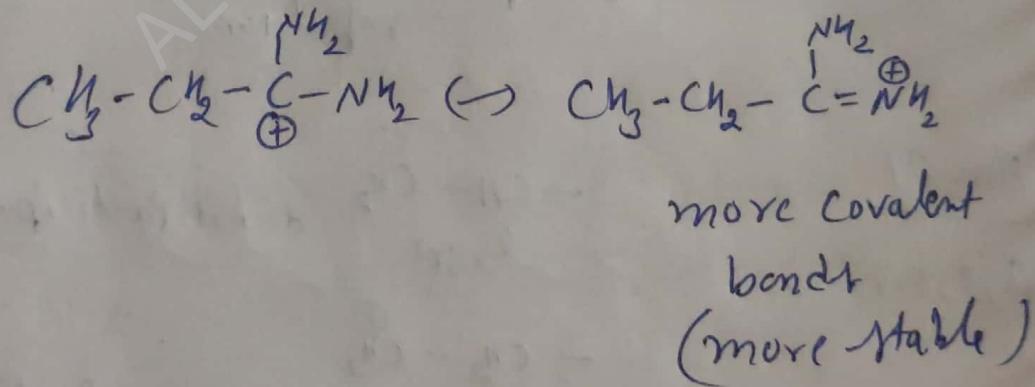
Ans 23



(b)

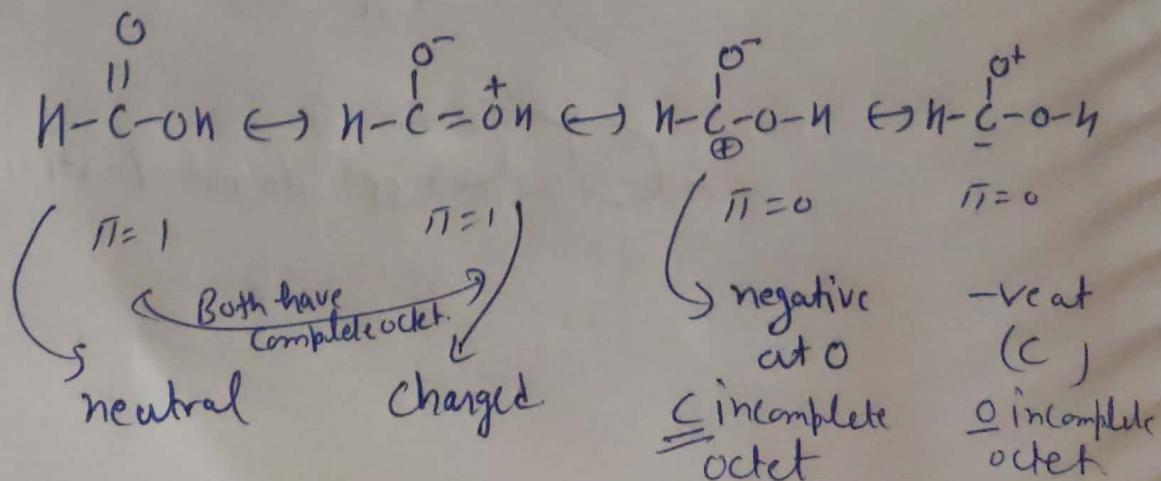


(c)



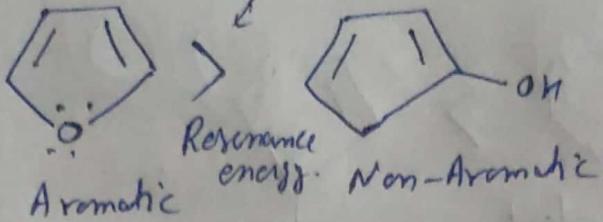
Ans 24

(A)

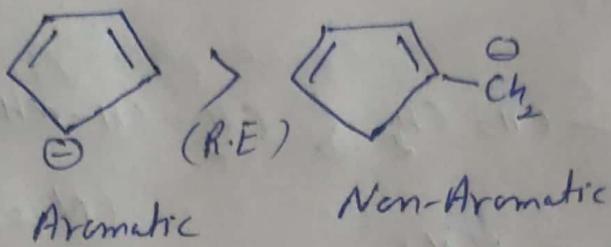


Ans 25

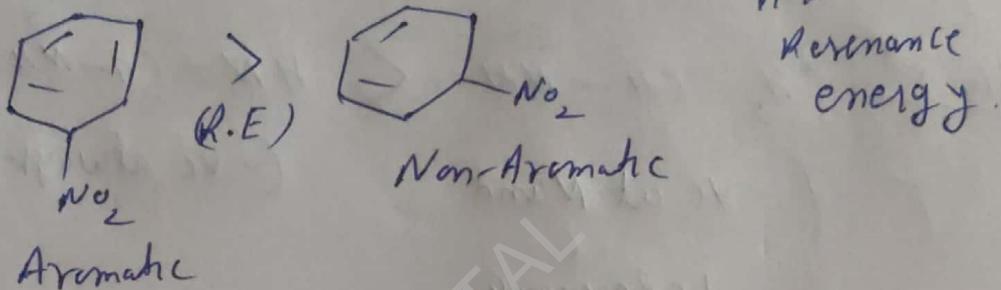
(a)



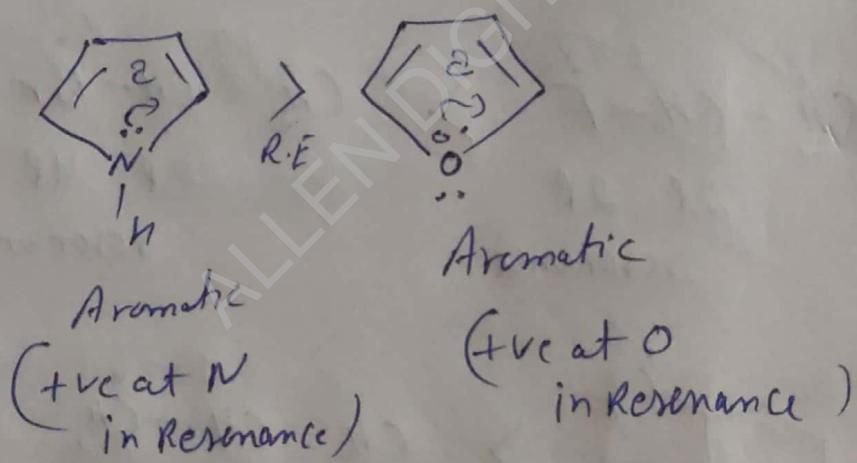
(b)



(c)



(d)



Ans 26

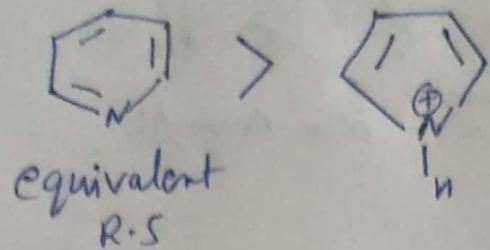
(a, b)

Resonance & equivalent Canonical Structure.
energy

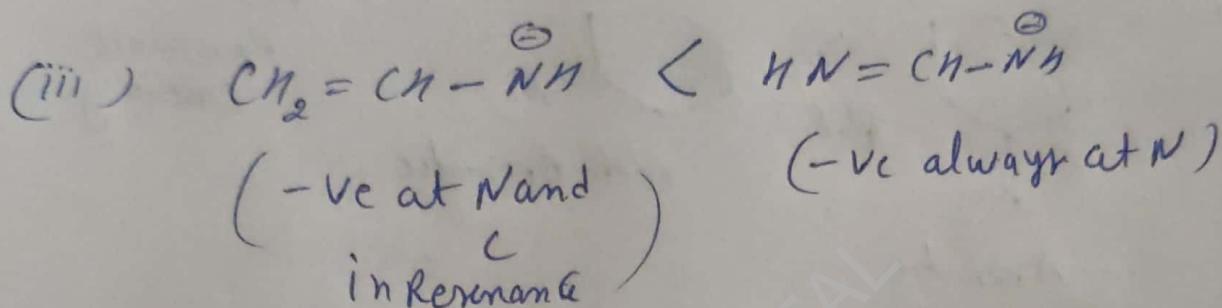
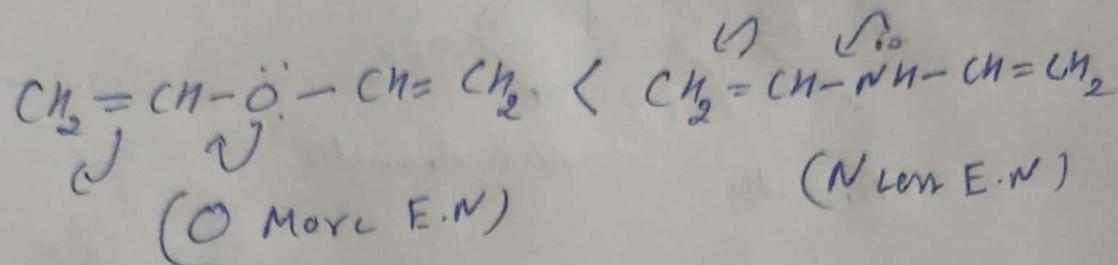
Resonance & Aromatic
energy

Am 27

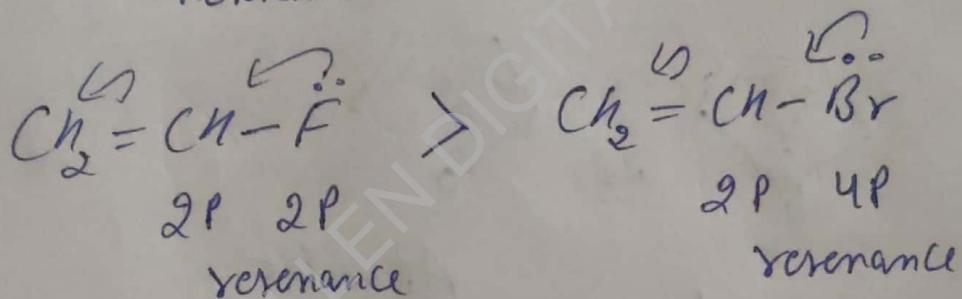
(i)



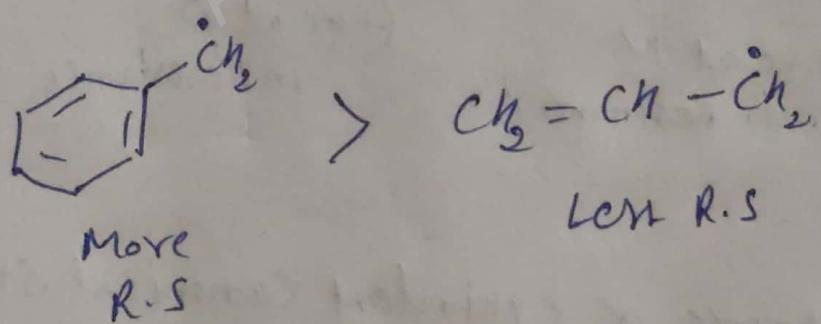
(ii)



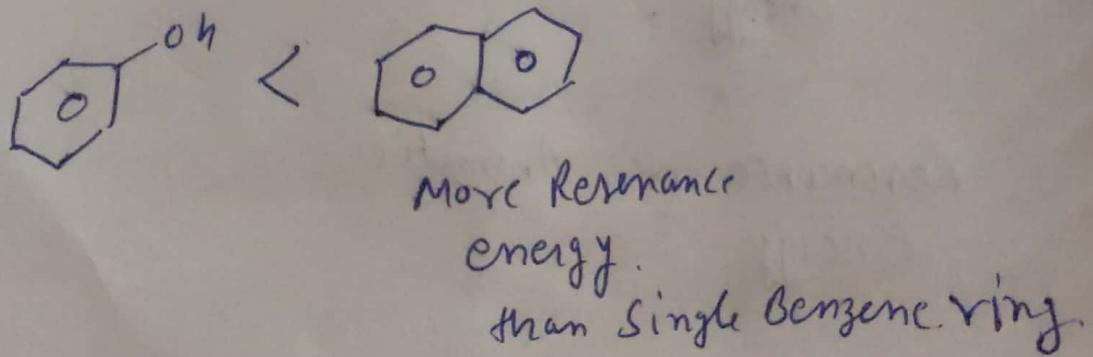
(IV)



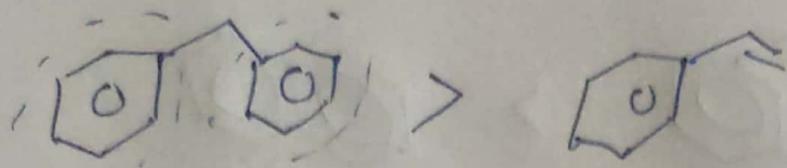
(V)



(VI)

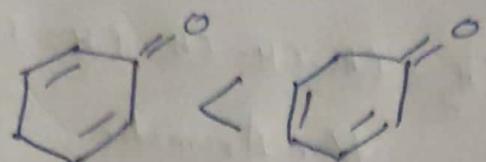


(VII)



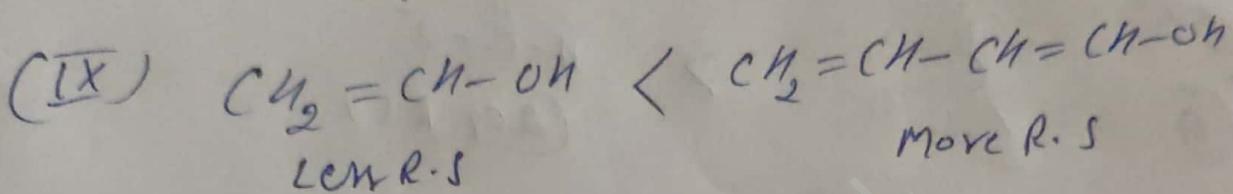
Two Benzene ring

(VIII)

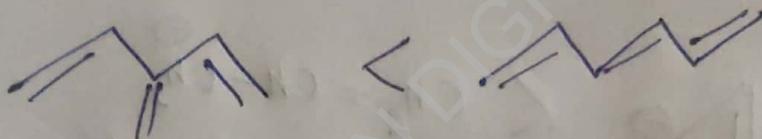


Cross
conjugation

Linear conjugation

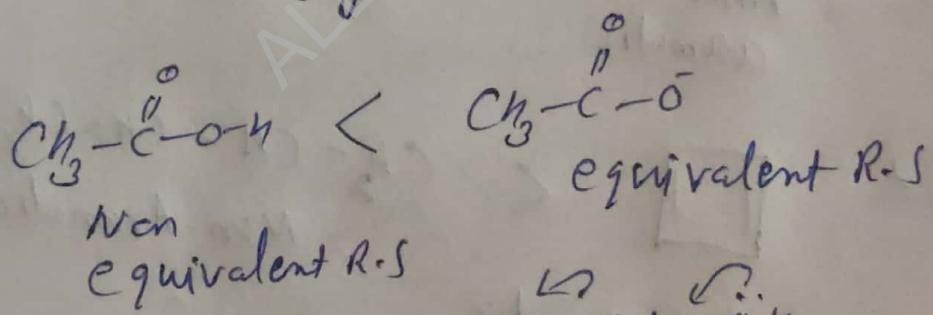


(X)

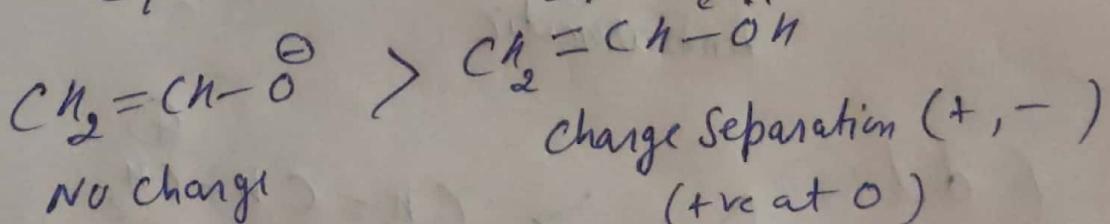


Cross Conjugation

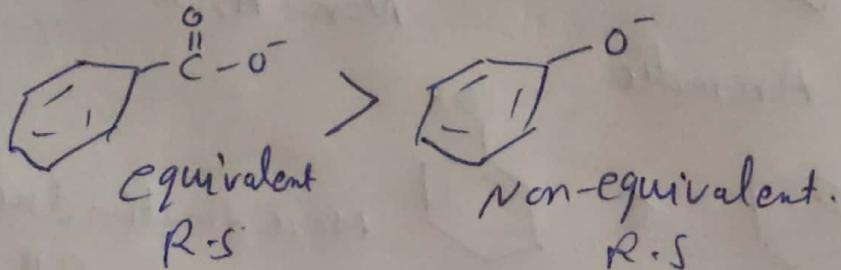
(XI)



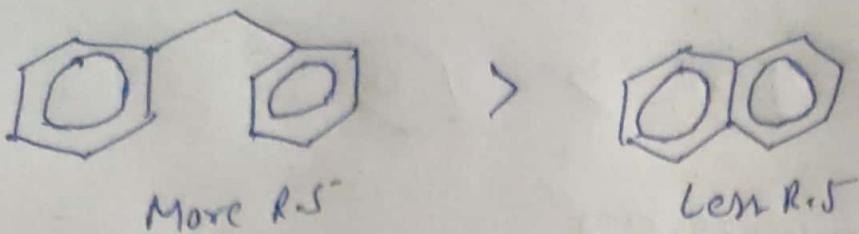
(XII)



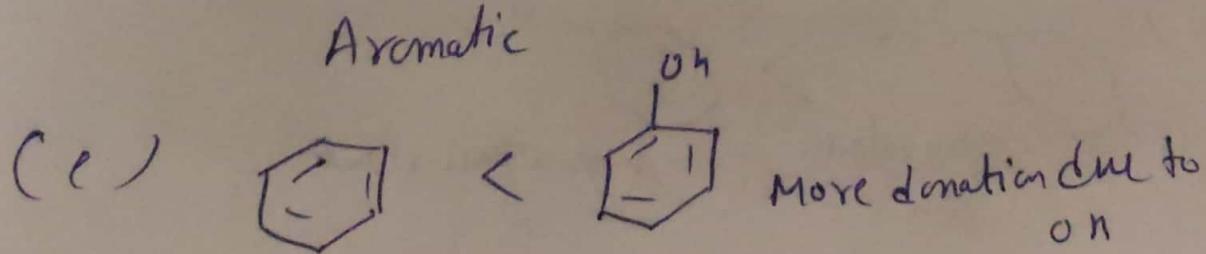
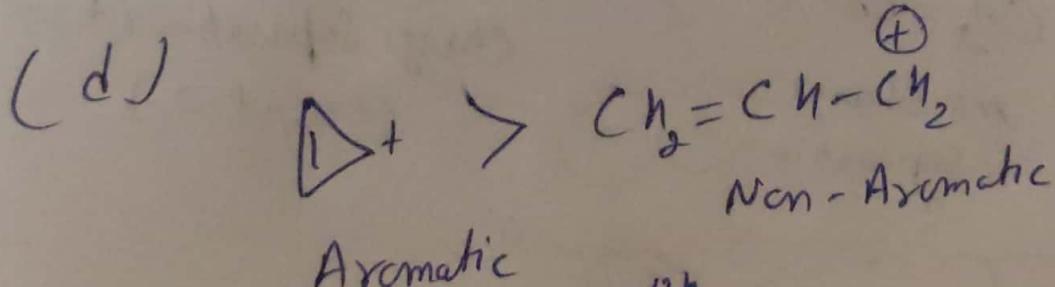
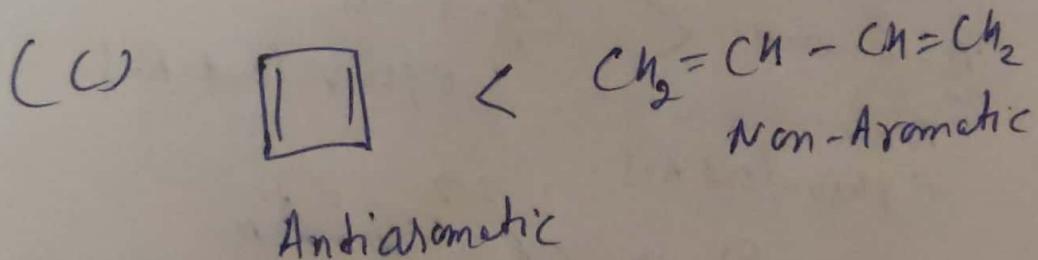
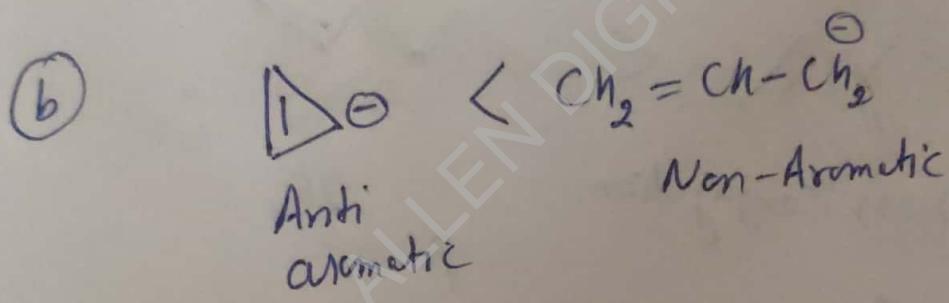
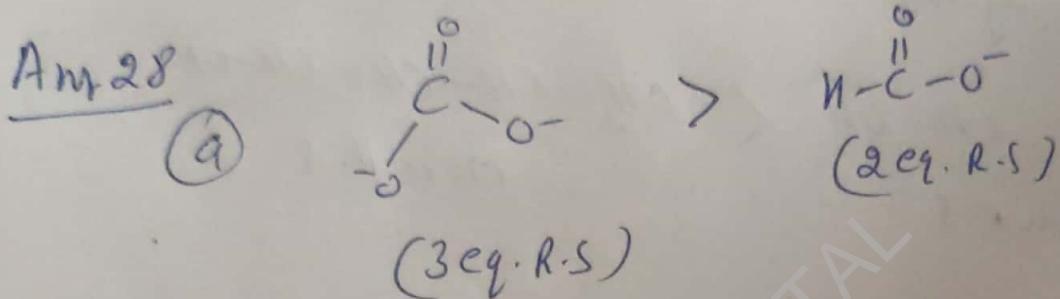
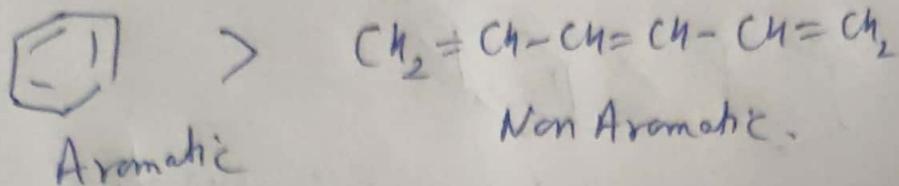
(XIII)



(XIV)

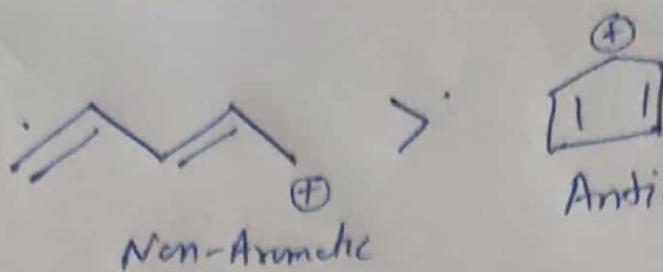


(XV)



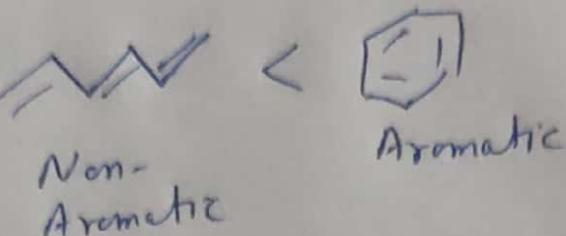
Am 29

(B)



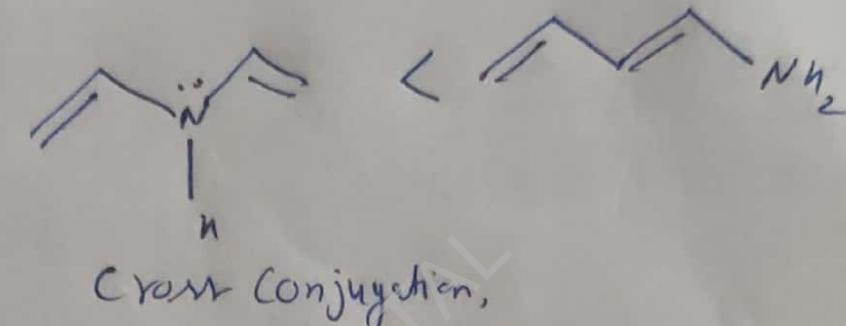
Antiaromatic

(A)



Aromatic

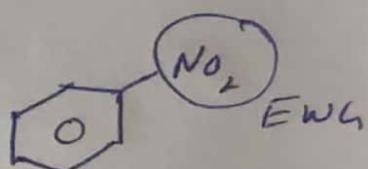
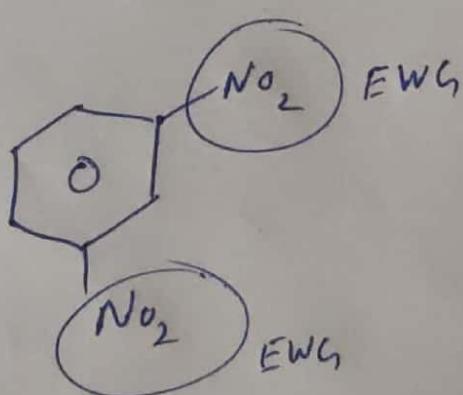
(C)



Am 30

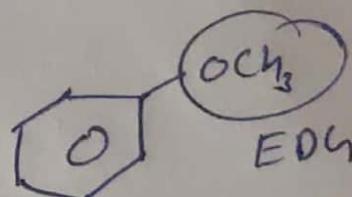
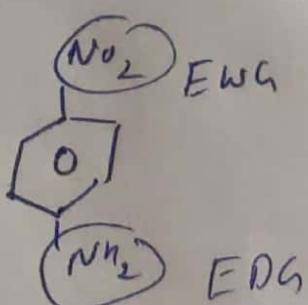
(D)

More is $-R/-M$ group (EWG)
at ring less will be πe^- density.



(EDG)
Electron
donating
group

(EWG)
Electron
withdrawing group



Ex O1 (30-45)

Solutions of Electron displacement effect

30. Electromagnetic of Benzene ring \propto $\frac{1}{\text{electron withdrawing group}}$ & electomagnetic reflecting group.
31. Same above
32. Reactivity of Benzene ring \propto no. of α -C-H bonds (i.e. hyperconjugative structures)
- 33.



35. I, II & III all are correct

36. In 'D' it is G.

37. Most stable resonance structure is Ist one so C₂-C₃ more single bond character than C₁-C₂ so bond length order is C₂-C₃)>C₁-C₂

38. More the environment of $\text{C}=\text{O}$ bad in resonance, more will be bond length.

39. More the environment of lone pair on N more will be double bond character

40.

41. Bond length of C=C \propto $\frac{1}{\text{no. of } \alpha\text{-C-H bonds}}$ (Hyperconjugative structures)

42. overlapping b/w $\text{sp}-\text{sp}^2$ hybrid orbital

43. Non identical resonance structures give different bond lengths.
So. only Ist has identical structure.

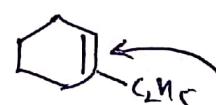
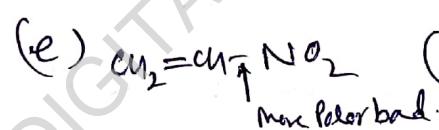
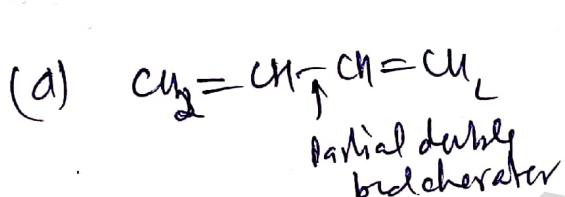
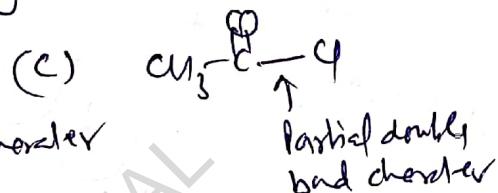
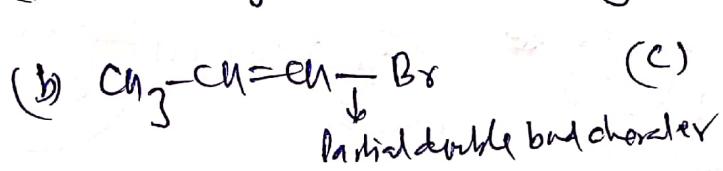
44.

45. more the stable resonance structure, more will be C-C bond length.

46. Polar double and triple bond more shorter than non polar double and triple bond. Bond length order \Rightarrow Single bond > double bond > Triple bond.

47. More the double / ~~and~~ Triple bond character, ~~less~~ ^{more} will be dissociation energy.

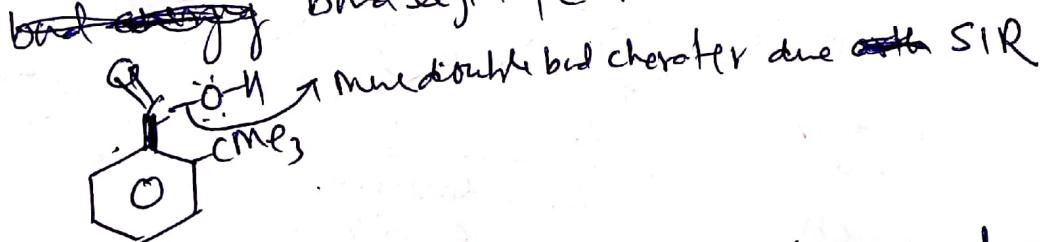
48. (a) Bond strength & overlapping area & comparable size of orbital



(more ~~partial~~ double bond character due to less no. of d.G.M. and)

49. Bond dissociation energy & $\frac{1}{\text{Stability of corresponding free radical.}}$

50. more the stable resonance structure, ~~more~~ ~~less~~ lesser will be bond length of C-N bond.



51.

Solution of electrom displacement effect
Leader (Ex-1, Ours No. 30 - 51) By A.F.

Solution of Exercise - O-II

Q-[1]

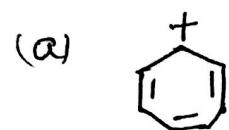
Condition For Aromaticity .

- ① Compound must be cyclic and planar.
- ② Complete Conjugation
- ③ $[4n+2] \pi$ electron

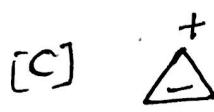
[i]



[ii]



[iii]



[iv]



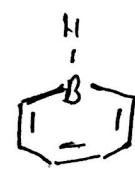
(b)



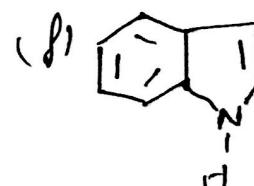
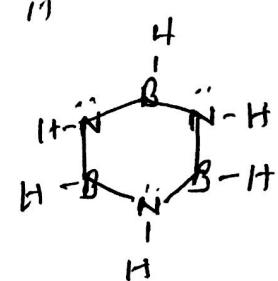
(c)



(d)



(e)



Q-(2)

Aromatic

- ① Cyclic, planer
- ② Complete conjugation
- ③ $[4n+2] \pi$ electron

Antiaromatic

- ① Cyclic, planer
- ② Complete conjugation
- ③ $[4n] \pi$ electron.

* Aromatic - a, b, d, e, g *

Nonaromatic - c, f

Q [3] -

(i)



Charge separation



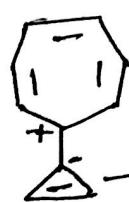
2 - Aromatic ring
stabilized by
Resonance

(ii)



More stable
due to extra
resonance and
has 2 - Aromatic
ring

(iii).



One Aromatic
ring
One Anti-Aromatic
ring

So, charge separation
is less

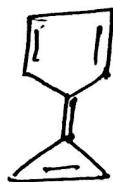
So, Bond Rotation Energy \rightarrow

$$\text{III} > \text{I} > \text{II}$$

So, Order of Rotation $\rightarrow \text{II} > \text{I} > \text{III}$

Ans : [C]

Q - 4]. Minimum Rotation Energy is for (III)

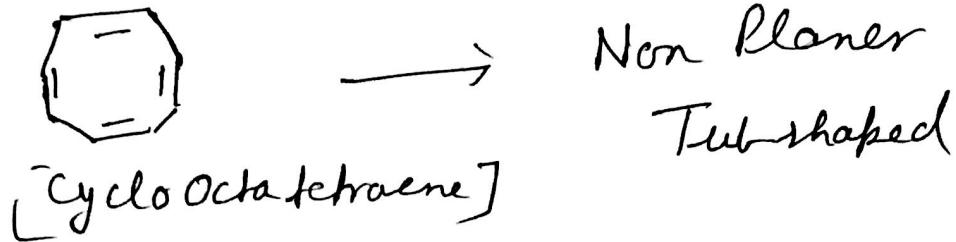


2 - Aromatic
ring

So more
charge
separation

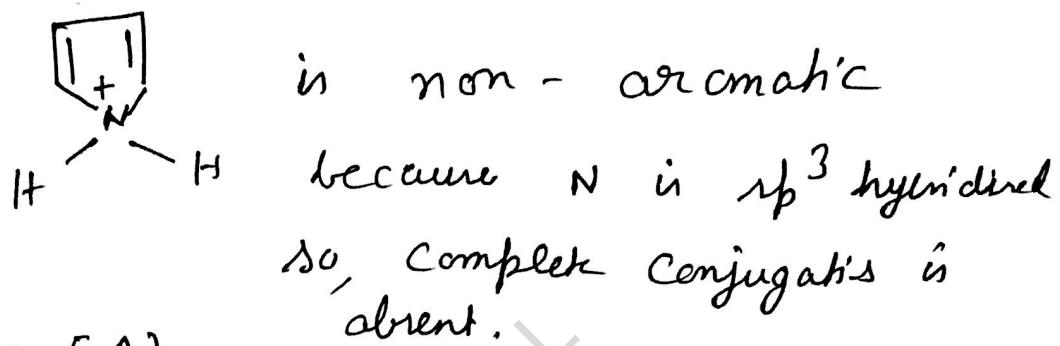
Ans : [C]

Q [5].



Ans: [B]

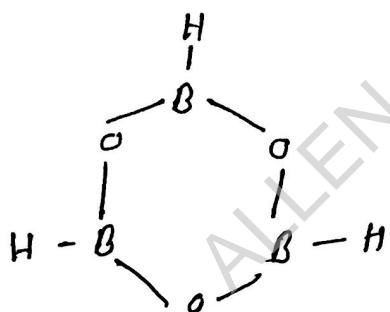
Q [6].



Ans : [A]

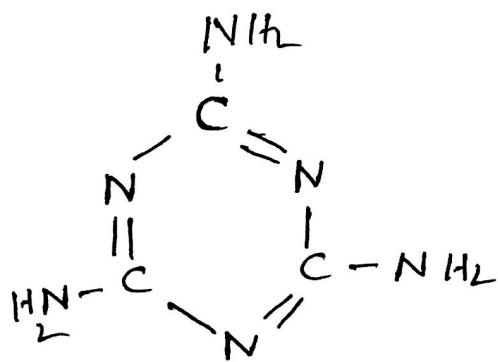
Q. [7].

(a)

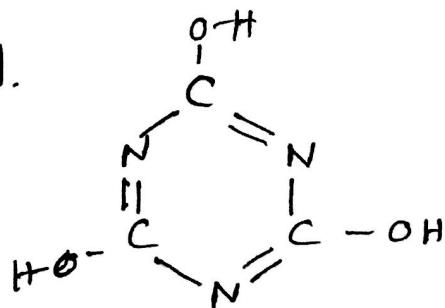


All are
Aromatic.

(b)



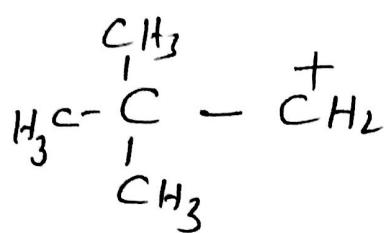
[c].



Ex-02 (Q. 8 to 23)

Q. 8. Stability of Carbocation \propto no of α -H

In



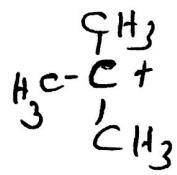
no of α -H $\rightarrow 0$

So, 9t is least stable

Ans : [D]

Q. 9. Stability of Carbocation \propto no of α -H

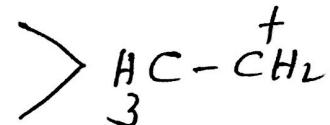
(i) (a)



α -H = 9

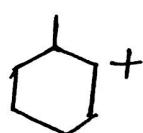
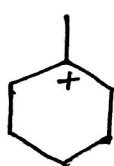


α -H = 6



α -H = 3

(ii).
(b).

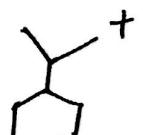
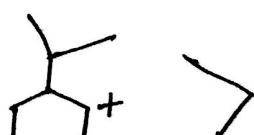


α -H = 7

α -H = 3

α -H = 1

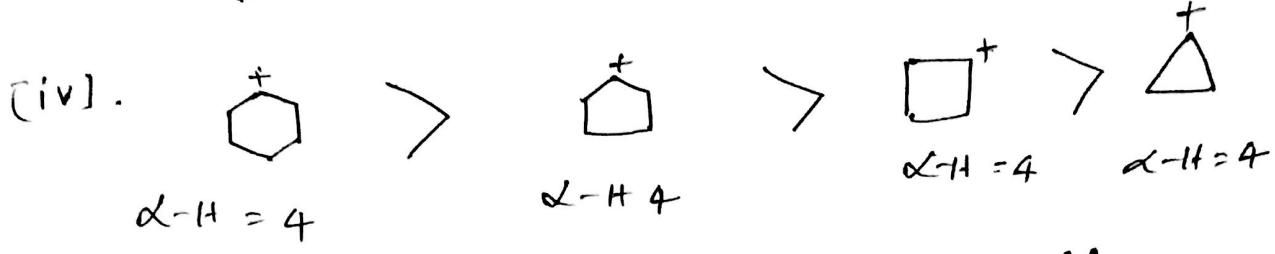
(iii).



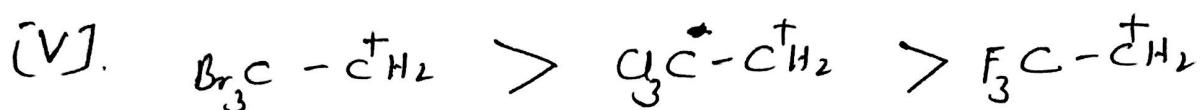
α -H = 7

α -H = 3

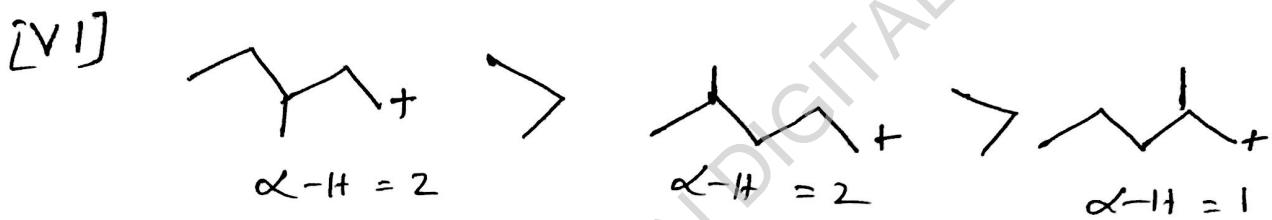
α -H = 1



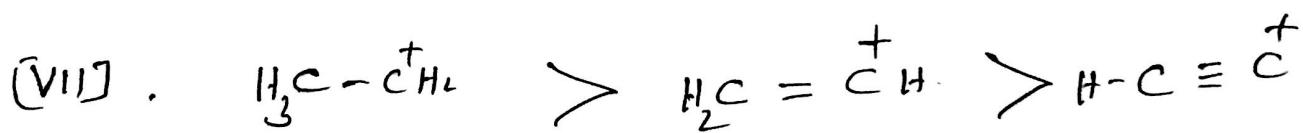
If no of $\alpha\text{-H}$ is equal in all then stability is depends on +I effect
In cyclic ring + I \propto no of Carbon.



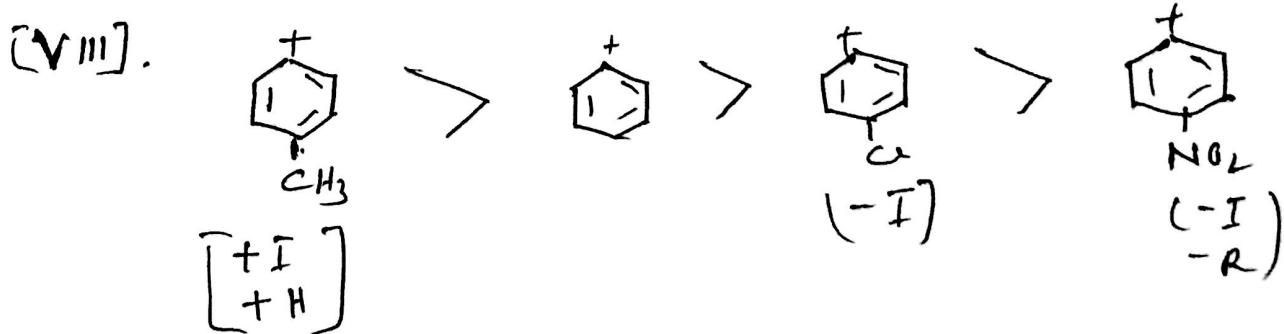
Stability of Carbocation $\propto \frac{1}{-\text{I effect}}$



If $\alpha\text{-H}$ is equal then stability of Carbocation $\propto +\text{I}$

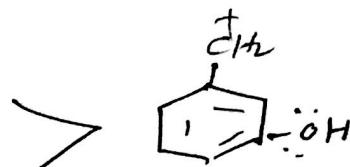
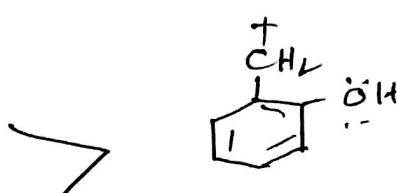
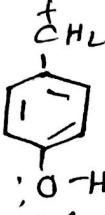
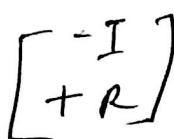
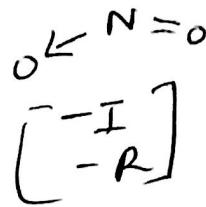
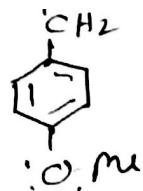


With increase % of s-character EN. value increase, so, stability of Carbocation decreases.

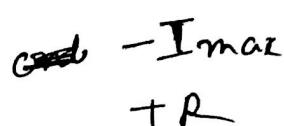
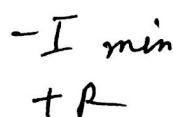


Stability of Carbocation is $\propto +\text{I}/+\text{H}/+\text{R}$

[i x].

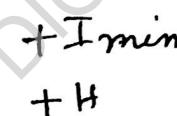
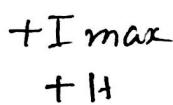
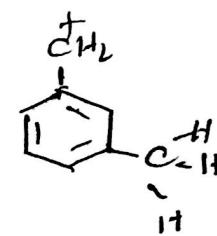
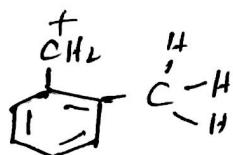


[X]



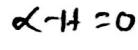
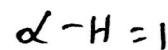
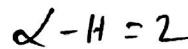
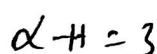
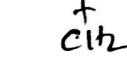
only - I

[xi]

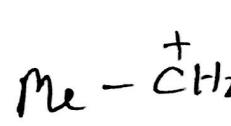
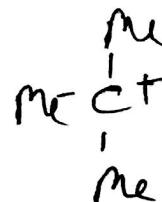
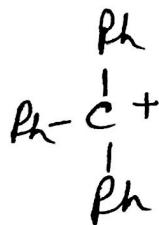


only + I

[xii]



[xiii]



Resonance
stabilized

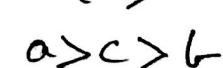


no of $\alpha\text{-H}$
 $= 3$

[xiv]



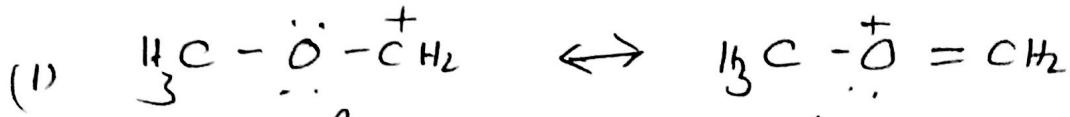
[xv]



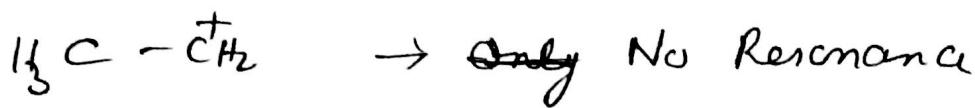
[xvi]



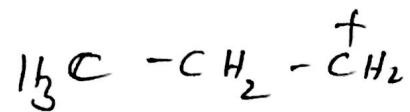
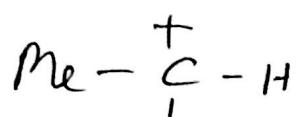
Q (10)



Resonance stabilized



(ii)



Me

No of $\alpha\text{-H} = 2$

No of $\alpha\text{-H} = 6$

(iii)

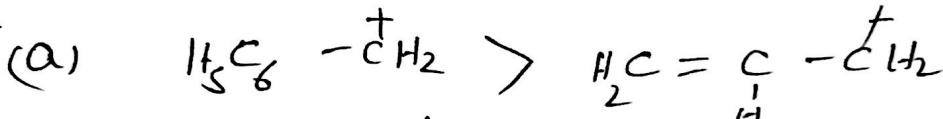


Resonance stabilized



S_o Ans - [C]

Q [11] -



[more no of
R.S.]

(b)



No of $\alpha\text{-H} = 3$

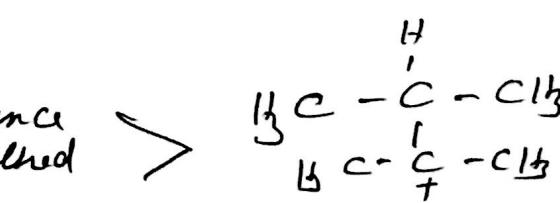
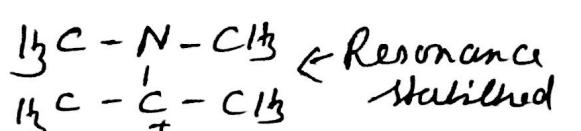
No of $\alpha\text{-H} = 0$

(c)

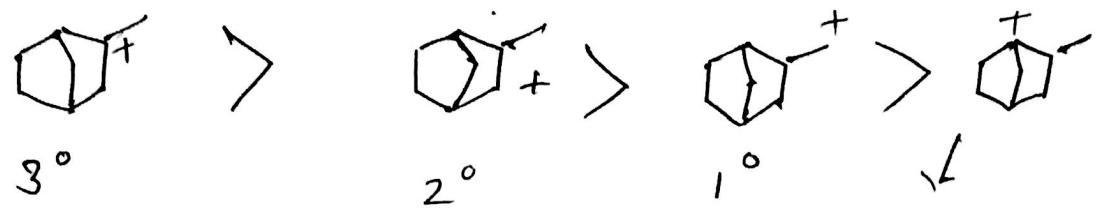


Resonance
stabilized

(d)



Q(12).

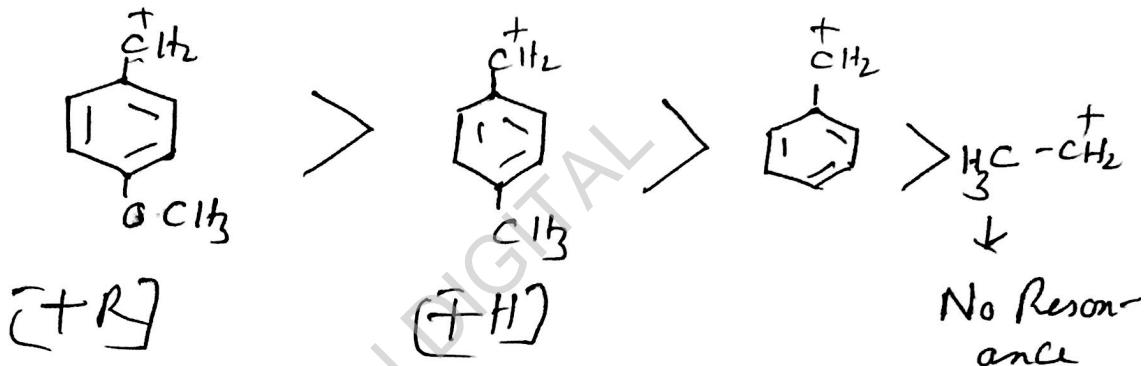


Ans : [C]

Bridge head
 C^+ is highly
unstable.

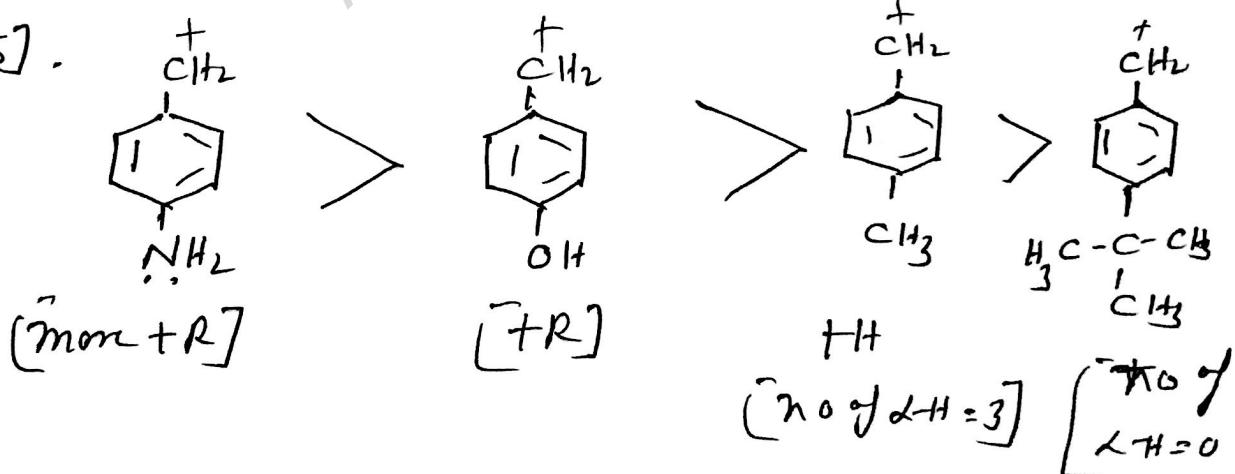
Q(13) $\xrightarrow{[A]} (Ph)_3 C^+$ is most stable due
to maximum number of R.S.

Q(14) -



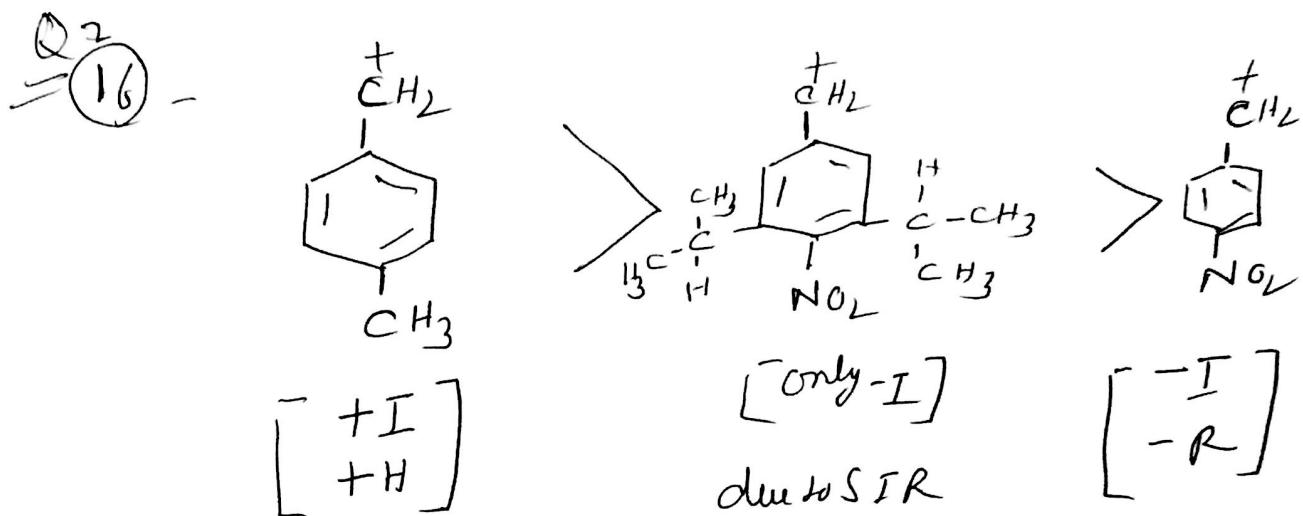
Ans - [A]

Q(15) .

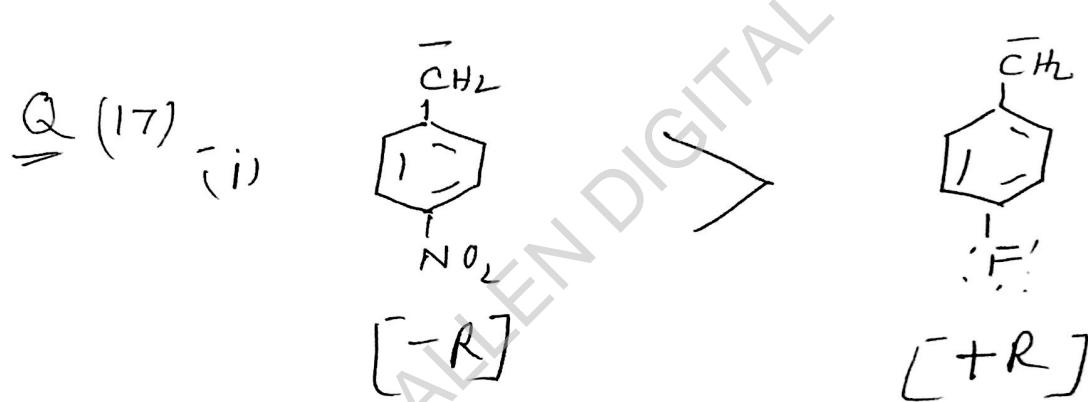


Solution of Ex - O-2

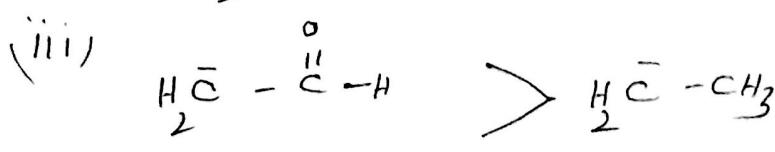
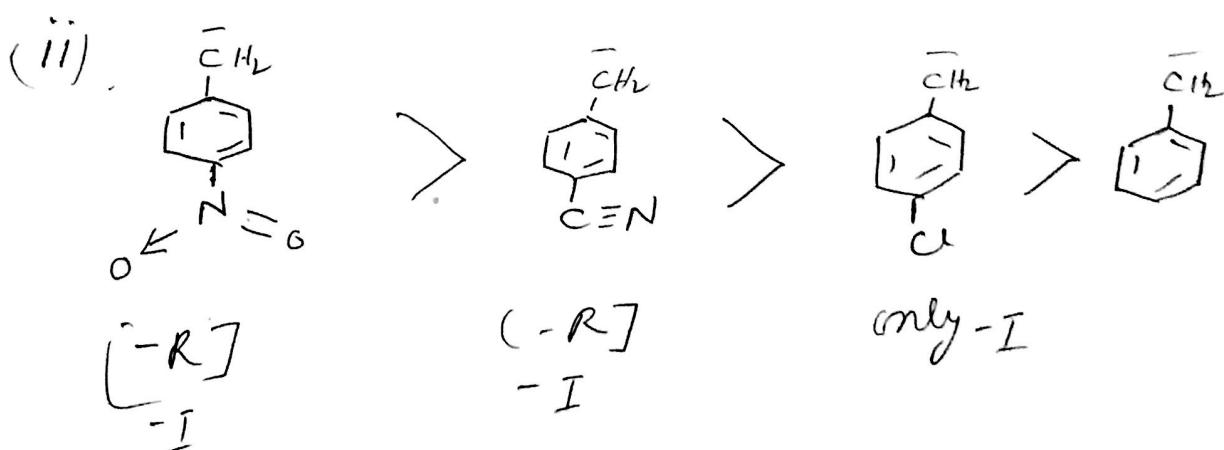
Q : 16 to Q : 30



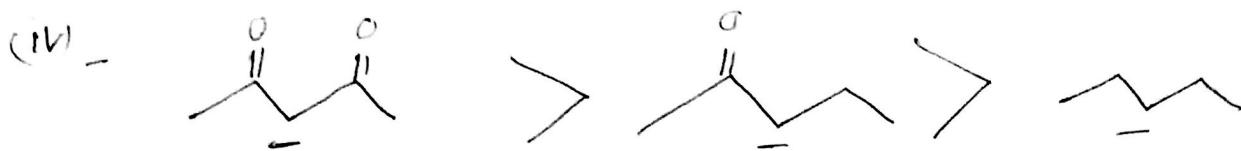
Ans: [B]



Stability of Carbanion $\propto -I / -II - R$



Resonance
stabilized

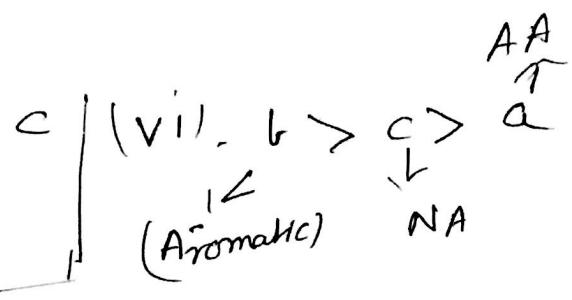
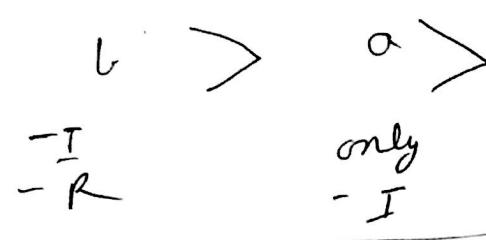


more
no resonating
structure

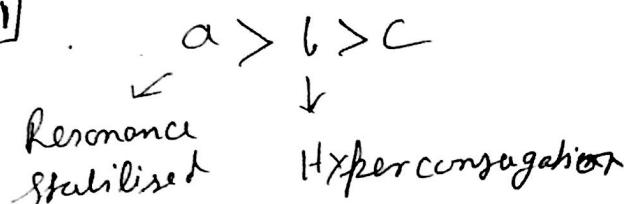
less R.S.

No Reso
nance

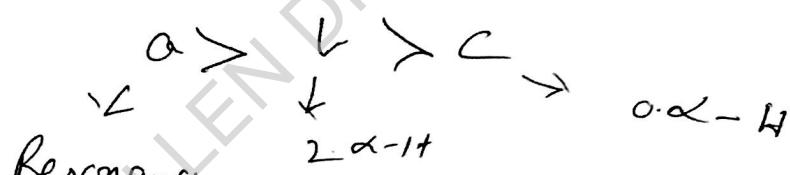
[V]



[VI]



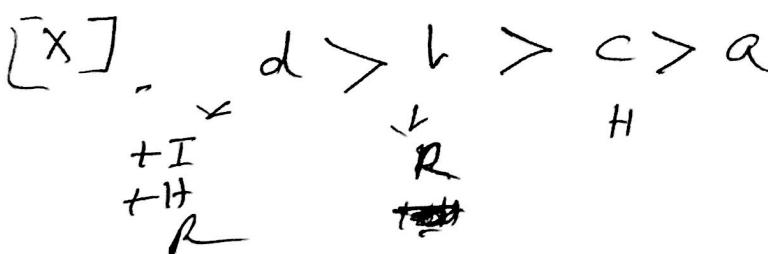
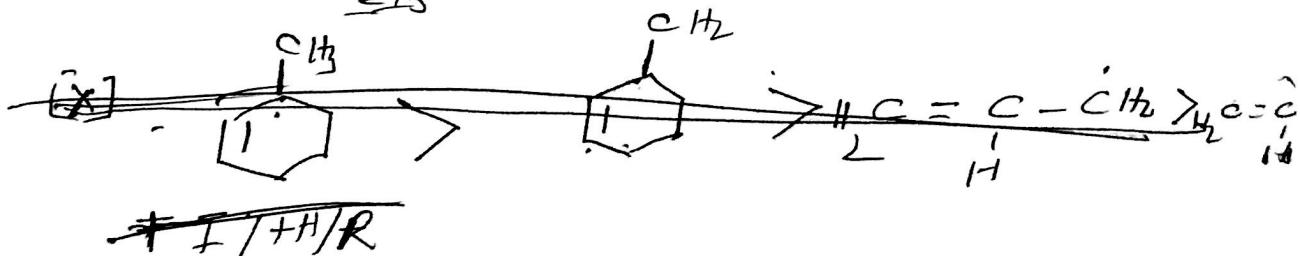
~~[VII]~~ [VIII]



[IX]



more
R.S



Q 18. Most Stable Carbocation is



-ive charge is at sp hybridized

Ans: [A] Carbon.

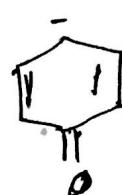
Q

=

[19] Most Stable Carbocation.

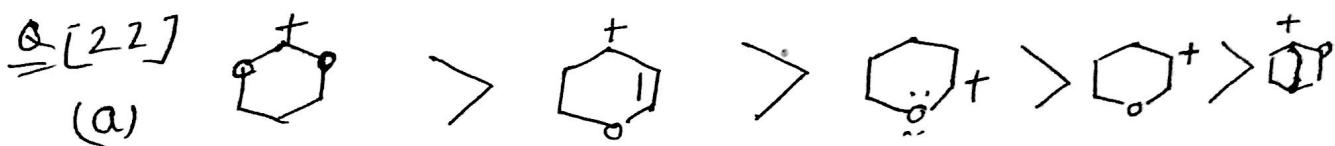


Q 20. [B]



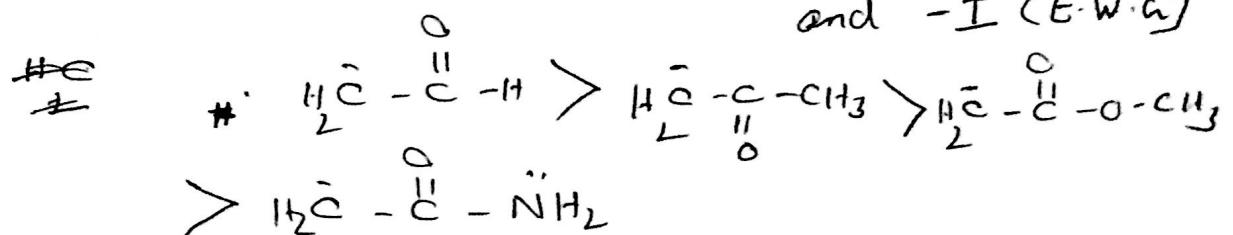
Most Stable due to Resonance

Q 21. [D]

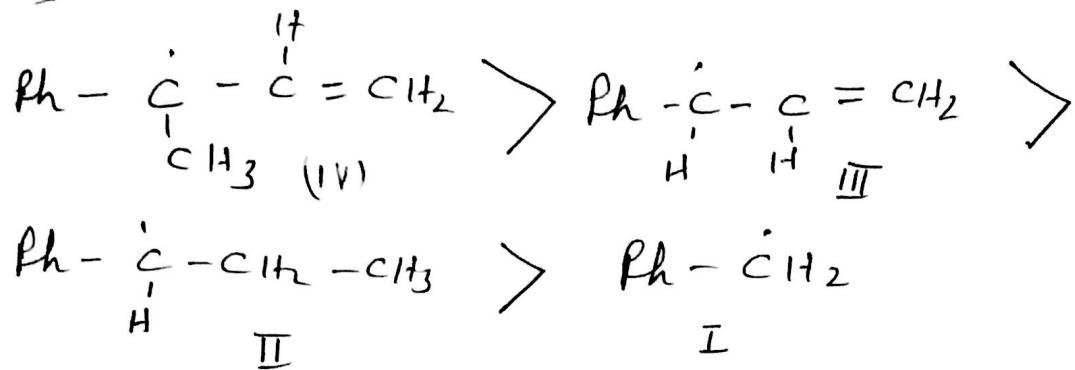


Stability of Carbocation \propto No of Resonating Structure.

(b) Stability of Carbanion \propto No of Resonating Structure and - I (E.W.G)



Q [23]



In (IV). Free radical is stabilized by $\overset{+}{\text{I}}/\overset{+}{\text{H}}/\text{Reso}$
 ~~$\overset{+}{\text{I}}/\overset{+}{\text{H}}/\text{Reso}$~~

(III). Free radical is stabilized by Resonance only

(II) Free radical is stabilized by less Resonance

(i). only Reso.

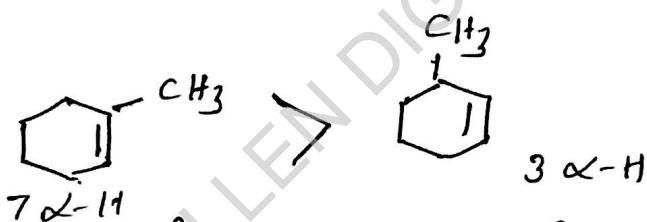
So, Ans - [B]

Q [24]

[A]

Q [25] -

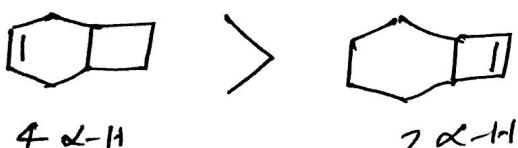
(a)



Stability of Alkene \propto no of α -H

(b). Isobutylcyclopentane $>$ Allylcyclopentane

[C]



Q [26].

HOC \propto No of Carbon

if no of C is equal

then HOC \propto Unsaturation

So (a) - 4658 , (b) 4638 (c) 4632

(d) - 4650, (e) 5293

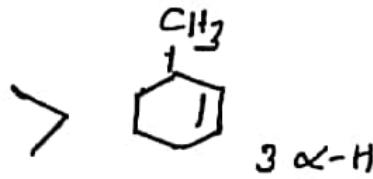
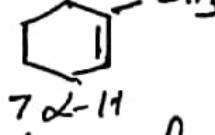
Ex-O2

Q [24].

[A]

Q [25].

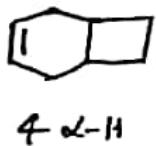
(a)



Stability of Alkene \propto no of α -H

(b). Isopropenyl cyclopentene $>$ Allylcyclopentane

[C]



2 α -H

Q [26].

HOC \propto No of Carbon

If no of C is equal

then HOC \propto Unstability

So (a) - 4658, (b) 4638 (c) 4632

(d) - 4650, (e) 5293

Scanned with CamScanner

Q [27].

Stability of Alkene \propto no of α -H

$$II > IV > III > I$$

Ans : [A]

Q [28].

Ans : [B] Only α -H

Q [29].

$HOC \propto$ no of Carbon

If no of C is equal

then $HOC \propto$ Unstability

Q [30].

$HOH \propto$ no of π bond

If no of π bond is equal $\frac{1}{\text{no of } \alpha\text{-H}}$

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

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

(iii) $b > a$

(iv) $a > b > c$

Ex. O-II

Q 31. HON

case-I \rightarrow when no. of π -Bonds are diff.

$|\Delta H_{\text{Hydrogenation}}| \propto \text{no. of } \pi\text{-Bonds}$

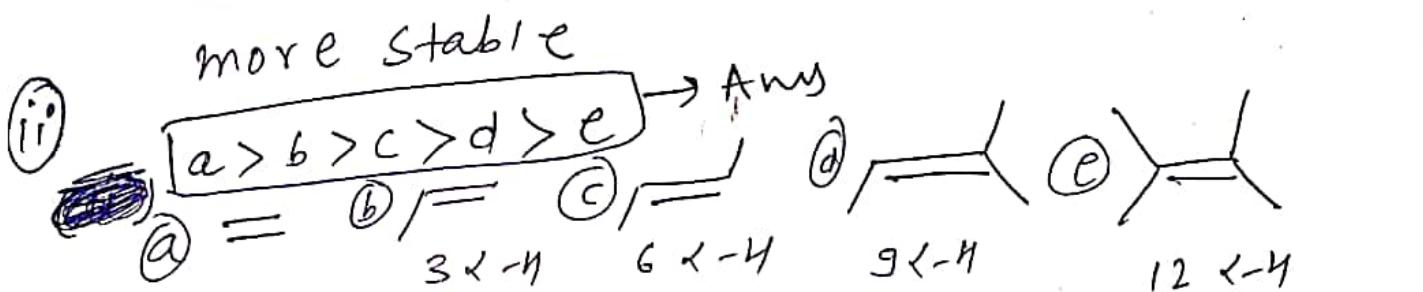
case-II \rightarrow when no. of π -Bonds equal

$|\Delta H_{\text{Hydrogenation}}| \propto \frac{1}{\text{Stability of Alkene}}$



\hookrightarrow Here no. of π -Bonds are same, so we will go for stability.

\hookrightarrow Due to Resonance, a will be



least stable max^m $\Delta H_{\text{Hydrogenation}}$ most stable

\hookrightarrow More α -H, Stability \uparrow $\Delta H_{\text{Hydrogenation}} \downarrow$ Less $\Delta H_{\text{Hydrogenation}}$

(iii)



1- π Bond 2- π Bonds Aromatic



$$b > c > a$$

In (a) and (b)
we will see
according to
no. π -Bonds

Here (b) is more stable
due to ~~Aromaticity~~ Aromiticity

\uparrow
Stability $\uparrow \Delta H_{\text{Hydrogenation}}$

π -Bonds $\uparrow \Delta H_{\text{Hydrogenation}} \uparrow$

So, Ans is

$$b > c > a$$

(iv)

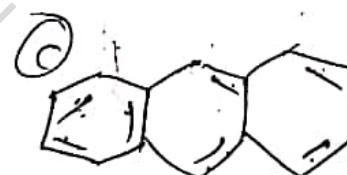


3 π Bonds

per Benzene
Ring



2.5 π Bonds
per Benzene
Ring



$\frac{7}{3}$ π Bonds
per Benzene
Ring

(HOM per
Benzene)
Ring

HOM of π -Bonds

$$a > b > c$$

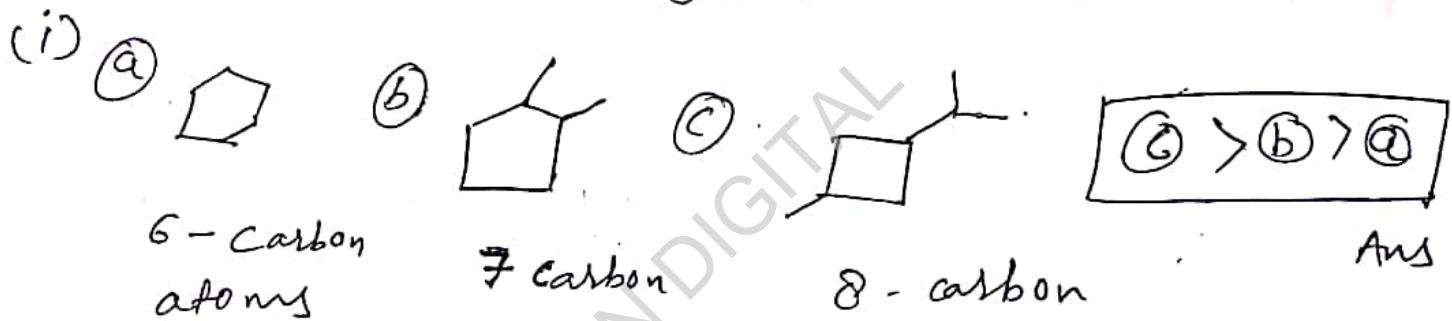
Ans

Q(32) $\underline{\underline{HOC}}$

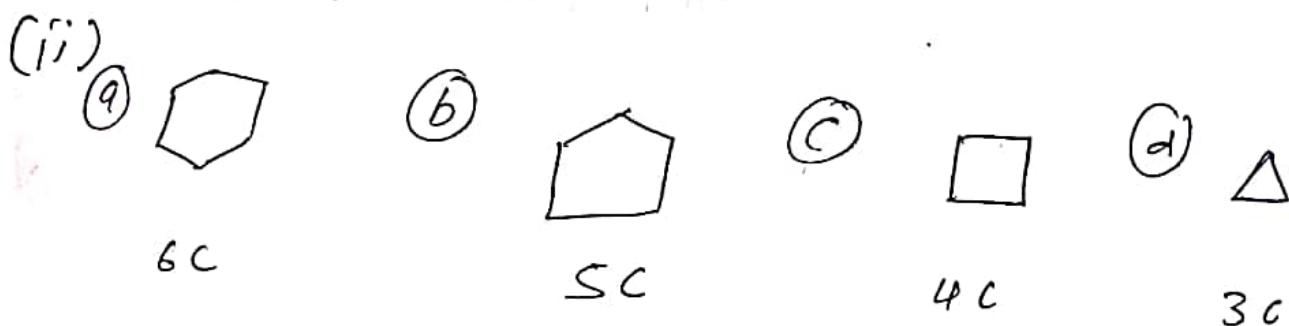
↳ $HOC \propto$ no. of c-atoms

↳ If no. of c-atoms are same

$$HOC \propto \frac{1}{\text{Stability}}$$

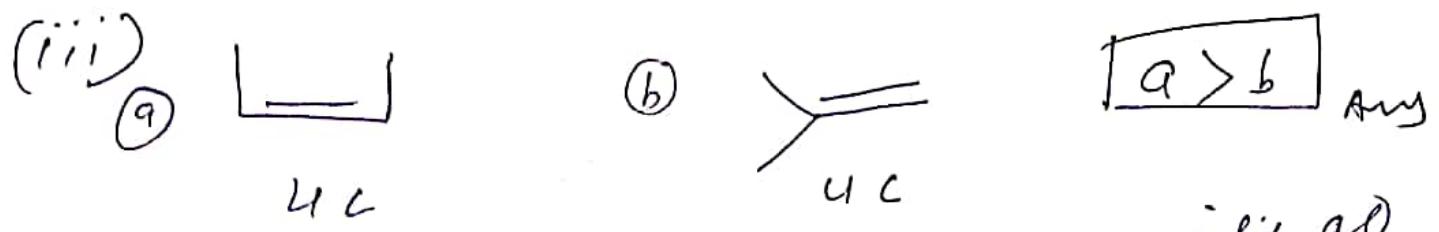


↳ more no. of c, more will be HOC.



↳ more no. of c, more will be HOC

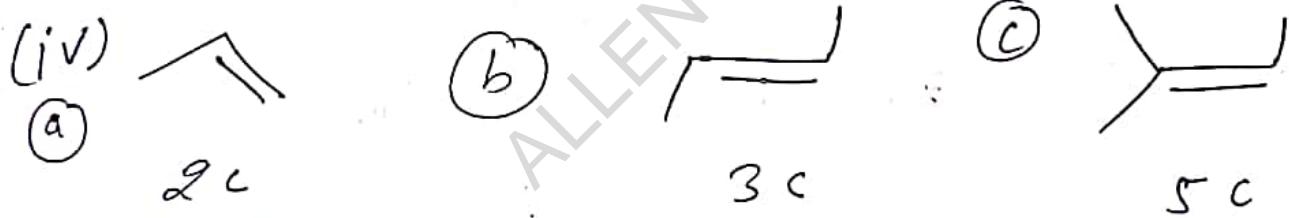
$$a > b > c > d$$
 Ans



$$\boxed{a > b} \text{ Ans}$$

↳ no. of 'c' same, now we will go for stability

↳ (b) is more stable, then (a) so,
HOC will be less for (b).



↳ more no. of 'c', HOC will be more

$$\boxed{c > b > a} \text{ Ans}$$

Q 33

↳ HOMO & no. of π -bonds

↳ HOMO $\frac{1}{\text{stability of Alkene}}$ (I) no. of π -Bonds
are same

(a)



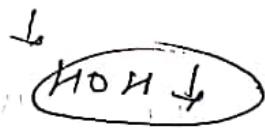
(a)



(I)

$$\xrightarrow{\text{HOMO}} \boxed{\text{I} > \text{II}} \quad \underline{\text{Ans}}$$

Stable due to Resonance



(b)



3- π Bonds

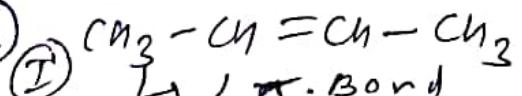


1 π -Bond

$$\xrightarrow{\text{HOMO}} \boxed{\text{I} > \text{II}}$$

Ans

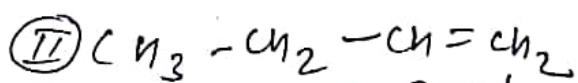
(c)



1 π -Bond

$\hookrightarrow 6 \alpha - \text{H}$

\downarrow



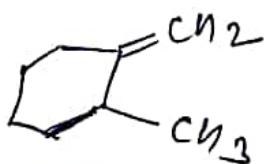
1 π -Bond

$\downarrow 2 \alpha - \text{H}$

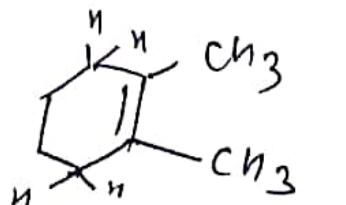
more stable, less HOMO

$$\xrightarrow{\text{HOMO}} \boxed{\text{II} > \text{I}} \quad \underline{\text{Ans}}$$

(d)



1 π -Bond
 $\hookrightarrow 3 \alpha - \text{H}$

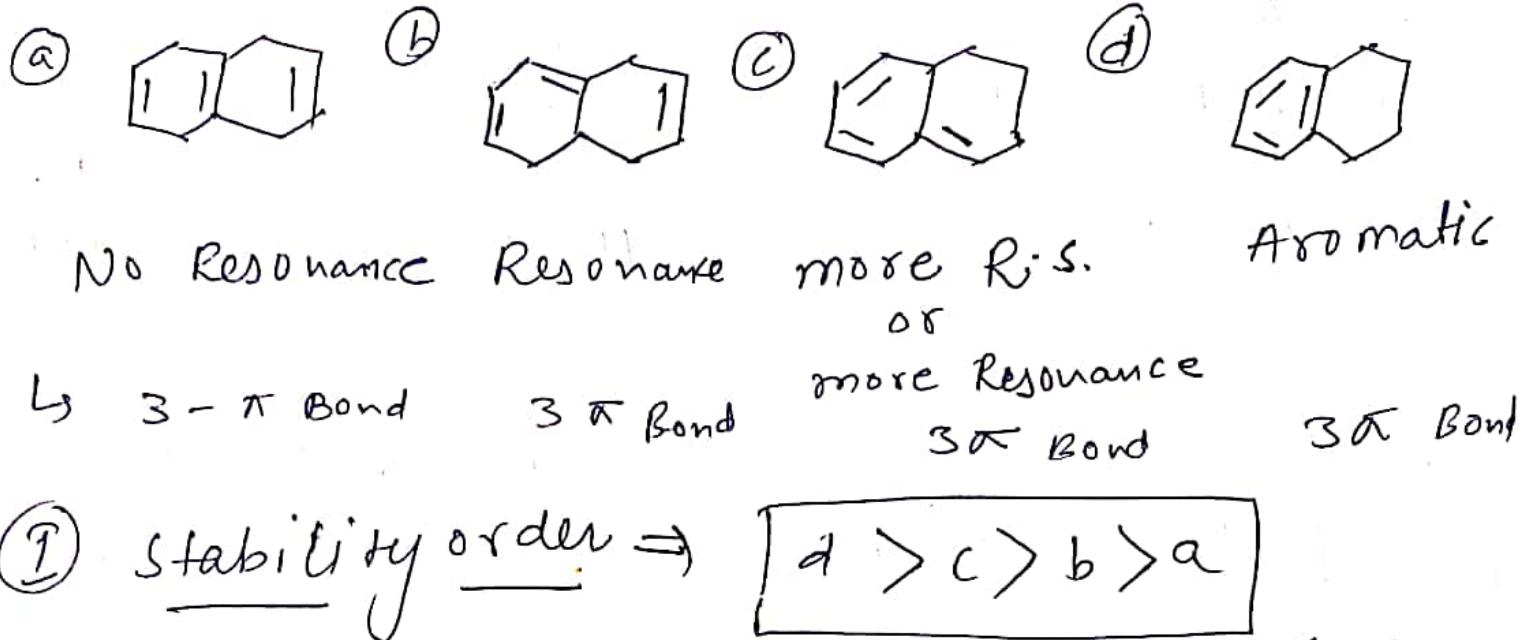


1 π -Bond
 $\downarrow 10 \alpha - \text{H}$
more stable

$$\xrightarrow{\text{HOMO}} \boxed{\text{I} > \text{II}}$$

Ans

Q 34



Ans

(ii) HOM

↳ no. of π -Bonds are same, ~~is same~~ now we will go for stability.

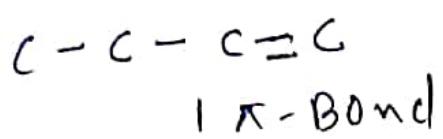
HOM \propto 1 /
stability of Alkene

HOM \Rightarrow a > b > c > d

Ans

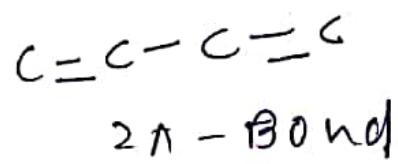
? 35

1-Butene



HOM \rightarrow 30 Kcal/mol.

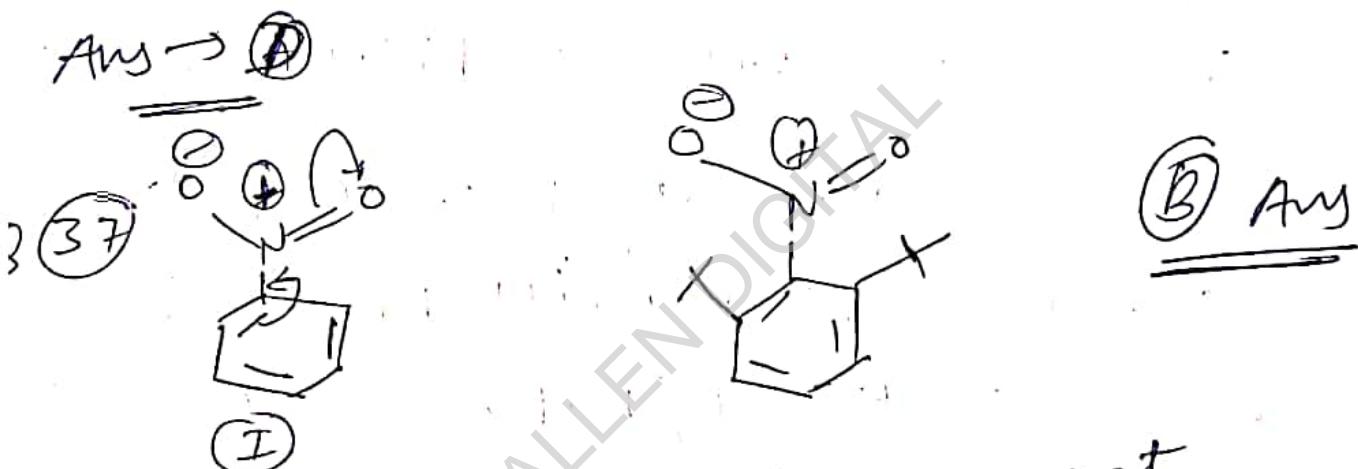
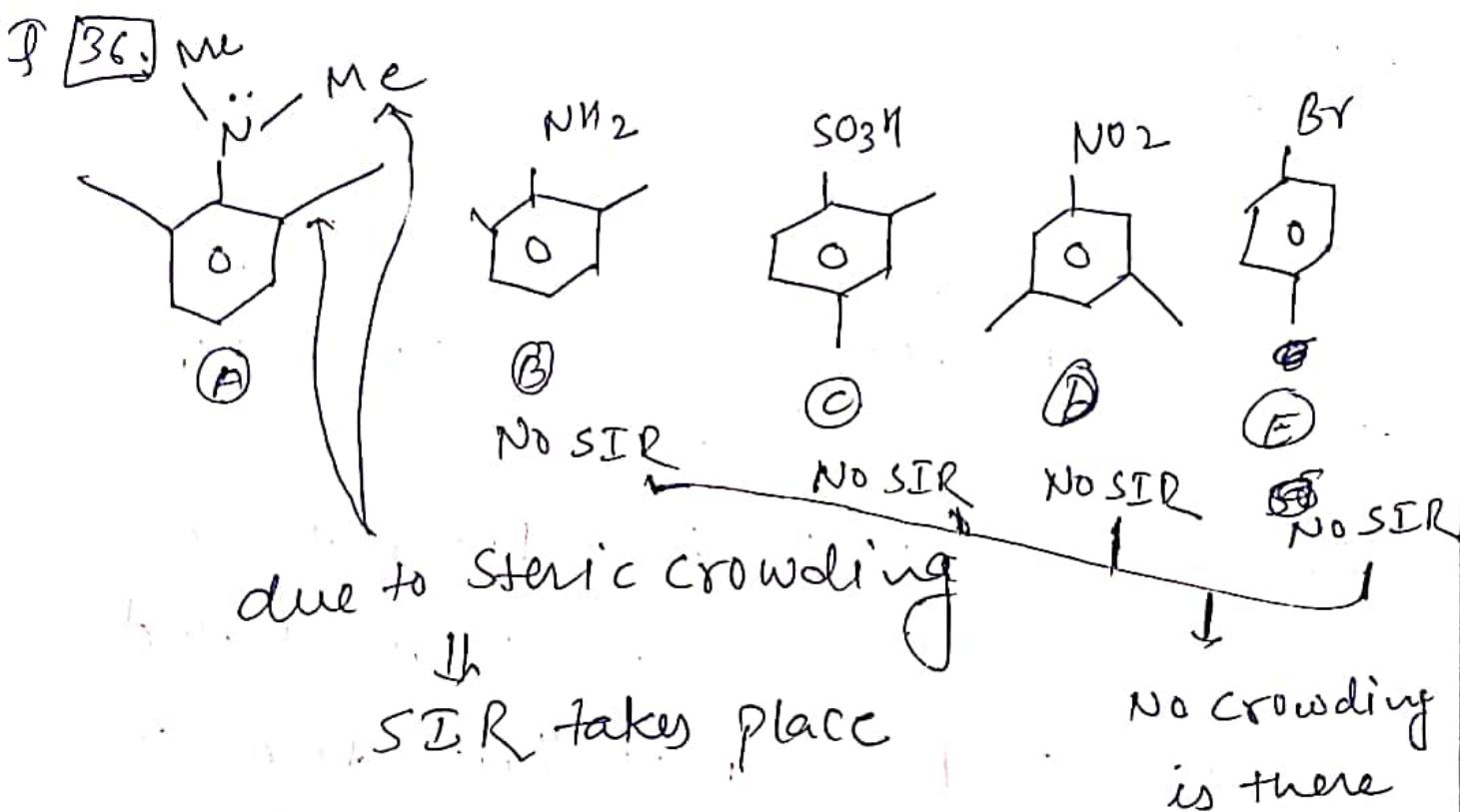
1, 3-Butadiene



↳ As 1, 3-butadiene has two π -bonds so, its HOM should be 60 Kcal/mol but due to resonance its stability increase

(Resonance energy) so HOM decrease a bit, so HOM will be lesser than 60 Kcal/mol. so it will 57 Kcal/mol.

Ans \rightarrow C



Resonance not possible due to SIR effect

\downarrow

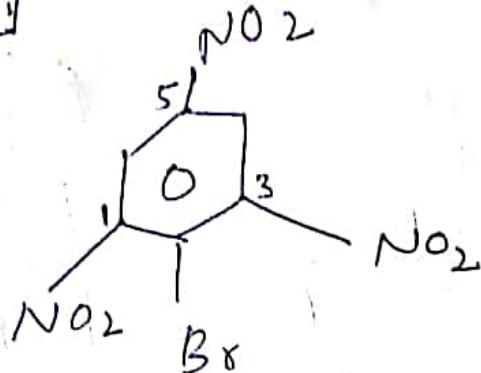
Single Bond character is there only

B.O.T

B.L. \downarrow

So. B.L. \Rightarrow $\boxed{II > I}$

Q 38



Ans - C

B.L

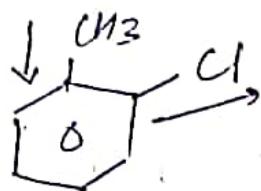
$$C_1-N = C_3-N > C_5-N$$

~~Between~~ C₁-N and C₃-N steric crowding is there so, no resonance takes place between C and N atom.

So equal kind of B.O. developed and hence equal bond lengths but in ~~C₅-N~~ steric crowding, so resonance takes place and it differs from others two in bond length and it will be less than other two bond lengths because of D.B. character due to resonance.

Q [39] Dipole moment (μ)

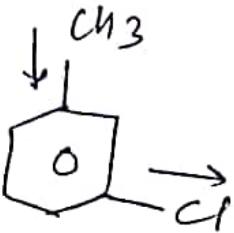
(i) (a)



$$\boxed{\mu \neq 0}$$

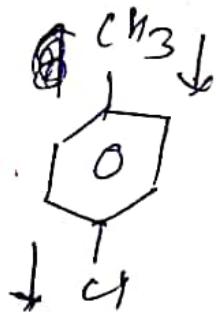
least μ

(b)



$$\boxed{\mu \neq 0}$$

(c)



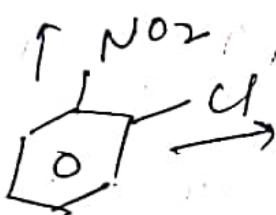
$$\boxed{\mu \neq 0}$$

max^m μ

$$\Rightarrow \boxed{(c) > (b) > (a)}$$

Ans

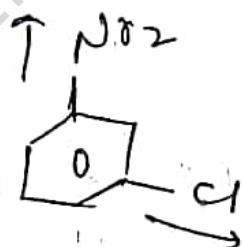
(ii) (a)



$$\boxed{\mu \neq 0}$$

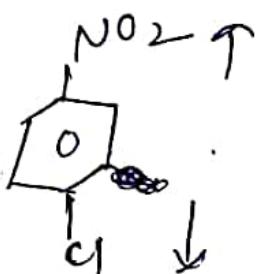
max^m μ

(b)



$$\boxed{\mu \neq 0}$$

(c)



$$\boxed{\mu \neq 0}$$

least μ

$$\Rightarrow \boxed{a > b > c}$$

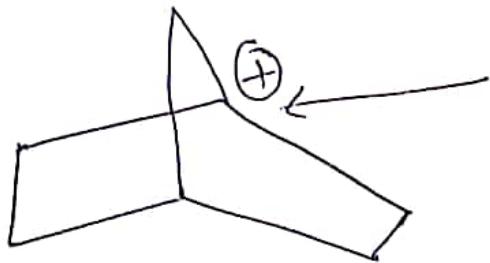
Ans

(iii) In (b) there is steric crowding so, compound becomes non-planar hence we can't calculate by direct vectors and methyl group cancel each other in the molecular plane so its dipole moment is less than (a).



$$[u \otimes (a > b)]$$

Q 40



Bridge Head position
④ not possible

↓

Bredt's Rule \Rightarrow According to this carbocation is not possible at bridge head position.

Ex: S-I

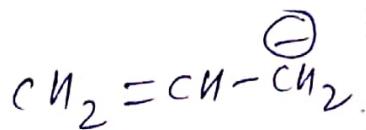
Q(1)



cyclopentadienyl

II

Aromatic



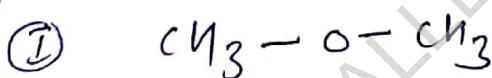
Allyl anion
II,

Resonance

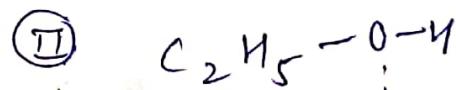
↳ more stable due to aromaticity

Ans - C

Q(2)



No H-Bonding

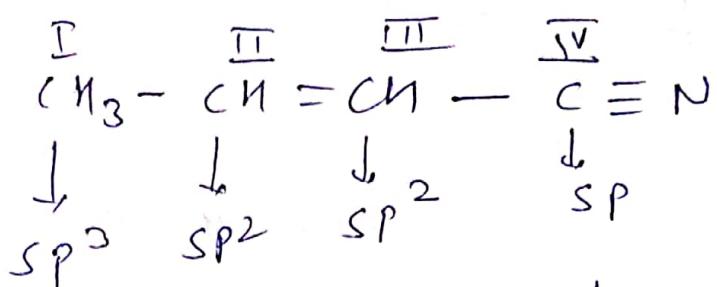


intermolecular
H-Bonding

So, Boiling point of ② is higher
than ①.

Ans → A, D

Q [3]

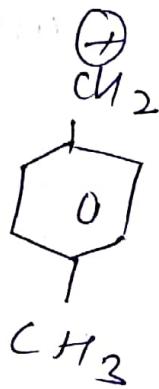
1.5 min^mmax^m

most EN



Ans → D

Q [4]



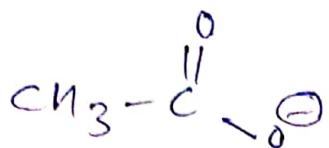
~~more stable due to hyperconjugation~~

↳ BE ($-n < C-D$)

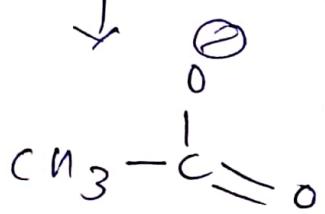
so, Extent of Hyperconjugation will be greater in (I). so (D) will be more stable.

⇒ (more $+n - \text{CH}_3$ than $- \text{CD}_3$)

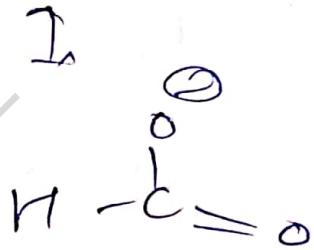
Q [5]



acetate ion



Formate ion



↳ equivalent R.s

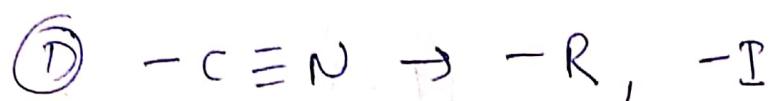
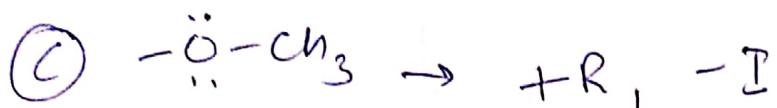
↳ C-O, B.L is equal

equivalent R.s

C-O, B.L is equal

Ans $\rightarrow \boxed{A, B, D}$

Q 6



Ans \rightarrow (A) $\rightarrow P, S$, (B) $\rightarrow Q, R$, (C) $\rightarrow Q, S$, (D) $\rightarrow P, S$

Q Ans (A) $\rightarrow P, Q, S$ (B) ~~R~~ (C) P, S (D) Q, S

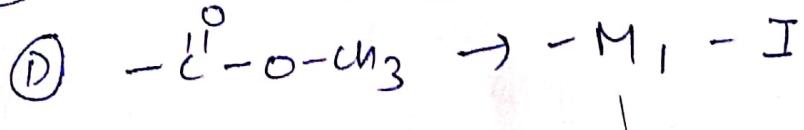
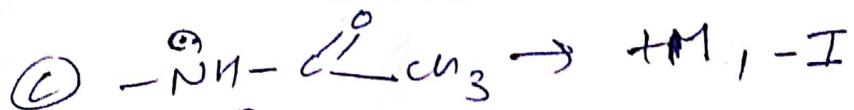
(A) $-N=O \rightarrow$ EWG, as well as EDG, so
it will show $+M$ as well
as $-M$.

$\boxed{-M, +M, -I}$

\hookrightarrow Due to EN of $-N=O$, it
will show $-I$.

(B) $-CH_3 \rightarrow \alpha-H \Rightarrow$ Hyperconjugation

$\downarrow h \uparrow +h$



$\text{Q} \oplus$	P	Q	R	S	T
-OH		$-\text{NO}_2$	$-\text{CH}_2-\text{CH}_3$	S^+ $-\text{NH}_3$	$-\text{NH}_2$
+M		-M	neither +M nor -M	Neither +M nor -M	+M
-I		-I	+I	-I	-I

↓

↳ Donate by Resonance ↳ withdraw by Reso.

↳ No Reso.

↳ No Reso.

↳ Donate by Reso.

↳ withdraw by inductive withdraw by inductive ↳ Donate by inductive ↳ withdraw by inductive ↳ withdraw by inductive ↳ withdraw by inductive

Ans → A → R B → S C → P, T D → Q

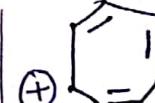
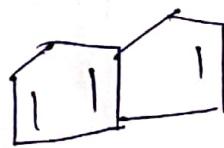
Q 9

(A) → Q, S

(B) → P, S

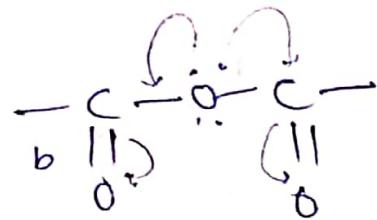
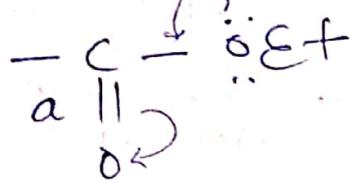
(C) → P, S

(D) → R, S



	(A) → Q, S	(B) → P, S	(C) → P, S	(D) → R, S
cyclic	✓	✓	✓	✓
cyclic conjugation	X	✓	✓	✓
planer	X	✓	✓	✓
Hückel πe^-	-	$10\pi e^-$	$6\pi e^-$	$4\pi e^-$
Result	Non Aromatic	Aromatic	Aromatic	Anti Aromatic

Q 10 Ans → D



~~BL~~

less D.B.

character at (a)

more D.B.

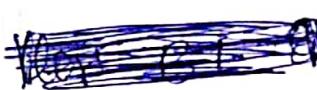
charact. at (b)

II



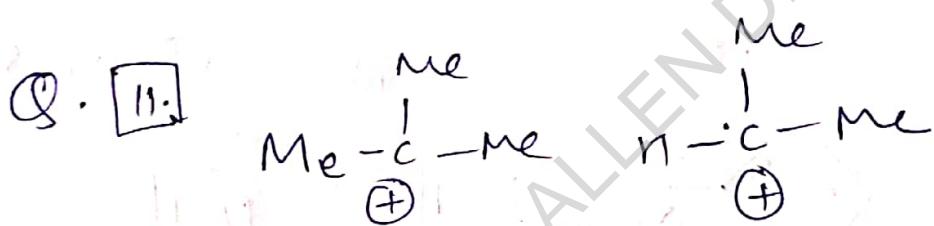
BL T_a

II



BL T_b

BL $\boxed{a > b}$



$\alpha-\text{H} \Rightarrow 9$

6

Hyperconjugative structure \Rightarrow max^m
stability max^m

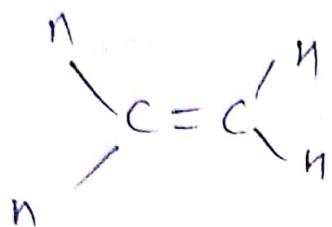
3
min^m
min^m

so stability $\rightarrow \text{Me}_3\overset{\oplus}{\text{C}} > \text{Me}_2\overset{\oplus}{\text{CH}} > \text{Me}\overset{\oplus}{\text{CH}_2}$

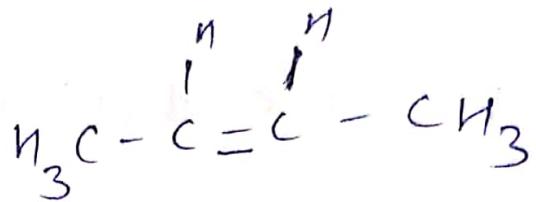
$\boxed{\text{Hyper conjugation} \propto \text{no. of } \alpha-\text{H}}$

Ans → A

Q[2] Ans → (D)



Ethylene



2-Butene

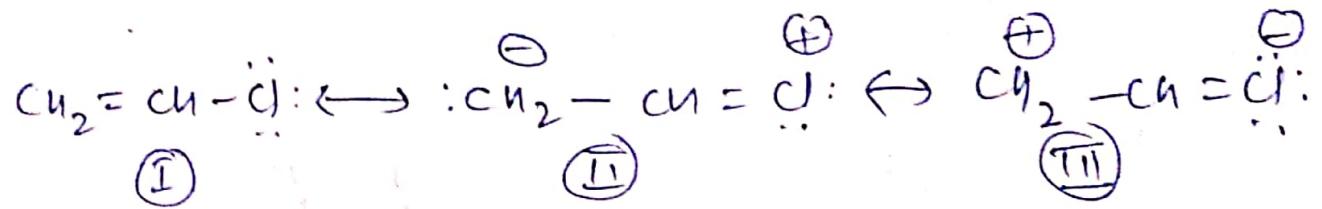


↳ Always D.B
character

↳ PEB ↑

6
Decreases Double
~~Double~~ Bond
character due
to hyperconjugation
PEB ↓

9 (13)



↳ for Relative stability of R.S -

- ## ① No. of π -Bonds & Stability

- ② Stability & New charge development

- ③ Stability & complete octet

- ④ One charge is more stable on more EN atom

- EN atom

⑤ opposite charges are more stable when they are closer and like charges are more stable when separated.

Neutral

o cket → complete
(all atoms)

(II)
4.
charged

complete
calibration

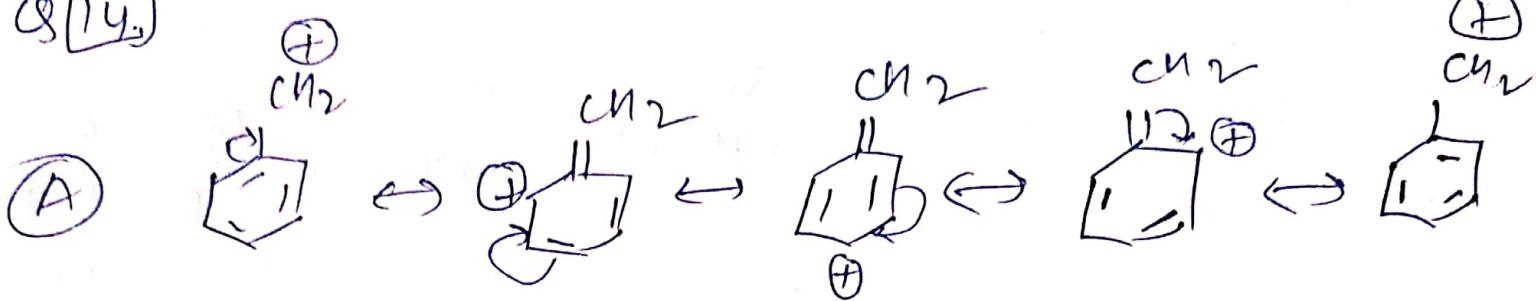
11

charged

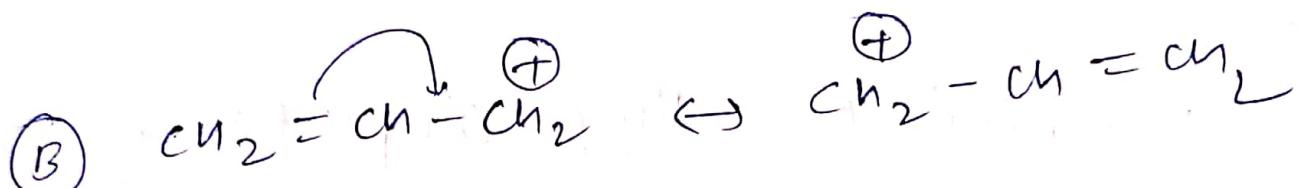
~~Incomplete~~ Incomplete
(c atom)

so order of stability is $I > II > III$

Q(14)



$$\text{Total R.S} \Rightarrow 5$$

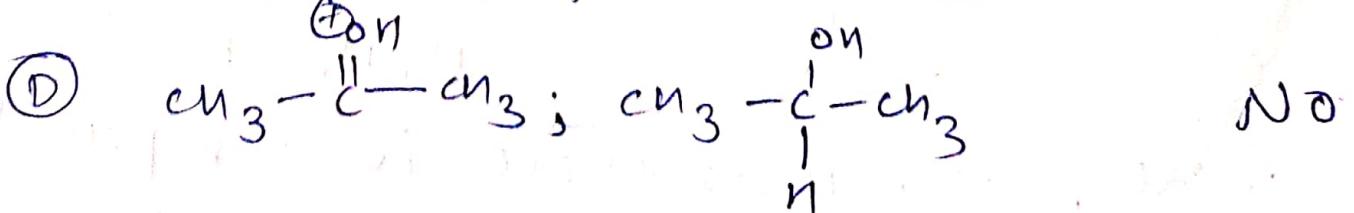
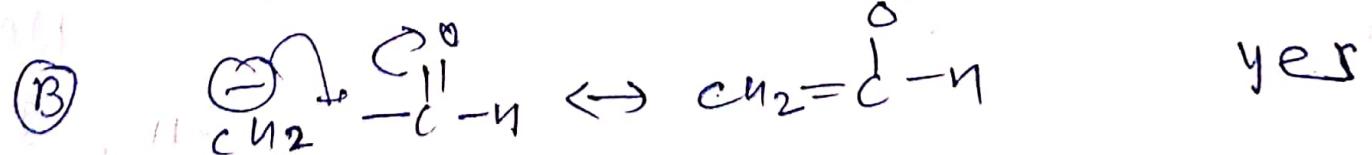
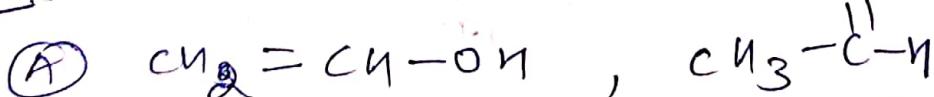


$$\text{Total R.S} \Rightarrow 2$$

so, (A) have greater R.S.

Ans \Rightarrow (A)

Resonance \rightarrow Only the location of l.p. or π -Bond can change. Resonance pair

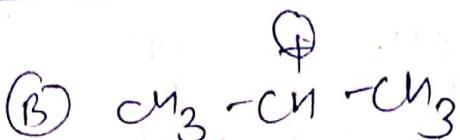


Ans \Rightarrow (B)

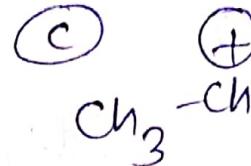
Q 6. Ans \rightarrow D



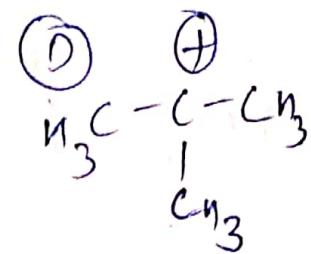
2 α -H



6 α -H



3 α -H

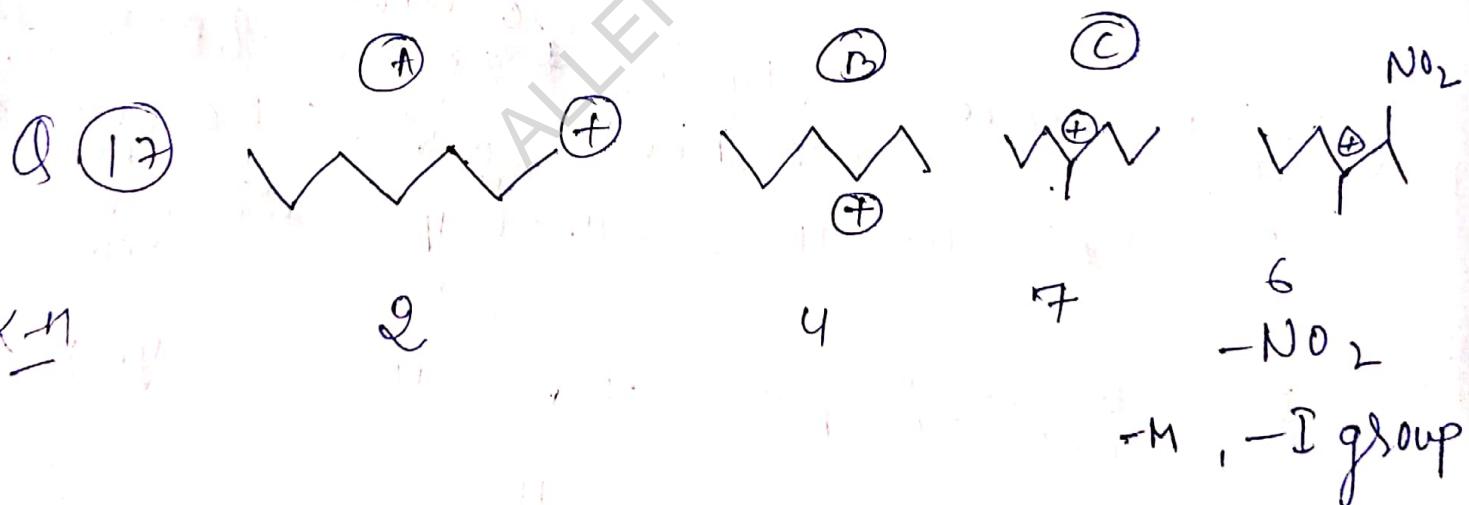


9 α -H

↳ Stability of hyperconjugation \propto

no. of α -H

D > B > C > A



Stability of C^+ \propto $\frac{+\text{M}, +\text{H}, +\text{I}}{-\text{M}, -\text{H}, -\text{I}}$

Here, 7 α -H is there in compound (D)

so, (D) will be most stable

Due to maxⁿ hyperconjugative structures.

Ans \rightarrow (D)

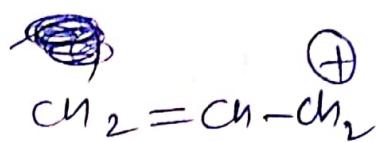
Q 18

Stability

(A)



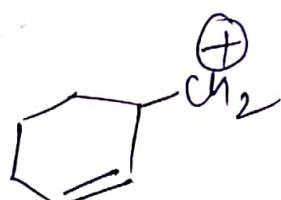
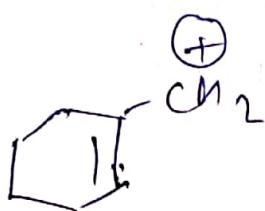
(II)

 $\boxed{\text{I} > \text{II}}$

more R.s

less R.s

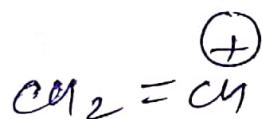
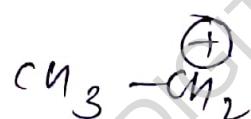
(B)

 $\boxed{\text{I} > \text{II}}$

Resonance

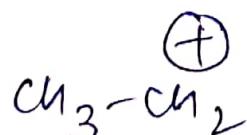
No Resonance

(C)

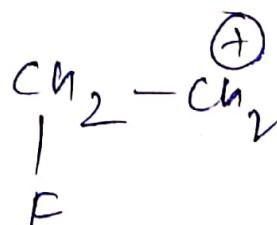
0 α -H~~3~~ α -H $\boxed{\text{II} > \text{I}}$

↳ Positive charge is less stable in (I) compound

(D)

3 α -H

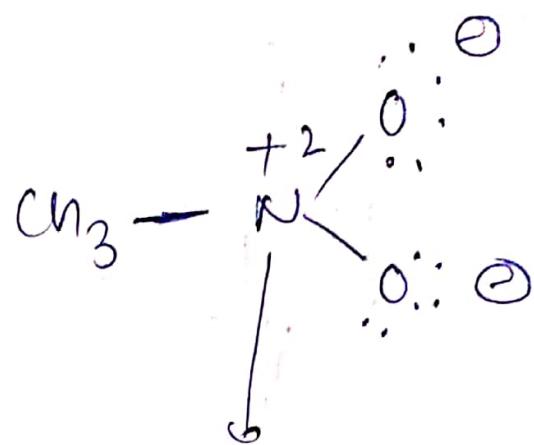
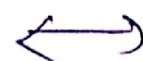
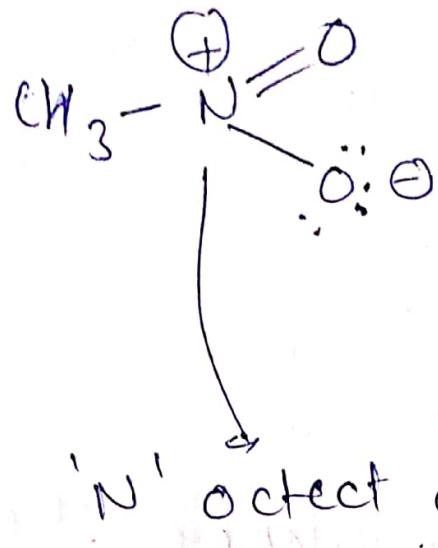
more stable



-I group
F.

 $\boxed{\text{I} > \text{II}}$ Ans \rightarrow (C)

Q 19.



'N' octect complete

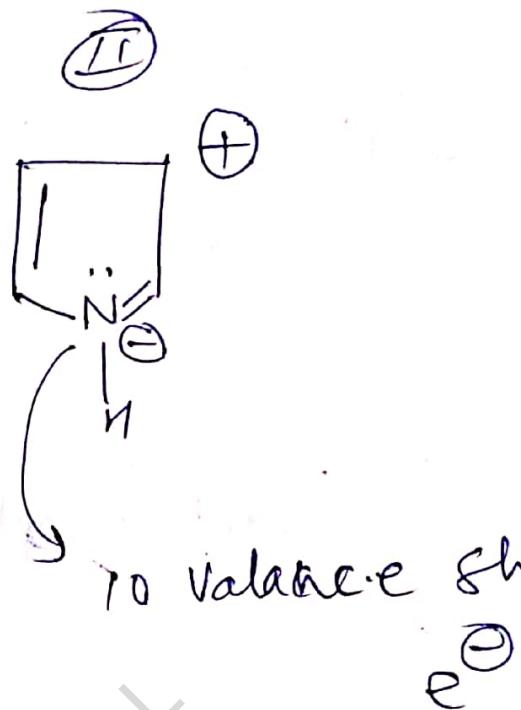
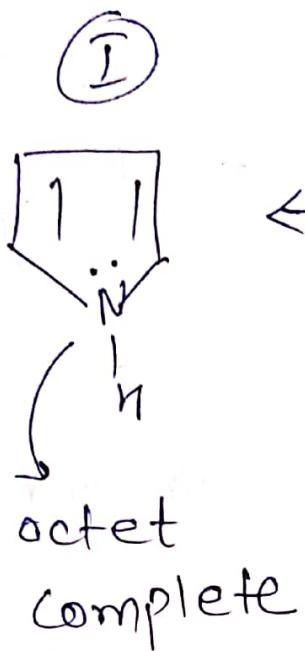
Incomplete
octet

~~1. sextet~~

↳ Generally there are $8e^-$ in valence shell of 2nd period element but here in ~~respective~~ II their are only six e^- in valence shell of 'N', so it's not acceptable.

Ans - B

Q 20.



↳ According to octet Rule (for 2nd period elements), there are $8e^-$ in valence shell - ~~But~~ But here in structure ②, there are $10e^-$ in ~~the~~ N-atom's valence shell, which is not acceptable

Ans → C

Q 21

Delocalization of e^- increase molecular stability because -

↳ potential energy of molecule decreases

↳ $e^- - e^-$ repulsion decreases

Aus $\rightarrow \textcircled{C}$

Q 22.

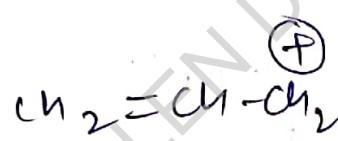


Aromatic

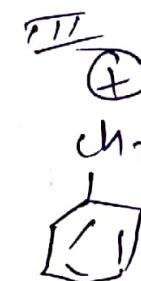
II

most stable

II

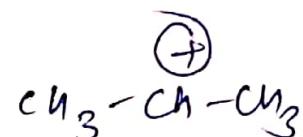


Resonance



Resonance
(more)

III



II

least
stable

Because for stability of C^+ we will see -

① Dancing Resonance

② Aromaticity

③ +M

④ Resonance

⑤ +H

increasing
stability

+I

Hybridisation

-I

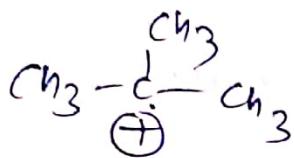
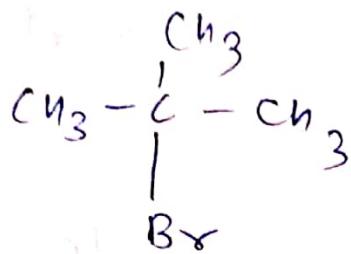
-H

-M

⑪ Antiaromatic

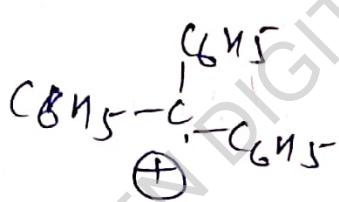
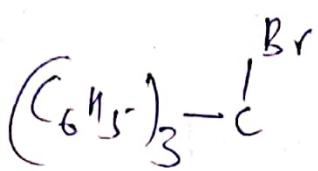
Q 23

(A)



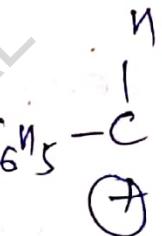
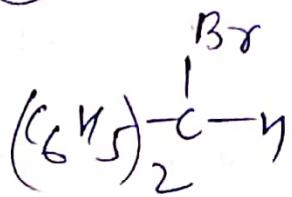
92-11

(B)



Most stable
 C^{\oplus}

(C)



Resonance least

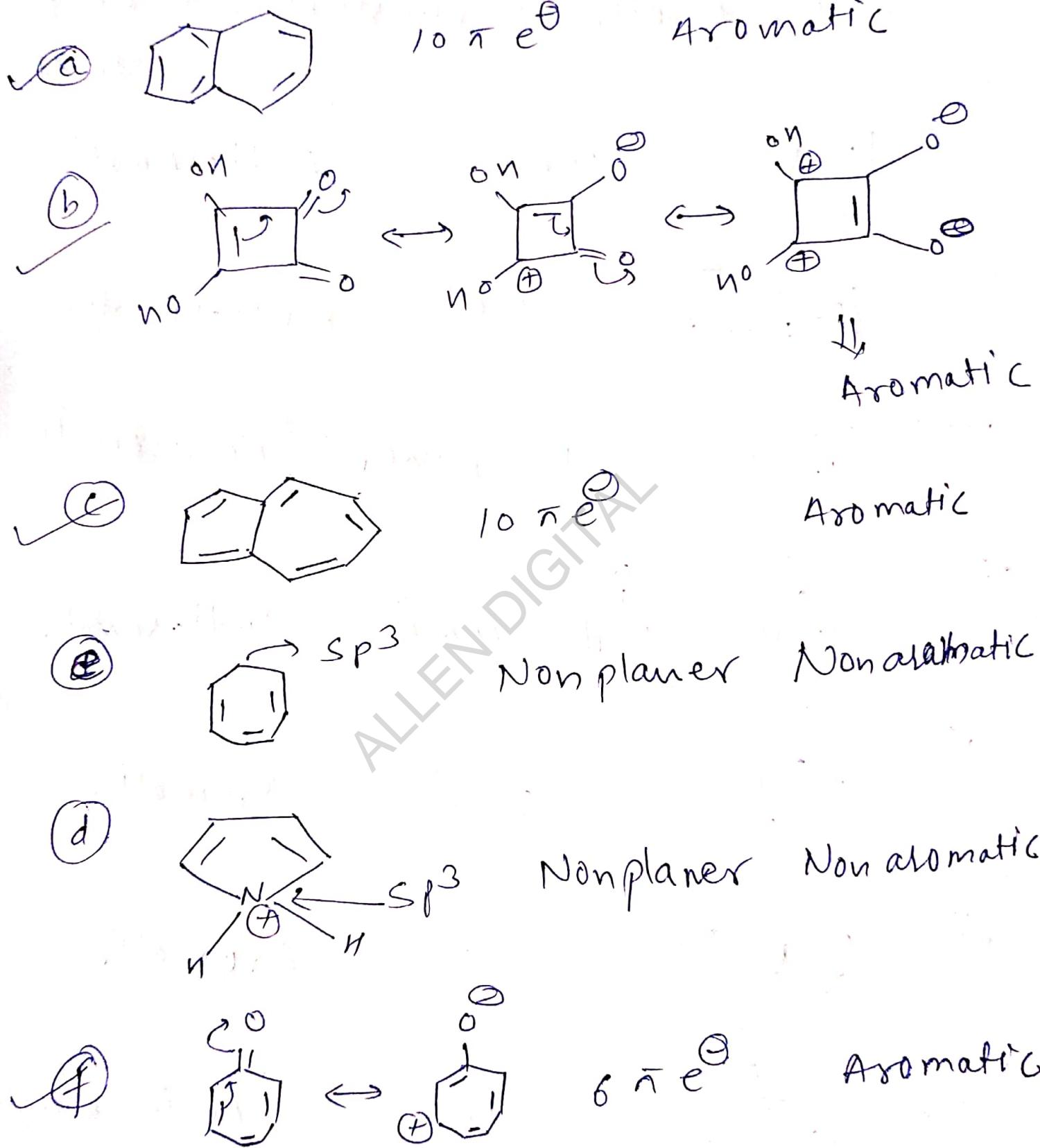
(max^m R.S.)

Reso.

(Min^m R.S.)

Ans → (B)

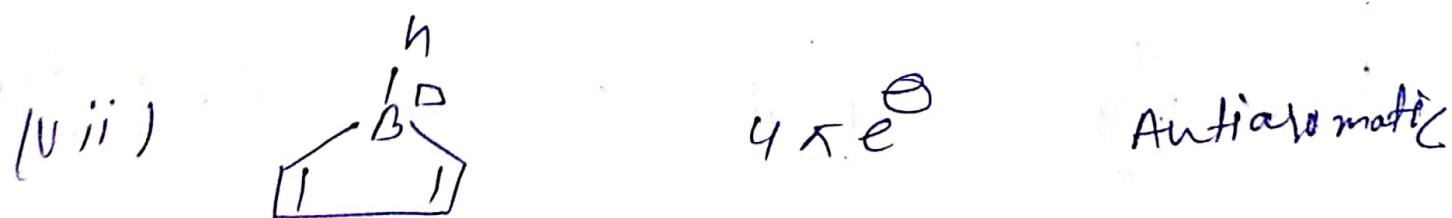
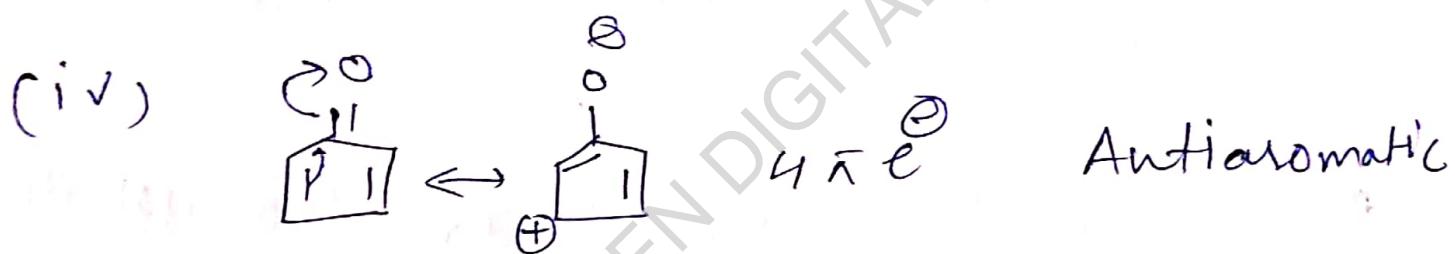
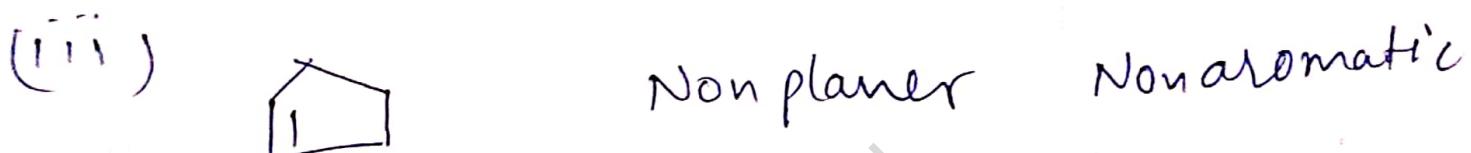
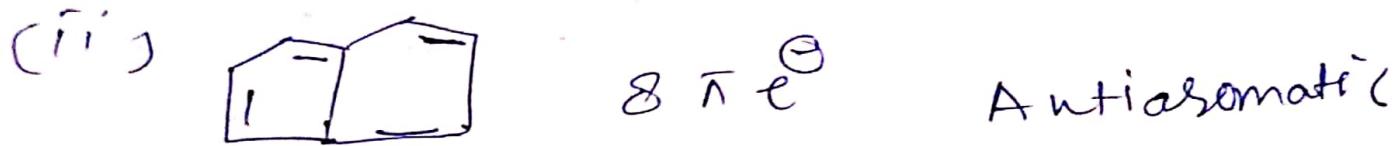
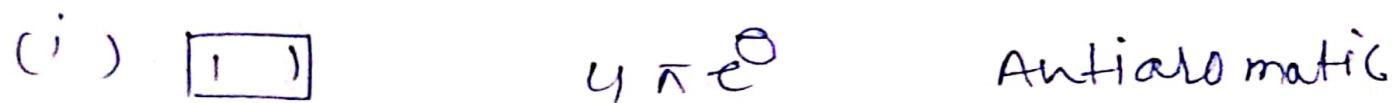
Q 24



Ans \rightarrow (f)

Q 25

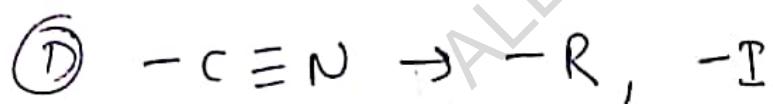
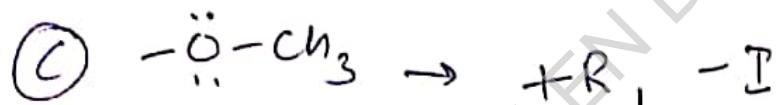
Anti Aromatic \Rightarrow unstable at Room Temp.



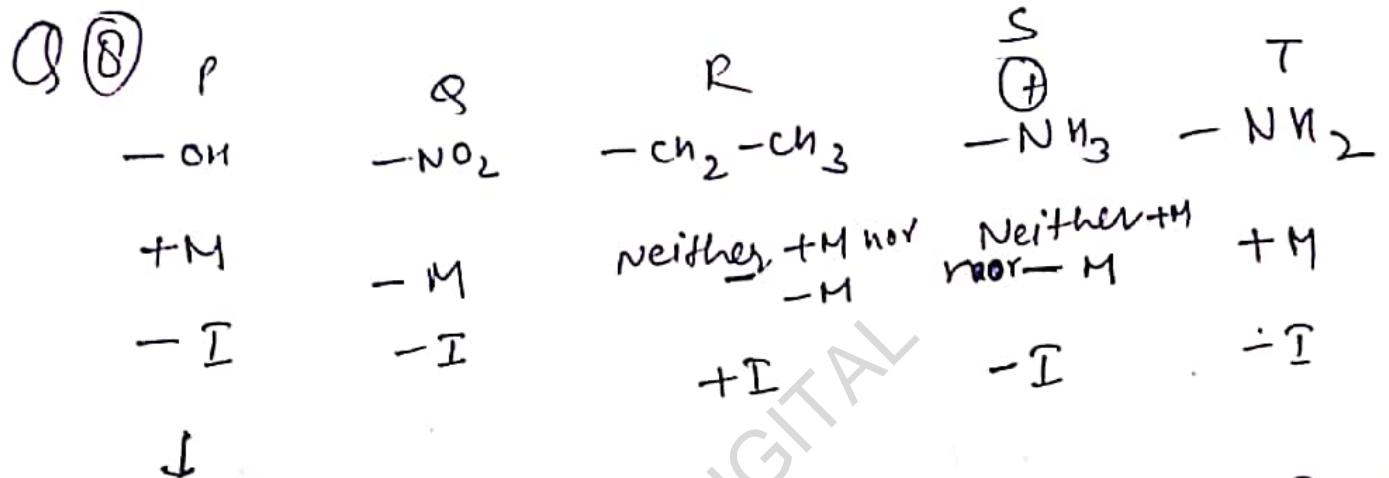
Ans \Rightarrow (4)

Ex -S1

Q 6



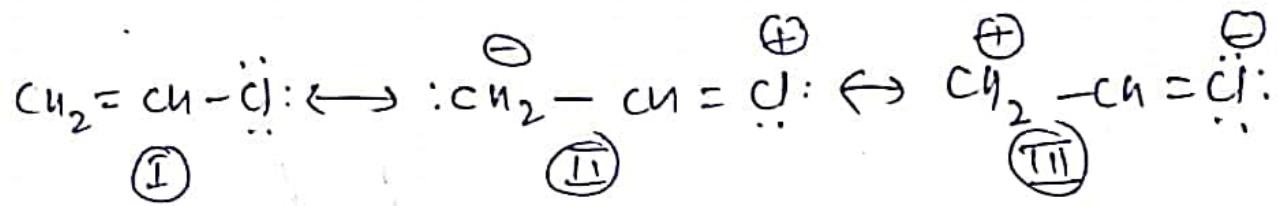
Ans \rightarrow (A) $\rightarrow P, S$, (B) $\rightarrow Q, R$, (C) $\rightarrow Q, S$, (D) $\rightarrow P, S$



\hookrightarrow Donate by Resonance \hookrightarrow withdraw by Reso. \hookrightarrow No Reso. \hookrightarrow No Reso \hookrightarrow Donate by Reso
 \hookrightarrow withdraw by inductive \hookrightarrow withdraw by inductive \hookrightarrow Donate by inductive \hookrightarrow withdraw by inductive \hookrightarrow withdraw by inductive \hookrightarrow withdraw by inductive

Ans $\Rightarrow \textcircled{A} \Rightarrow \textcircled{R}$ $\textcircled{B} \Rightarrow \textcircled{S}$ $\textcircled{C} \Rightarrow \textcircled{P}, \textcircled{T}$ $\textcircled{D} \Rightarrow \textcircled{Q}$

9 (13)



↳ for Relative stability of R-S-

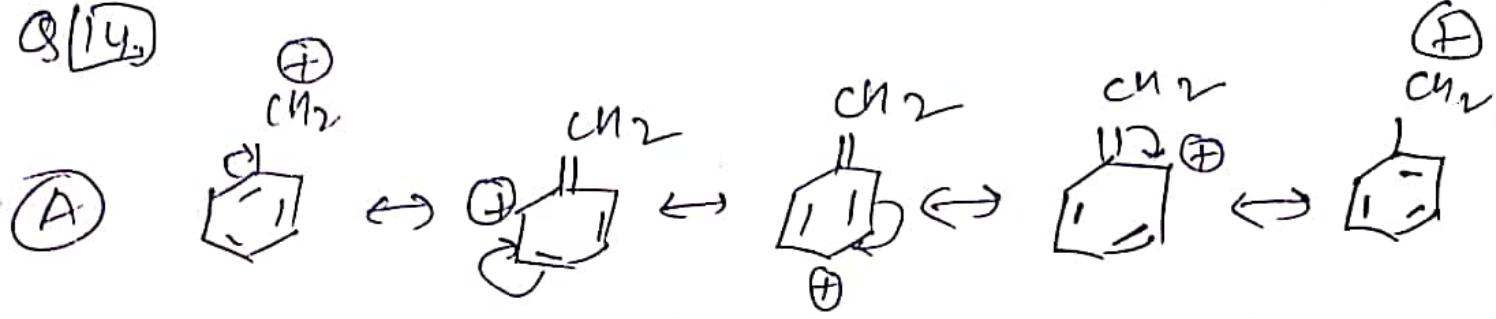
- ① No. of π -Bonds & Stability
 - ② Stability $\propto \frac{1}{\text{New charge development}}$
 - ③ Stability \propto complete octet
 - ④ \ominus ve charge is more stable on more EN atom
 - ⑤ opposite charges are more stable when they are closer and like charges are more stable when separated.

→ Neutral charged charged

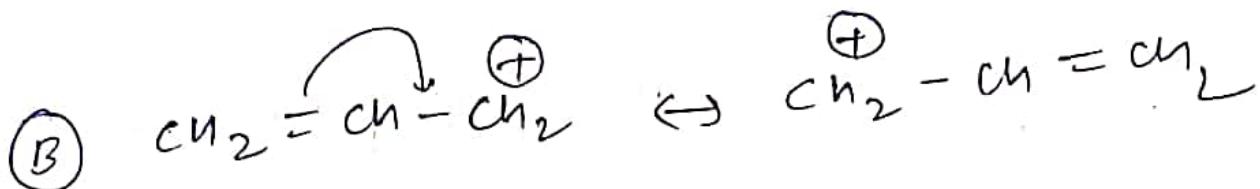
Octet → complete complete incomplete
(all atoms) (all atoms) (1c atom)

so order of stability is $I > II > III$

Q(14)



Total R.S. \Rightarrow 5

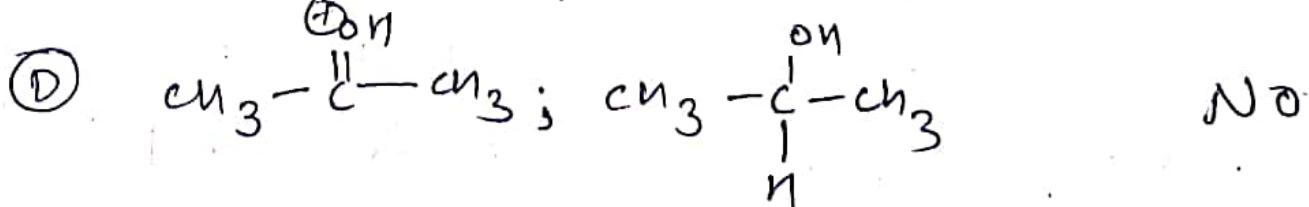
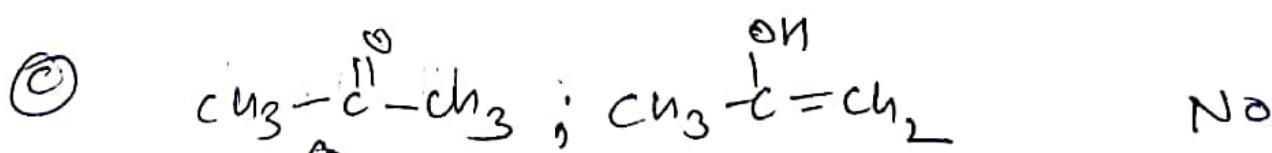
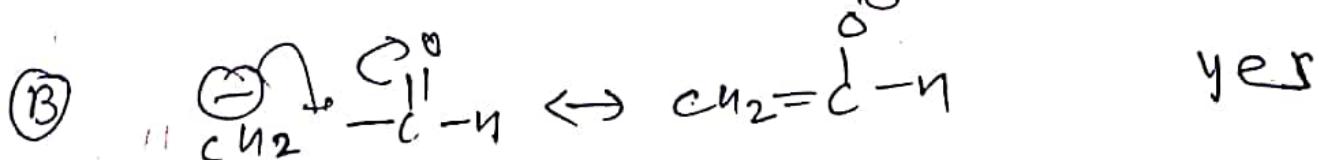
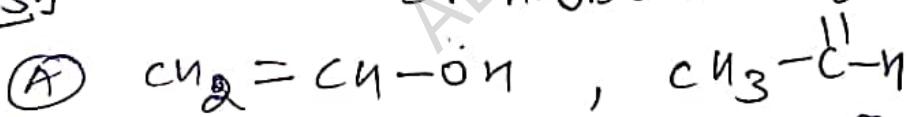


Total R.S. \Rightarrow 2

so, (A) have greater R.S.

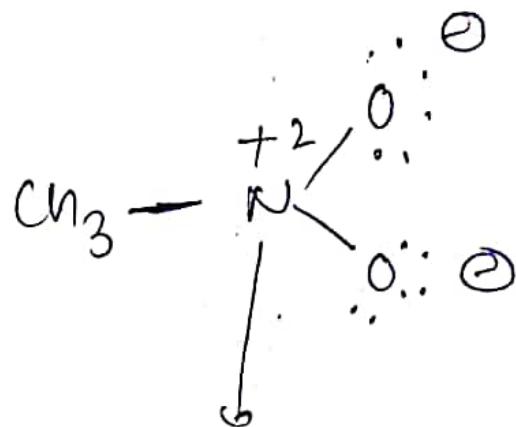
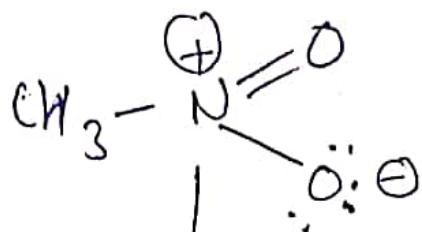
Ans \Rightarrow (A)

Q(15) Resonance \rightarrow only the σ or π -Bond can change. location of l.p. Resonance Pair



Ans \Rightarrow (B)

Q 19.



'N' octect complete

Incomplete
octet

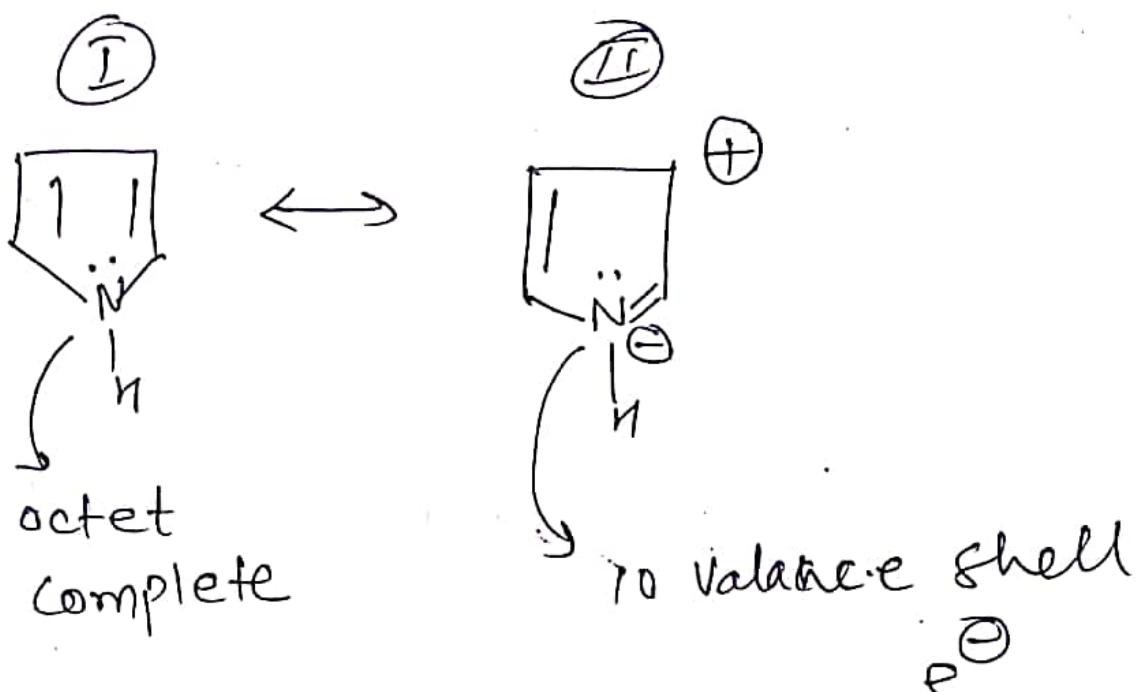
↓

~~sextet~~

→ Generally there are $8e^-$ in valence shell of 2nd period element but here in ~~hexapektate~~ (II) their are only six e^- in valence shell of 'N', so it's not acceptable.

Ans - B

Q 20



↳ According to octet Rule (for 2nd period elements), there are $8e^-$ in Valance shell - ~~in~~ But here in Structure II, there are $10e^-$ in ~~in~~ N - atom's valance shell, which is not acceptable

Ans → C

Q 21

=====

Delocalization of e^- increase molecular stability because -

↳ potential energy of molecule decreases

↳ $e^- - e^-$ repulsion decreases

Aus \rightarrow C

E.D.E

JEE-MAINS Solution

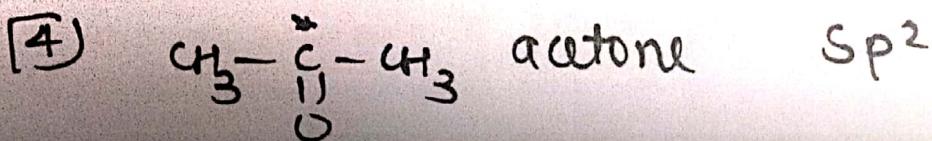
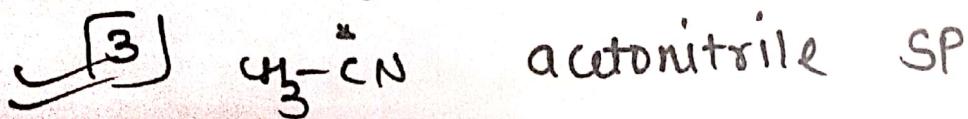
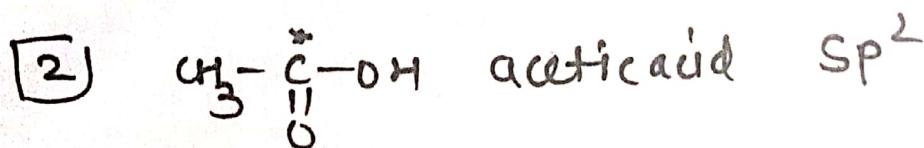
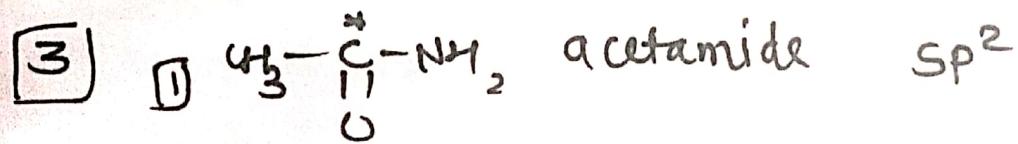
- ① + I effect of n. of alkyl group
+ Branching

So + I order will be $(\text{CH}_3)_3\text{C} \rightarrow (\text{CH}_3)_2\text{CH} \rightarrow \text{CH}_3\text{CH}_2$

Ans \Rightarrow 1

- ② Due presence of equivalent Resonance
in $\text{H}-\overset{\text{O}}{\underset{\text{C}}{\overset{\leftrightarrow}{\text{O}}} \leftrightarrow \text{H}-\overset{\text{O}^-}{\underset{\text{C}}{\text{=O}}}$

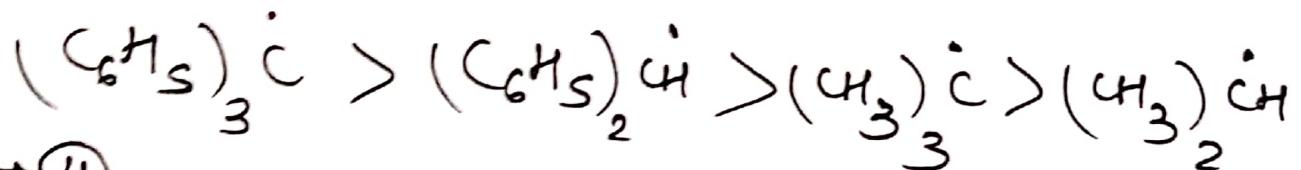
Ans \Rightarrow 3



④ $\dot{\text{CH}}_3 \rightarrow$ Free radical

(2) chemically reactive

⑤ Stability order of Free radical

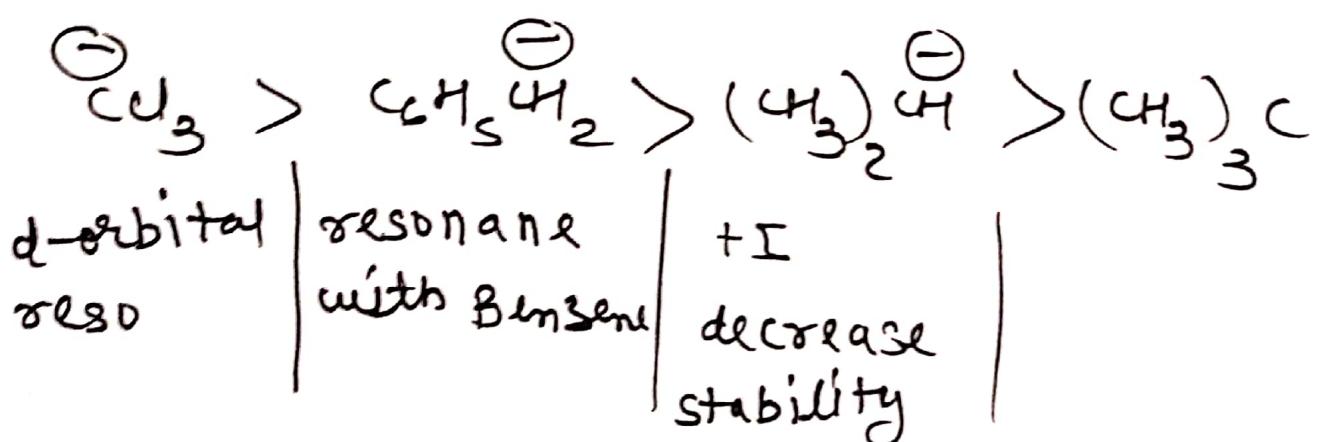


Ans \Rightarrow ④

⑥ Stability of Carbanion & D-orbital Resonance

Ans \Rightarrow ①

< Resonance
< -M-I effect



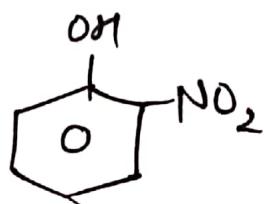
⑦



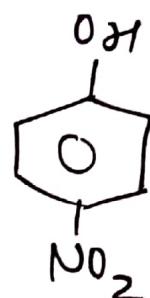
AntiAromatic
due to non planarity

⑧

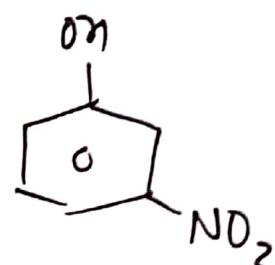
Q. [8]



" orthonitro
phenol "



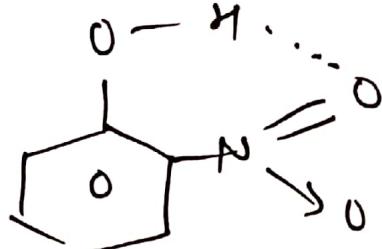
" para nitro
phenol "



" metanitro
phenol "

Ans

(3)



O -Nitrophenol shows Intra molecular
 H - Bonding

(9)

(I)



Aro

II



Non-Aro

III



Non Aro

(IV)



Aro

(V)



Anti Aro

(VI)

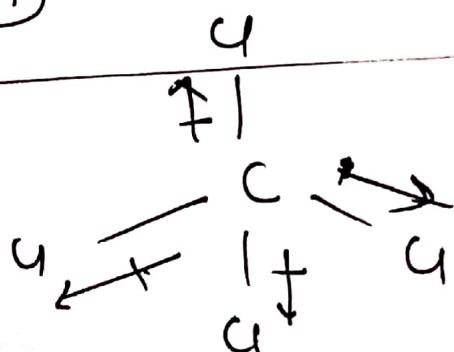


Anti Aro

Ans ④

(40)

Ans
③

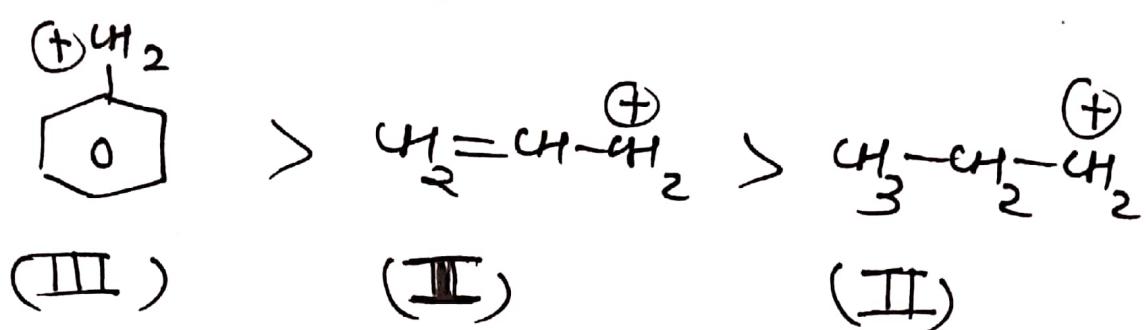


$$U=0$$

due to Symmetrical structure

11

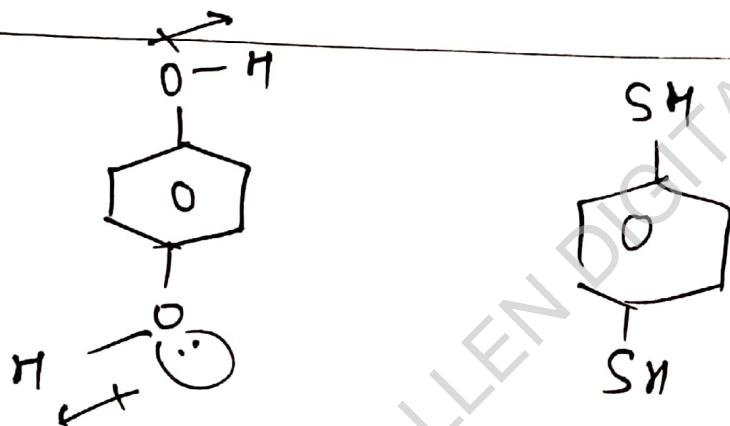
stability of carbocation is



Ans

(1) (4)

12



2

13

(1)



Aromatic

Ans

(2)



Aromatic

(4)

(3)



Aromatic

(4)



Non Aromatic

14

1



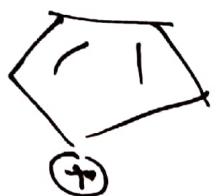
Aromatic

2



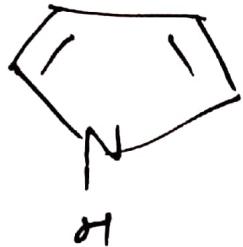
Aromatic

3



Anti aromatic

4

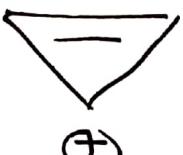


Aromatic

Ans \Rightarrow 3

15

A

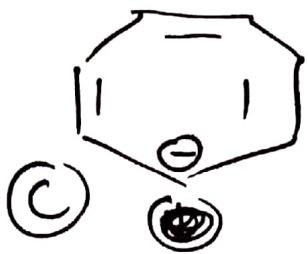


Aromatic

B

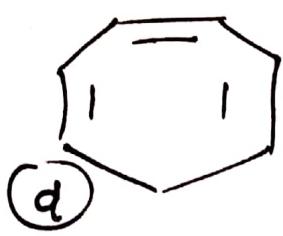


Anti Aromatic



~~(non)~~ a

Non-Aromatic



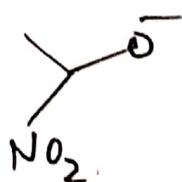
Non-Aromatic

Ans \Rightarrow

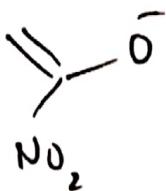
~~B, d~~

B, C, D

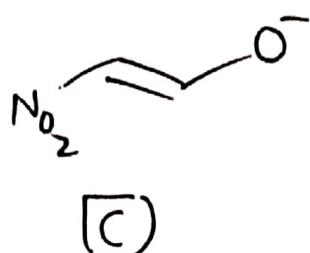
(16)



(A)



(B)



(C)

stability order is

$$\boxed{\text{C} > \text{B} > \text{A}}$$

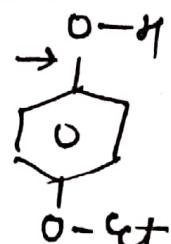
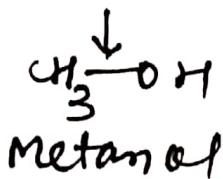
(C) → in which Extended Resonance is present

(B) → resonance stability

(A) → only $-I$ of NO_2 is present

Ans ⇒ 1

(17)



Ans ⇒ 2

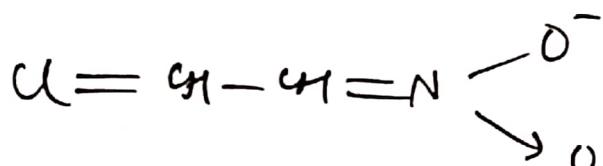
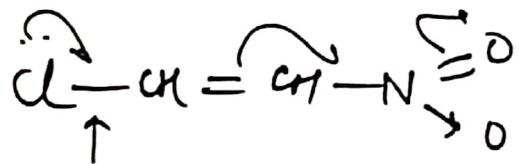
Methanol > β -Ethoxyphenol > Phenol

Pure
Single
Bond

Less Resonance
B/w OH & phenyl
Ring due to
presence of EtO^-
group at para
Position

More Resonance
B/w -OH & phenyl
Ring - SU formation
of double bond
character is
more less will
be Bond Length

(18) (4)



double Bond formation character
is more so Bond Length b/w C-Cl
is less than or other molecule

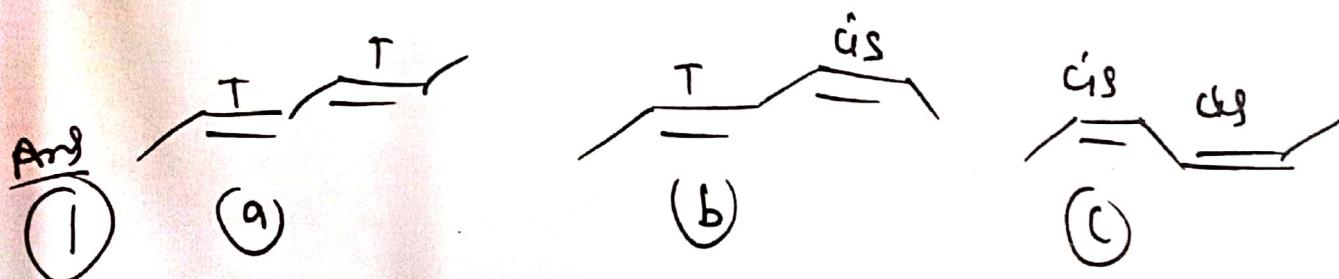
(19)



total 6 sp^2 hybridize carbon atom
Each atom contains
3 sp^2 orbital SD total
 sp^2 Hybridize orbital fig

$$6 \times 3 = 18$$

(20) heat of combustion



$\text{HOC} \propto \frac{1}{\text{Stability}} \propto n \cdot \text{of Carbon}$

$\text{HOC of } \boxed{\text{cis} > \text{trans}}$ $c > b > a$

Solution Ex. IV (JEE ADVANCE)
Electronic Displacement Effect

Que. 1

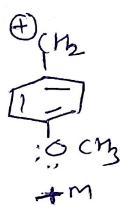
Ans. D

Heat of hydrogenation $\propto \frac{1}{\text{stability of per } \pi\text{-bond}}$

In  π is resonance stabilized.

Que. 2

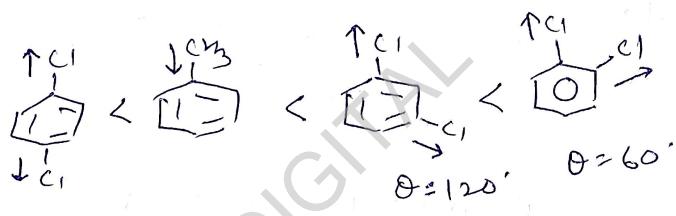
Ans. D



$-\ddot{\text{O}}\text{CH}_3$ is +M
so it is most stable
carbocation

Que. 3

Ans. B



$$\mu_{\text{net}} = \sqrt{\mu_1^2 + \mu_2^2 + 2 \mu_1 \mu_2 \cos \theta}$$

Que. 4

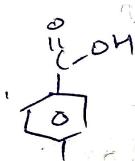
5 bonds for N are not possible

Ans. C

Que. 5

Ans. A

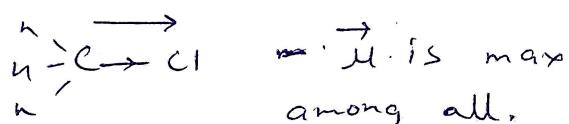
Un K electrons are
present in Anti Aromatic
compound.



It has intermolecular H-bonding
So its B.P is more than ortho
isomers.

Que. 6

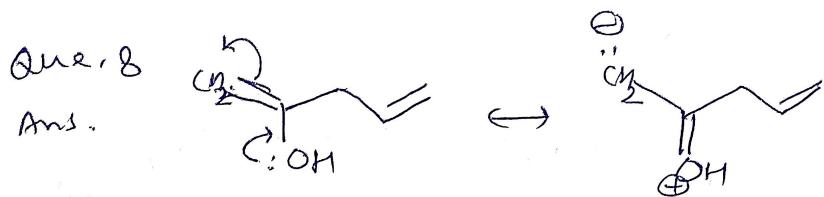
Ans. D



μ is max
among all.

Que. 7

Ans. A



Que. 9 $\text{CH}_3-\ddot{\text{O}}-\ddot{\text{C}}\text{H}-\text{CH}-\text{CH}=\text{CH}_2$ is least stable
Ans. D.

Reason ① Incomplete octate of C^{\oplus}

Reason ② Lone pair - Lone pair repulsion.

Que. 10



Reason ① Incomplete octate of C^{\oplus}

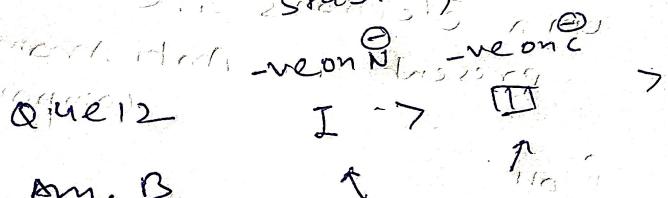
Reason ② repulsion b/w $\text{+}, \text{+}$ charge.

Que. 11

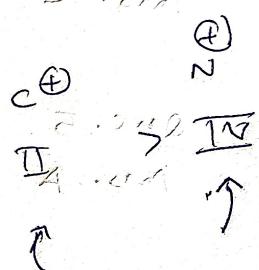


Back bonding

Stability



Ans. B



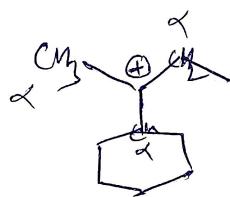
Incomplete octate

Ans. B

Incomplete octate for all atoms

Que. 13

Ans. 6



6 x H

∴ 6 Hyperconjugation structures.

Que. 14

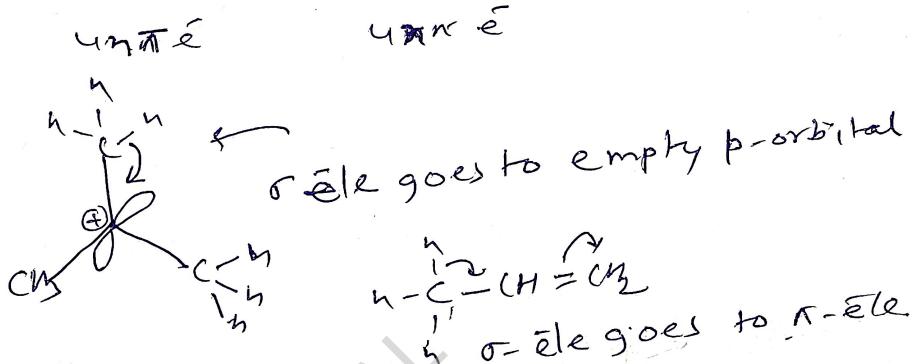
Ans. B, C



are Anti-aromatic

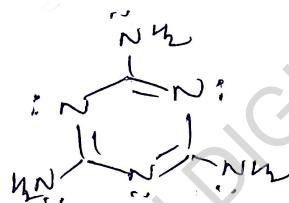
Que. 15

Ans. A



Que. 16.

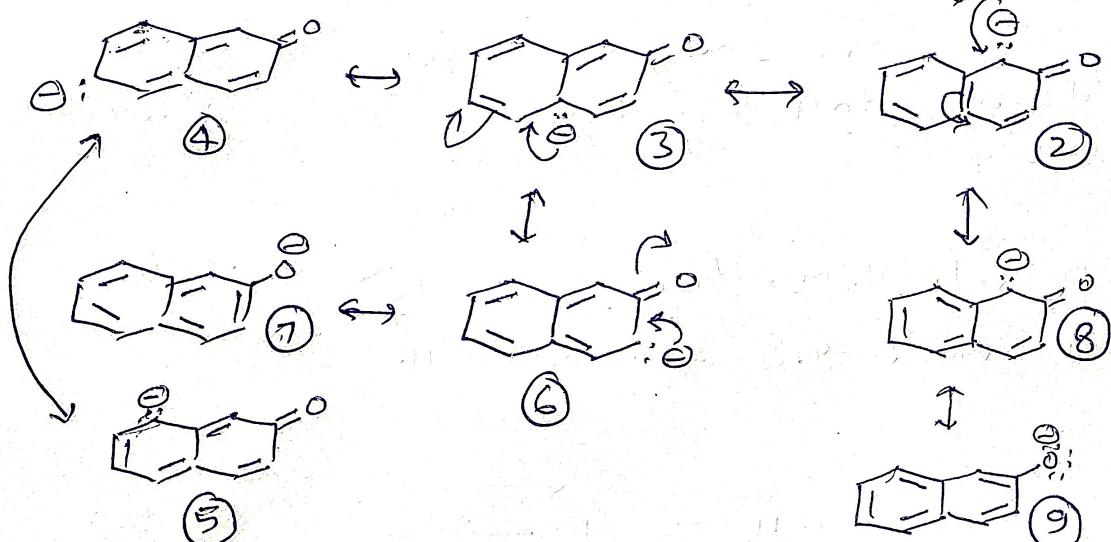
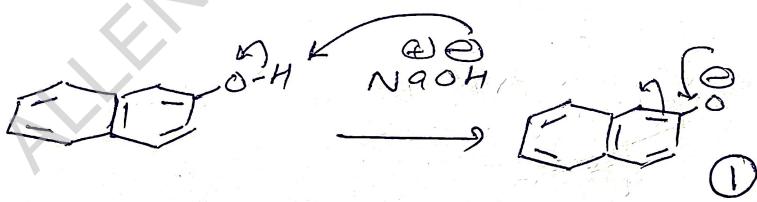
Ans. 6



6 Lone pair electrons

Que. 17

Ans. 9



Que. 18

Ans. 5 (iii), (v), (vi), (vii), (ix)