



Additional Problems for Self Practice (APSP)

☞ Marked questions are recommended for Revision.

This Section is not meant for classroom discussion. It is being given to promote self-study and self testing amongst the Resonance students.

PART - I : PRACTICE TEST-1 (IIT-JEE (MAIN Pattern))

Max. Marks: 100

Max. Time : 1 Hour

Important Instructions:

A. General :

- The test paper is of 1 hour duration.
- The Test Paper consists of **25** questions and each questions carries **4** Marks. Test Paper consists of **Two** Sections.

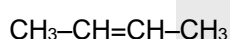
B. Test Paper Format and its Marking Scheme:

- Section-1 contains **20** multiple choice questions. Each question has four choices (1), (2), (3) and (4) out of which **ONE** is correct. For each question in Section-1, you will be awarded 4 marks if you give the corresponding to the correct answer and zero mark if no given answers. In all other cases, minus one (**-1**) mark will be awarded.
- Section-2 contains **5** questions. The answer to each of the question is a **Numerical Value**. For each question in Section-2, you will be awarded 4 marks if you give the corresponding to the correct answer and zero mark if no given answers. No negative marks will be answered for incorrect answer in this section. In this section answer to each question is **NUMERICAL VALUE** with two digit integer and decimal upto two digit. If the numerical value has more than two decimal places **truncate/round-off** the value to **TWO** decimal placed.

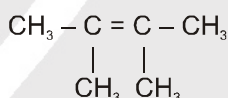
SECTION-1

This section contains **20** multiple choice questions. Each questions has four choices (1), (2), (3) and (4) out of which Only **ONE** option is correct.

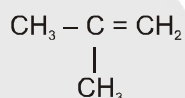
1. Stability of π -bond in following alkenes in the increasing order is :



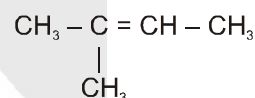
(I)



(II)



(III)



(IV)

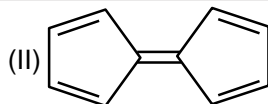
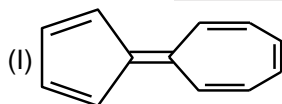
(1) I < III < IV < II

(2) I < II < III < IV

(3) IV < III < II < I

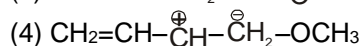
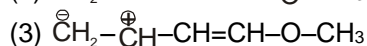
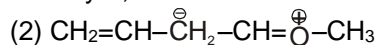
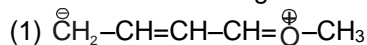
(4) II < III < IV < I

2. Select the correct statement regarding the following compounds :



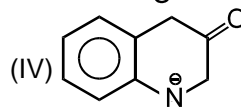
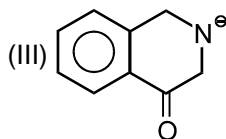
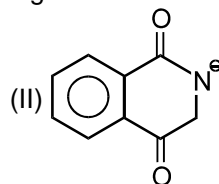
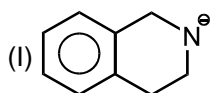
- II has a greater dipole moment than I
- Covalent character of II is less than I
- I is more soluble in polar solvent than II
- None of these

3. Which of the following resonating structure of 1-Methoxy-1,3-butadiene is least stable ?





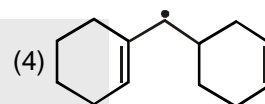
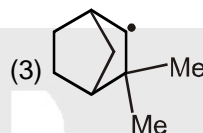
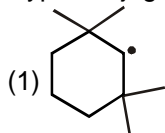
4. The decreasing order of electron density on the ring is :



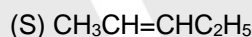
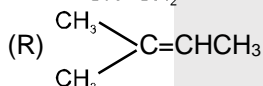
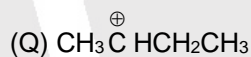
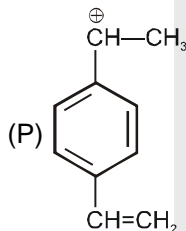
(1) (II) > (III) > (IV) > (I)
 (3) (IV) > (I) > (III) > (II)

(2) (IV) > (I) > (II) > (III)
 (4) (I) > (III) > (IV) > (II)

5. Hyperconjugation observed in



6. The number of hyperconjugable hydrogen atoms of following species are respectively :



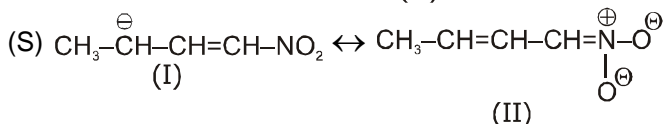
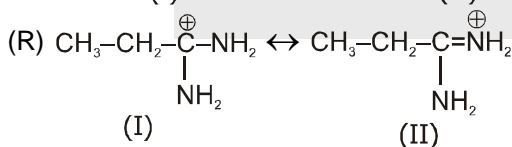
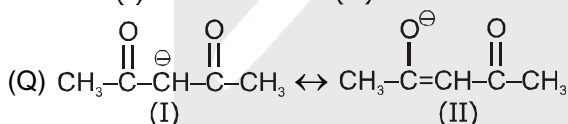
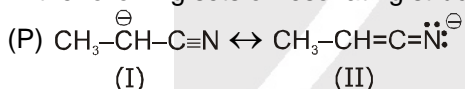
(1) 3, 5, 9, 8

(2) 3, 5, 9, 5

(3) 5, 5, 3, 5

(4) 5, 2, 6, 5

7. In the following sets of resonating structure, label the major contributors towards resonance hybrid.



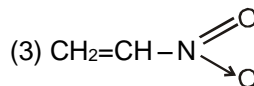
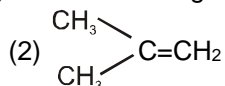
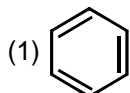
(1) II, II, I, II

(2) II, II, II, I

(3) II, II, II, II

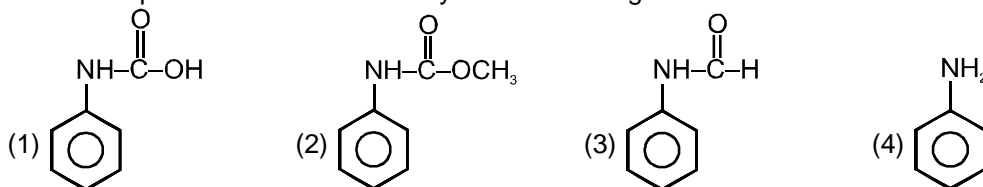
(4) I, I, II, I

8. In which of the following C = C bond length is minimum :

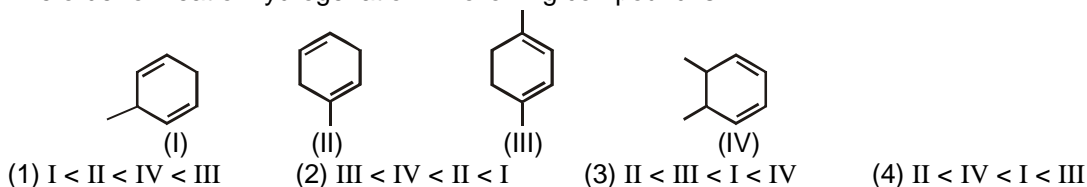




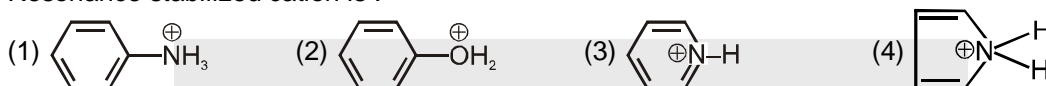
9. Which compound has least e^- density in benzene ring



10. The order of heat of hydrogenation in following compound is :



11. Resonance stabilized cation is :

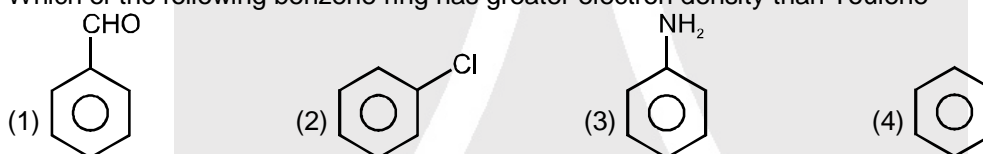


12. $H-N=C=O \leftrightarrow H-\overset{\oplus}{N} \equiv C-\overset{\ominus}{O} \leftrightarrow H-\overset{\ominus}{N} - C \equiv \overset{\oplus}{O}$

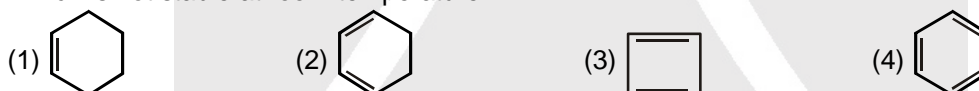
which resonating structure is least stable

(1) x (2) y (3) z (4) All are equivalent

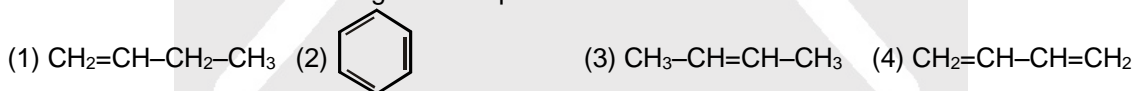
13. Which of the following benzene ring has greater electron density than Toulene



14. Which is not stable at room temperature ?



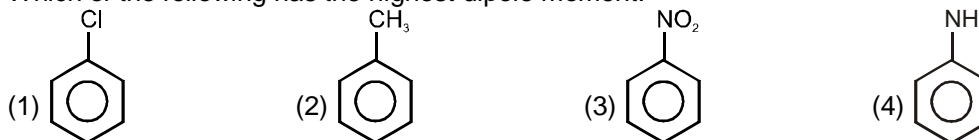
15. All the carbon-carbon bond lengths are equal in



16. The kind of delocalization involving sigma bond orbitals is called

(1) Inductive effect (2) Hyperconjugation effect
(3) Electromeric effect (4) Mesomeric effect

17. Which of the following has the highest dipole moment.



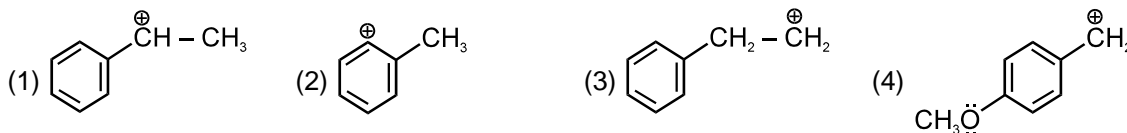
18. $CH_3-\overset{\overset{H}{|}}{\underset{\underset{CH_3}{|}}{C}}-\overset{\overset{H}{|}}{CH}-\overset{\overset{3}{|}}{CH_2}-H$ in C_1-H , C_2-H and C_3-H the homolytic bond dissociation energy order is :

[Hint : Dissociation energy $\propto \frac{1}{\text{stability of free radical}}$]

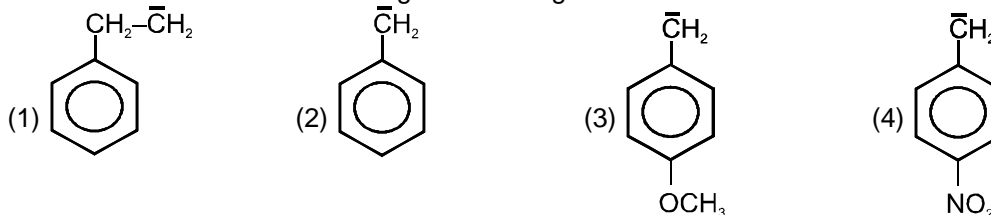
(1) $C_2-H > C_3-H > C_1-H$ (2) $C_2-H > C_3-H > C_1-H$
(3) $C_2-H > C_3-H > C_1-H$ (4) $C_3-H > C_2-H > C_1-H$



19. The most stable carbocation is :



20. The most stable carbanion among the following is



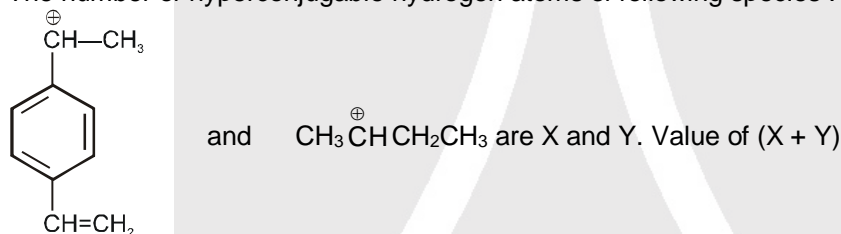
SECTION-2

This section contains 5 questions. Each question, when worked out will result in **Numerical Value**.

20. Sum of number of delocalized electron pairs in squaric acid and dianion of squaric acid is

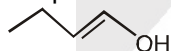
22. How many resonating structures are possible for ?

23. The number of hyperconjugable hydrogen atoms of following species :



24. $\text{CH}_2=\text{CH}-\text{CH}_2-\text{C}\equiv\text{C}-\text{CH}=\text{CH}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$
The maximum number of π -electron pairs in direct conjugation with each other is :

25. For the compound :



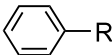




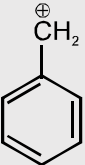
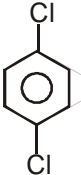
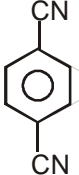
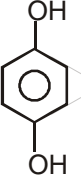
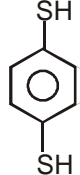


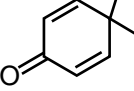

Give the number 1 for presence of resonance only, 2 for presence of resonance and hyperconjugation only, 3 for presence of resonance, hyperconjugation and inductive effect and 4 for presence of resonance hyperconjugation, inductive effect and electromeric effect.

Practice Test-1 (IIT-JEE (Main Pattern))

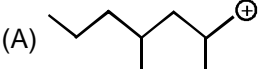

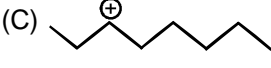
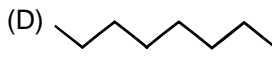
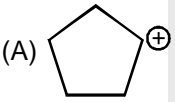
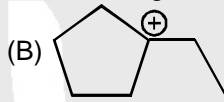
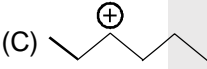
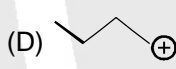
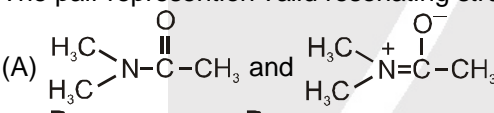

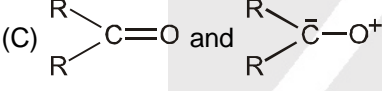

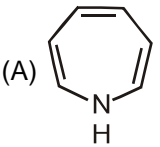
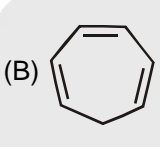
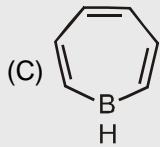
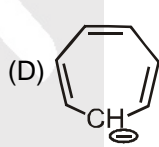
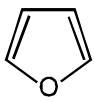
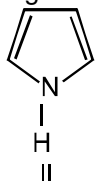
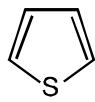
OBJECTIVE RESPONSE SHEET (ORS)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25					
Ans.										

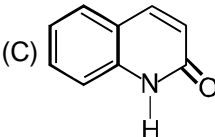
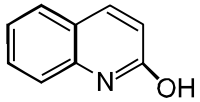

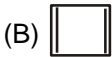
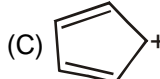
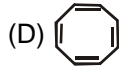
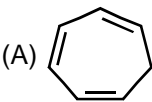
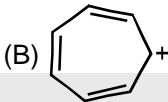

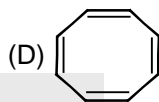
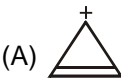
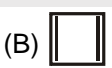
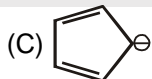
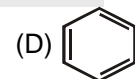
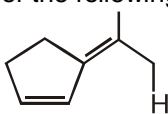
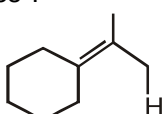
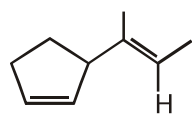
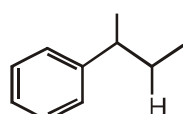

PART - II : JEE (MAIN) / AIEEE OFFLINE PROBLEMS (PREVIOUS YEARS)

1. In the following benzyl/allyl system
 $R-CH=CH_2$ and  (R is alkyl group)
 Then decreasing order of inductive effect is : [AIEEE-2002, 3/225]
 (1) $(CH_3)_3C- > (CH_3)_2CH- > CH_3CH_2-$ (2) $CH_3CH_2- > (CH_3)_2CH- > (CH_3)_3C-$
 (3) $(CH_3)_2CH- > CH_3CH_2- > (CH_3)_3C-$ (4) $(CH_3)_3C- > CH_3CH_2- > (CH_3)_2CH-$
2. In the anion $HCOO^-$ the two carbon-oxygen bonds are found to be of equal length. What is the reason for it? [AIEEE 2003, 3/225]
 (1) electronic orbitals of carbon atom are hybridised
 (2) the $C=O$ bond is weaker than the $C-O$ bond
 (3) the anion $HCOO^-$ has two resonating structures
 (4) the anion is obtained by removal of a proton from the acid molecule.
3. The increasing order of stability of the following free radicals is : [AIEEE-2006, 3/165]
 (1) $(CH_3)_2\dot{C}H < (CH_3)_3\dot{C} < (C_6H_5)_2\dot{C}H < (C_6H_5)_3\dot{C}$
 (2) $(C_6H_5)_2\dot{C} < (C_6H_5)_2\dot{C}H < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$
 (3) $(C_6H_5)_2H\dot{C} < (C_6H_5)_3\dot{C}H < (CH_3)_3\dot{C} < (CH_3)_2\dot{C}H$
 (4) $(CH_3)_2H\dot{C} < (CH_3)_3\dot{C} < (C_6H_5)_3\dot{C} < (C_6H_5)_2\dot{C}H$
4. Arrange the carbanions, $(CH_3)_3\bar{C}$, $\bar{C}Cl_3$, $(CH_3)_2\bar{C}H$, $C_6H_5\bar{C}H_2$ in order of their decreasing stability: [AIEEE-2009, 4/144]
 (1) $(CH_3)_2\bar{C}H > \bar{C}Cl_3 > C_6H_5\bar{C}H_2 > (CH_3)_3\bar{C}$
 (2) $\bar{C}Cl_3 > C_6H_5\bar{C}H_2 > (CH_3)_2\bar{C}H > (CH_3)_3\bar{C}$
 (3) $(CH_3)_3\bar{C} > (CH_3)_2\bar{C}H > C_6H_5\bar{C}H_2 > \bar{C}Cl_3$
 (4) $C_6H_5\bar{C}H_2 > \bar{C}Cl_3 > (CH_3)_3\bar{C} > (CH_3)_2\bar{C}H$
5. The non aromatic compound among the following is : [JEE-Main 2011, 4/120]
 (1)  (2)  (3)  (4) 
6. The order of stability of the following carbocations : [JEE(Main)-2013, 4/120]
 $CH_2=CH-\overset{\oplus}{C}H_2$; $CH_3-\overset{\oplus}{C}H_2-CH_3$;  is :
 I II (III)
 (1) III > II > I (2) II > III > I (3) I > II > III (4) III > I > II
7. For which of the following molecule significant $\mu \neq 0$? [JEE(Main)-2014, 4/120]
 (a)  (b)  (c)  (d) 
 (1) Only (a) (2) (a) and (b) (3) Only (c) (4) (c) and (d)
8. Which of the following molecules is least resonance stabilized ? [JEE(Main)-2017, 4/120]
 (1)  (2)  (3)  (4) 


PART-III : NATIONAL STANDARD EXAMINATION IN CHEMISTRY (NSEC) STAGE-I

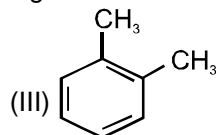
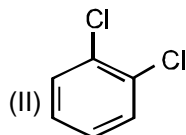
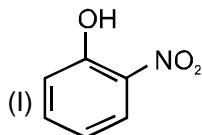
1. Which of the following is true about the cycloheptatrienyl free radical ? [NSEC-2000]
 (A) It is an isolatable stable free radical (B) It is an aromatic free radical
 (C) It has $4n + 2\pi$ electrons (D) None of these
2. Select the most stable carbonium ion from amongst the following [NSEC-2001]
 (A)  (B) 
 (C)  (D) 
3. Identify the correct statement regarding effect of Cl atom bonded to the carbon atom adjacent to a carbocation carbon ? [NSEC-2000]
 (A) It has no effect on the stability of the carbocation
 (B) It destabilizes the carbocation
 (C) It stabilizes the carbocation
 (D) Cannot predict its effect on the carbocation from the given information.
4. Select the most stable carbocation from amongst the following. [NSEC-2000]
 (A)  (B) 
 (C)  (D) 
5. Arrange the following in the order of increasing stability : [NSEC-2002]
 PhC^+H_2 , Ph_3C^+ , Me^+ , $\text{Ph}_2\text{C}^+\text{H}$
 (A) $\text{Me}^+ < \text{PhC}^+\text{H}_2 < \text{Ph}_2\text{C}^+\text{H} < \text{Ph}_3\text{C}^+$ (B) $\text{PhC}^+\text{H}_2 < \text{Me}^+ < \text{Ph}_3\text{C}^+ < \text{Ph}_2\text{C}^+\text{H}$
 (C) $\text{PhC}^+\text{H}_2 < \text{Ph}_3\text{C}^+ < \text{Me}^+ < \text{Ph}_2\text{C}^+\text{H}$ (D) $\text{PhC}^+\text{H}_2 < \text{Ph}_2\text{C}^+\text{H} < \text{Ph}_3\text{C}^+ < \text{Me}^+$
6. The pair representation valid resonating structures is [NSEC-2003]
 (A)  (B) 
 (C)  (D) 
7. The aromatic compound would be [NSEC-2004]
 (A)  (B) 
 (C)  (D) 
8. Inductive effect is a polarisation of a [NSEC-2004]
 (A) sigma bond (B) π -bond
 (C) co-ordinate bond (D) conjugated system.
9. Match the resonance energies 67, 88 and 121 kJ mol^{-1} for the following compounds. [NSEC-2005]
 I  II  III 
 (A) I - 67, II - 121, III - 88 (B) I - 121, II - 67, III - 88
 (C) I - 67, II - 88, III - 121 (D) I - 121, II - 88, III - 67



10. The pair of resonating structures among the following is [NSEC-2005]
- (A) $R_2CH-N=O$ $R_2C=N-OH$ (B) $R_2CH-N^+ \begin{matrix} O^- \\ // \\ O \end{matrix}$ $R_2CH-N^+ \begin{matrix} O \\ // \\ O^- \end{matrix}$
- (C)   (D) $R_2CH-N^+ \begin{matrix} O^- \\ // \\ O \end{matrix}$ $R_2C=NN^+ \begin{matrix} HO \\ // \\ O^- \end{matrix}$
11. Identify the aromatic compound from the following. [NSEC-2005]
- (A)  (B)  (C)  (D) 
12. Which of the following species is aromatic? [NSEC-2006]
- (A)  (B)  (C)  (D) 
13. The number of π electrons required for a planar cyclic conjugated system to exhibit aromatic behaviour is $(4n + 2)$. Here n is [NSEC-2006]
- (A) number of C atoms in the system (B) number of π bonds
(C) a non-negative integer (D) number of bonds in the system.
14. Following is an example of [NSEC-2006]
- $$CH_2 = \overset{\overset{O}{\parallel}}{CH} - CH \leftrightarrow CH_2 - CH = \overset{\ominus}{O} - C - H \leftrightarrow \overset{\ominus}{CH_2} = CH - \overset{\oplus}{C} - H$$
- (A) hyperconjugation (B) tautomerism (C) resonance (D) inductive effect.
15. The observed order of carbocation stability is [NSEC-2006]
- (A) $CH_3^+ > CH_3CH_2^+ > (CH_3)_2CH^+ > (CH_3)_3C^+$
(B) $CH_3CH_2^+ > CH_3^+ > (CH_3)_2CH^+ > (CH_3)_3C^+$
(C) $(CH_3)_2CH^+ > CH_3^+ > CH_3CH_2^+ < (CH_3)_3C^+$
(D) $(CH_3)_3C^+ > (CH_3)_2CH^+ > CH_3CH_2^+ > CH_3^+$
16. The relative stabilities of the following carbocations is : [NSEC-2007]
- $$H_2CO \overset{\oplus}{CH} = CH - CH_2 \quad H_2C = \overset{\oplus}{C} - CH_2 \quad CH_3OCH_2 \overset{\oplus}{CH_2} \quad CH_3O \overset{\oplus}{CH_2}$$
- (A) I > II > III > IV (B) I > IV > II > III (C) II > III > IV > I (D) III > I > II > IV
17. Identify the odd species out (Which of the species among the following is different from others ?) [NSEC-2007]
- (A)  (B)  (C)  (D) 
18. Which of the following represents the true order of bond dissociation energy of the indicated C-H bond of the following molecules ? [NSEC-2007]
- (I)  (II)  (III)  (IV) 
- (A) I < II < IV < III (B) III < IV < II < I (C) IV < II < I < III (D) III < IV < II < I
19. The carbocation $(CH_3)_3C^+$ is stabilized primarily by : [NSEC-2007]
- (A) hyperconjugation (B) tautomerism (C) resonance (D) conjugation



20. The correct order of dipole moment for the following molecules is [NSEC-2011]



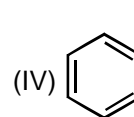
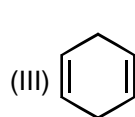
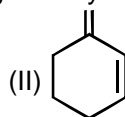
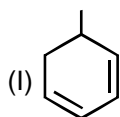
(A) $I = II = III$

(B) $I < II < III$

(C) $I > II > III$

(D) $II < III < I$

21. The order of decreasing stability is : [NSEC-2011]



(A) $IV > I > II > III$

(B) $I > IV > III > II$

(C) $I > II > IV > III$

(D) $IV > II > I > III$

22. The most Carbocations, carbanions, free radicals and radical cation are reactive carbon intermediates. Their hybrid orbitals respectively are [NSEC-2012]

(A) sp^2, sp^2, sp^3, sp

(B) sp^2, sp^2, sp, sp^3

(C) sp^2, sp^3, sp^2, sp

(D) sp^3, sp^2, sp, sp^2

23. The electronegativities of acetylene, ethylene and ethane are in the order : [NSEC-2012]

(A) ethylene > acetylene > ethane

(B) acetylene > ethylene > ethane

(C) ethane > acetylene > ethylene

(C) acetylene > ethane > ethylene

24. An electron releasing group will not stabilize which of the following groups ? [NSEC-2012]

(A) Carbocation

(B) Carbanion

(C) free radical

(D) None of these

25. The most stable free radical which can be isolated is [NSEC-2012]

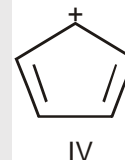
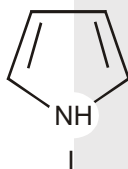
(A) Trityl radical

(B) Diphenyl methyl radical

(C) 2,4,6-Tri-ter-butylphenoxy radical

(D) tert-butyl radical

26. Which of the following structure is aromatic ? [NSEC-2013]



(A) Structures I and II

(B) Structure I only

(C) Structures II only

(D) Structure III only

27. Which of the following is most stable ? [NSEC-2013]

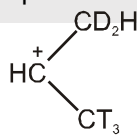
(A) 2,3-Dimethyl-2-butene

(B) 2-Butene

(C) 2-Methyl-1,2-butene

(D) 1-Butene

28. How many hyperconjugative structures are possible in the following carbocation? [NSEC-2013]



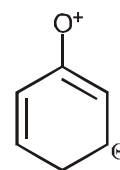
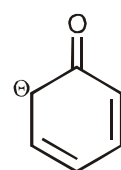
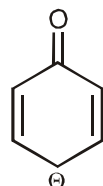
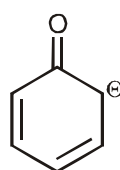
(A) 1

(B) 3

(C) 5

(D) 6

29. Which of the following is not a resonating structure for the phenoxide ion ? [NSEC-2013]



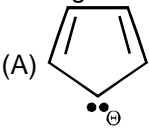
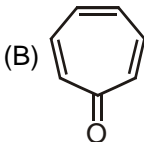
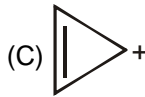
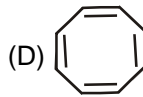
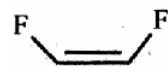
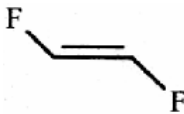
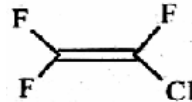
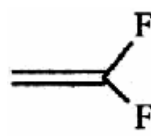
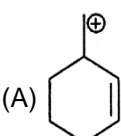
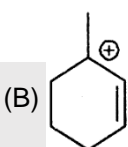
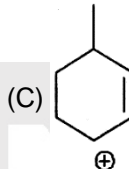
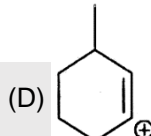
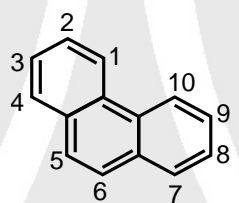
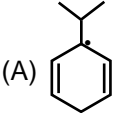
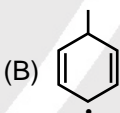
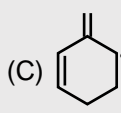
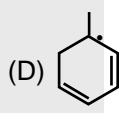
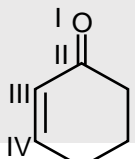
(A) I

(B) II

(C) III

(D) IV



30. Among the following compound that is not aromatic [NSEC-2014]
- (A)  (B)  (C)  (D) 
31. The correct order of dipole moment for the following molecules is [NSEC-2014]
- (I)  (II)  (III)  (IV) 
- (A) IV > I > III > II (B) I > IV > III > II (C) III > I > II > IV (D) II > III > IV > I
32. The most stable carbocation is [NSEC-2014]
- (A)  (B)  (C)  (D) 
33. In case of dibromo derivatives of the following compound, the derivative having highest energy has the bromo substituents in positions [NSEC-2016]
- 
- (A) 1, 2 (B) 2, 3 (C) 4, 5 (D) 1, 10
34. The most stable radical among the following is [NSEC-2018]
- (A)  (B)  (C)  (D) 
35. Which atom/s will have a δ^+ charge in the following molecule? [NSEC-2019]
- 
- (A) I and III (B) II only (C) II and III (D) II and IV

PART - IV : PRACTICE TEST-2 (IIT-JEE (ADVANCED Pattern))

Max. Time : 1 Hr.

Max. Marks : 60

Important Instructions :

A. General :

- The test is of 1 hour duration.
- The Test Booklet consists of 20 questions. The maximum marks are 60.

B. Question Paper Format :

- Each part consists of five sections.
- Section 1 contains 8 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE is correct.



5. Section 2 contains 6 multiple choice questions. Each question has four choices (A), (B), (C) and (D) out of which ONE OR MORE THAN ONE are correct.
6. Section 3 contains 3 questions. The answer to each of the questions is a numerical value, ranging from 0 to 9 (both inclusive).
7. Section 4 contains 1 paragraphs each describing theory, experiment and data etc. 2 questions relate to paragraph. Each question pertaining to a particular passage should have only one correct answer among the four given choices (A), (B), (C) and (D).
8. Section 5 contains 1 multiple choice questions. Question has two lists (list-1 : P, Q, R and S; List-2 : 1, 2, 3 and 4). The options for the correct match are provided as (A), (B), (C) and (D) out of which ONLY ONE is correct.

C. Marking Scheme :

9. For each question in Section 1, 4 and 5 you will be awarded 3 marks if you darken the bubble corresponding to the correct answer and zero mark if no bubble is darkened. In all other cases, minus one (-1) mark will be awarded.
10. For each question in Section 2, you will be awarded 3 marks. If you darken all the bubble(s) corresponding to the correct answer(s) and zero mark. If no bubbles are darkened. No negative marks will be answered for incorrect answer in this section.
11. For each question in Section 3, you will be awarded 3 marks if you darken only the bubble corresponding to the correct answer and zero mark if no bubble is darkened. No negative marks will be awarded for incorrect answer in this section.

SECTION-1 : (Only One option correct Type)

This section contains 8 multiple choice questions. Each questions has four choices (A), (B), (C) and (D) out of which Only ONE option is correct.

1. Which of the following is correctly ordered :

(A) $-\text{OH} > -\text{NH}_2$	(+M effect)	(B) $-\text{SO}_3\text{H} > -\text{NO}_2$	(-M effect)
(C) $-\text{F} > -\text{CN}$	(-I effect)	(D) $-\text{CN} > -\text{F}$	(-I effect)
2. Which of the following compound(s) is/are an aromatic compounds?

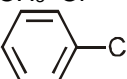
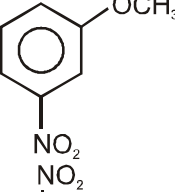
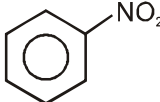

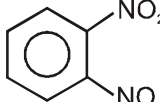
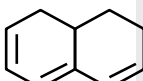
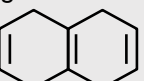
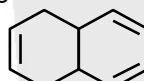
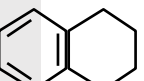
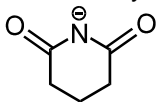
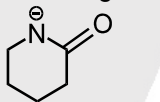
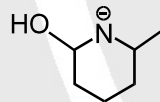
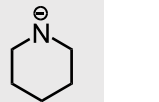
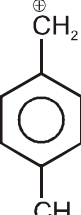
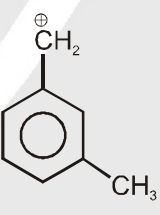
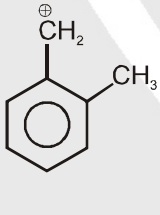
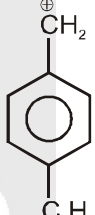
<p>(i) </p> <p>(iii) </p>	<p>(ii) </p> <p>(iv) </p>
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(A) I, II and III (B) III and IV (C) IV only (D) I, III and IV
3.

The most stable canonical structure of this molecule is :

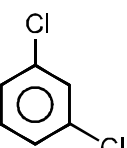
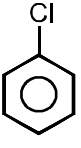
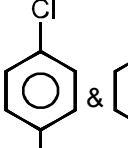
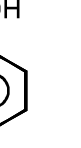
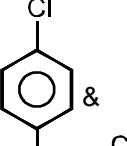
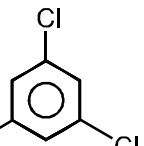
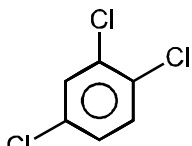
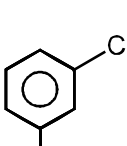
<p>(A) </p> <p>(C) </p>	<p>(B) </p> <p>(D) All are equally stable</p>
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4. Which of the following has shortest C–Cl bond ?
 (A) $\text{CH}_3\text{--Cl}$ (B) $\text{CH}_2\text{=CH--Cl}$
 (C)  (D) $\text{CH}_2\text{=CH--CH=CH--Cl}$
5. In which of the following molecules π -electron density in ring is minimum :
 (A)  (B) 
 (C)  (D) 
6. Give the correct order of magnitude of heat of hydrogenation of the following :
 (I)  (II)  (III)  (IV) 
 (A) $\text{I} < \text{IV} < \text{III} < \text{II}$ (B) $\text{IV} < \text{III} < \text{I} < \text{II}$ (C) $\text{IV} < \text{I} < \text{III} < \text{II}$ (D) $\text{IV} < \text{I} < \text{II} < \text{III}$
7. The stability order of the following anions :
 I  II  III  IV 
 (A) $\text{IV} > \text{III} > \text{II} > \text{I}$ (B) $\text{I} > \text{II} > \text{III} > \text{IV}$ (C) $\text{I} > \text{II} > \text{IV} > \text{III}$ (D) $\text{I} > \text{III} > \text{II} > \text{IV}$
8. Which of the following carbocation is most stable :
 (A)  (B) 
 (C)  (D) 

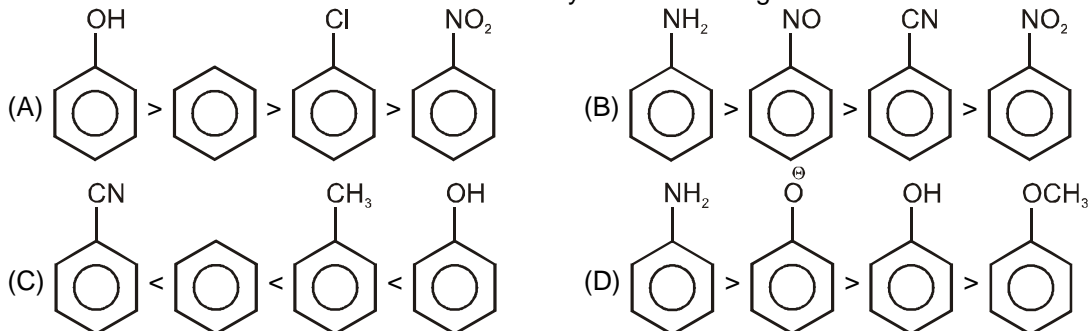
Section-2 : (One or More than one options correct Type)

This section contains 6 multipole choice questions. Each questions has four choices (A), (B), (C) and (D) out of which ONE or MORE THAN ONE are correct.

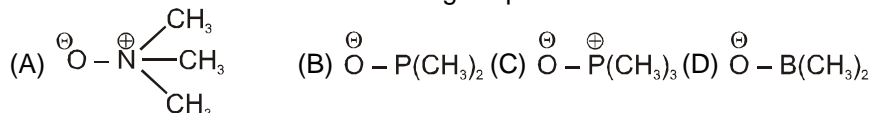
9. Which of the following pairs have same dipole moment
 (A)  & 
 (B)  & 
 (C)  & 
 (D)  & 



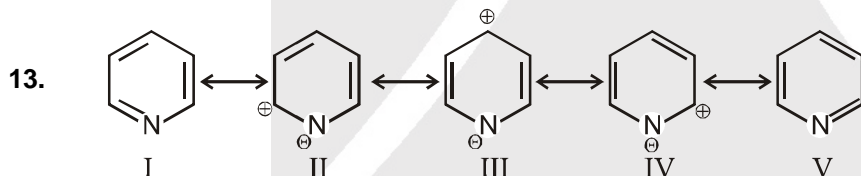
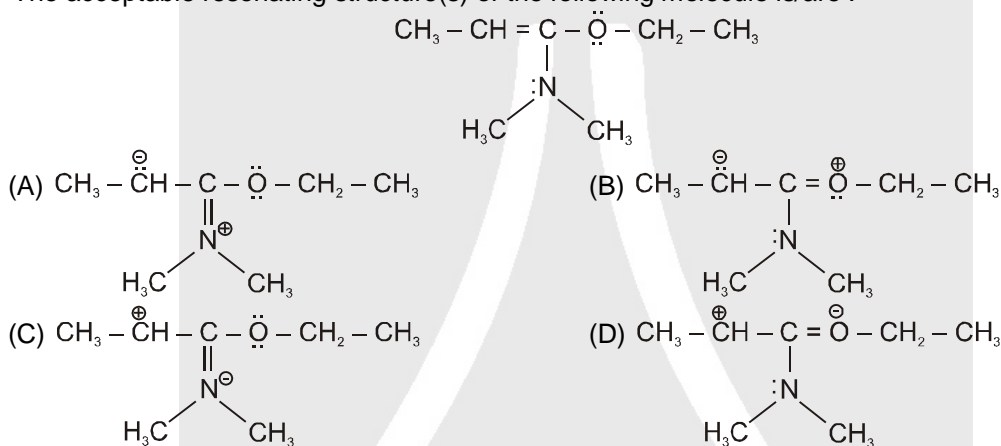
10. Which is/are the correct order of electron density in aromatic ring?



11. In which cases delocalisation of charge is possible?



12. The acceptable resonating structure(s) of the following molecule is/are :



Among these canonical structures of pyridine, the correct order of stability is/are :

(A) $(\text{II} = \text{IV}) > (\text{I} = \text{V})$ (B) $(\text{I} = \text{V}) > (\text{II} = \text{IV})$ (C) $\text{III} > (\text{II} = \text{IV})$ (D) $(\text{II} = \text{IV}) > \text{III}$

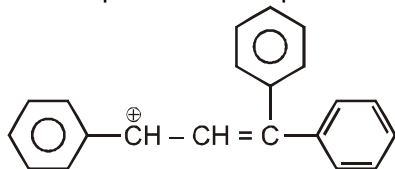
14. Which of the following statement is/are correct?

- (A) Contributing structures contributes to the resonance hybrid is directly proportional of their energies.
 (B) Equivalent contributing structures make the resonance important.
 (C) Contributing structures represent hypothetical molecules having no real existence.
 (D) Contributing structures are less stable than the resonance hybrid.

Section-3 : (Numerical Value Question)

This section contains 3 questions. Each question, when worked out will result in one numerical value from 0 to 9 (both inclusive)

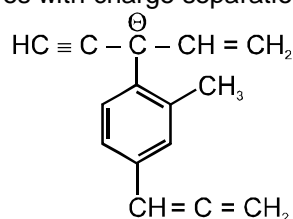
15. Find total number of the position where positive charge can be delocalized by true resonance.



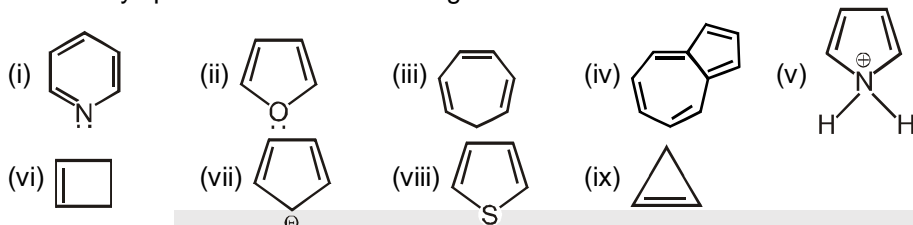
(Excluding the given position)



16. Find the number of carbon atoms including the given structure which can have negative charge in resonating structures. (The structures with charge separation are not acceptable)



17. How many species out of the following are aromatic?



SECTION - 4 : Comprehension Type (Only one option correction)

This section contains 1 paragraphs, each describing theory, experiments, data etc. 2 questions relate to the paragraph. Each question has only one correct answer among the four given options (A), (B), (C) and (D)

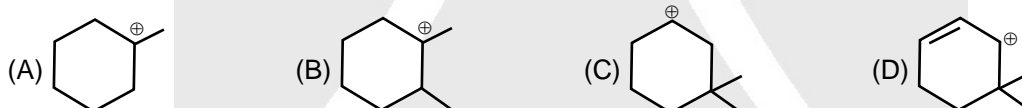
Paragraph for Questions 18 to 19

Whenever an intermediate carbocation is formed in reaction it may rearranges.

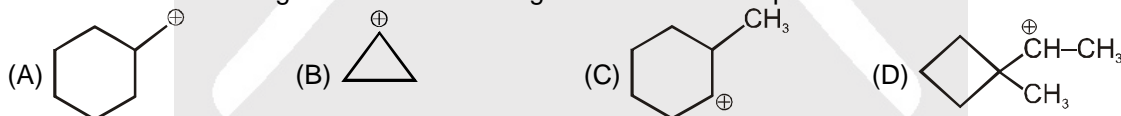
Only those carbocation will rearrange which can produce more stable species. It can be done either by:

- (i) Shifting of H, alkyl, aryl, bond (1, 2-shifting) (ii) Ring expansion (iii) Ring contraction

18. Most stable rearranged carbocation of is :



19. In which of the following carbocation rearrangement will not take place?



SECTION-5 : Matching List Type (Only One options correct)

This section contains 1 questions, each having two matching lists. Choices for the correct combination of elements from List-I and List-II are given as options (A), (B), (C) and (D) out of which one is correct.

20. Match the column :

	Column - I		Column - II
(P)		(1)	Aliphatic Hydrocarbon
(Q)		(2)	Anti aromatic
(R)		(3)	Aromatic
(S)		(4)	Alicyclic Compound



Code :

	P	Q	R	S		P	Q	R	S
(A)	3	1	4	2	(B)	1	2	4	3
(C)	2	1	3	4	(D)	3	2	1	4

**Practice Test-2 ((IIT-JEE (ADVANCED Pattern))
OBJECTIVE RESPONSE SHEET (ORS)**

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										

APSP Answers

PART - I

1.	(1)	2.	(3)	3.	(4)	4.	(3)	5.	(4)
6.	(2)	7.	(3)	8.	(2)	9.	(3)	10.	(2)
11.	(3)	12.	(3)	13.	(3)	14.	(3)	15.	(2)
16.	(2)	17.	(3)	18.	(4)	19.	(4)	20.	(4)
20.	10	22.	7	23.	8	24.	3	25.	3

PART - II

1.	(1)	2.	(3)	3.	(1)	4.	(2)	5.	(4)
6.	(4)	7.	(4)	8.	(3)				

PART - III

1.	(D)	2.	(B)	3.	(B)	4.	(B)	5.	(A)
6.	(A)	7.	(C)	8.	(A)	9.	(C)	10.	(B)
11.	(A)	12.	(B)	13.	(C)	14.	(C)	15.	(D)
16.	(B)	17.	(B)	18.	(A)	19.	(A)	20.	(C)
21.	(A)	22.	(C)	23.	(B)	24.	(B)	25.	(C)
26.	(B)	27.	(A)	28.	(D)	29.	(D)	30.	(D)
31.	(B)	32.	(B)	33.	(D)	34.	(D)	35.	(D)

PART - IV

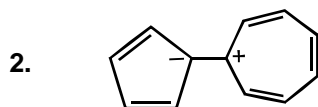
1.	(D)	2.	(D)	3.	(C)	4.	(C)	5.	(D)
6.	(C)	7.	(B)	8.	(C)	9.	(ACD)	10.	(ABC)
11.	(BCD)	12.	(AB)	13.	(BD)	14.	(BCD)	15.	10
16.	7	17.	5	18.	(B)	19.	(B)	20.	(A)



APSP Solutions

PART - I

1. Stability \propto Number of hyperconjugative H-atoms.

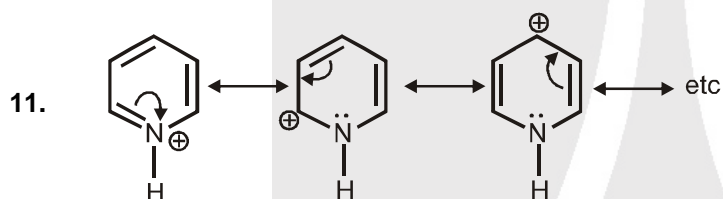


both rings are aromatic so, it will be polar in nature.

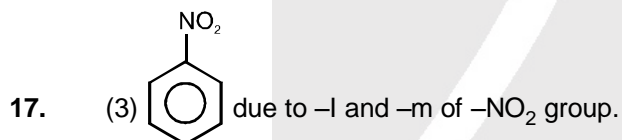
3. In (4) negative charge and lone pair on adjacent position.

10. Heat of hydrogenation $\propto \frac{1}{\text{stability of alkene}}$.

(III & IV have both resonance and hyperconjugation where as I and II have only hyperconjugation.)

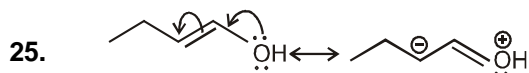


14. Anti aromatic compounds are unstable at room temperature.



20. $-\text{NO}_2$ group, being strong electron-withdrawing, disperses the $-ve$ charge, hence stabilizes the concerned carbanion.

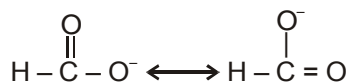
23. Number of α -hydrogens



PART - II

1. CH_3 group has + I effect, as number of $-\text{CH}_3$ group increases the inductive effect increases.

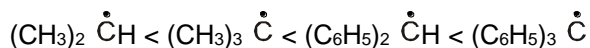
2. HCOO^- exists as

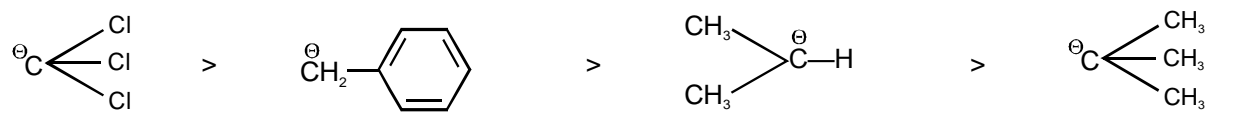



So, the carbon-oxygen bonds are found to be of equal length.



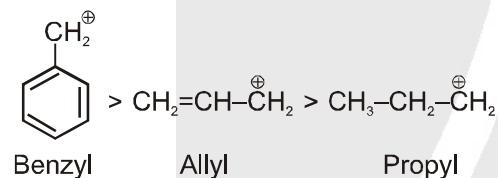
3. The order of stability of free radical is as follows: tertiary > secondary > primary.
Benzyl free radicals are stabilised by resonance and hence are more stable than alkyl free radicals. Further as the number of phenyl group attached to the carbon atom holding the odd electron increases, the stability of a free radical increases accordingly i.e.

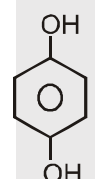
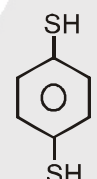


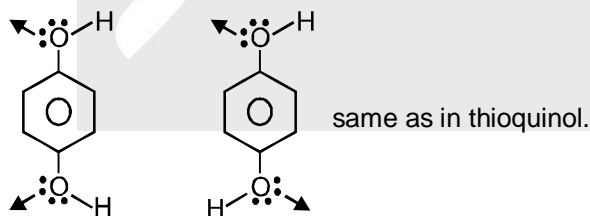
4. 
- Strong -I effect of Cl and bonding with vacant d-orbital
- m effect of phenyl
- +I effect of 2 CH₃
- +I effect of 3 CH₃

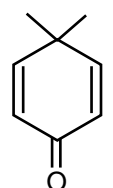
5. 
- Cyclopentadiene does not obey Huckel's Rule, as it has sp³ carbon in the ring.

6. The order of stability of carbocation will be



7. In the quinol  and thioquinol  -OH groups & -SH groups do not cancel their dipole moment as they exist in different conformations.

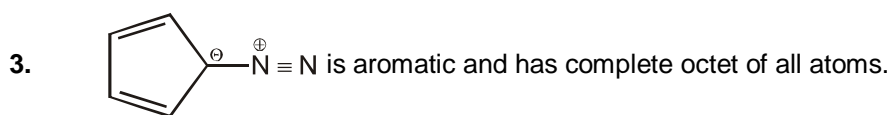


8. All are aromatic compounds except .

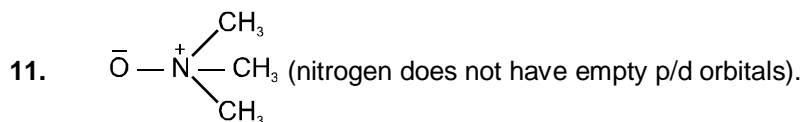
It is non aromatic so least resonance stabilised.



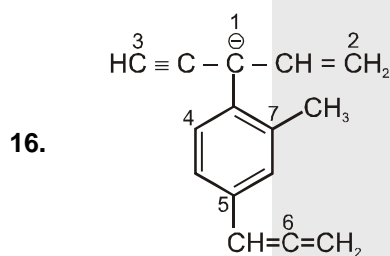
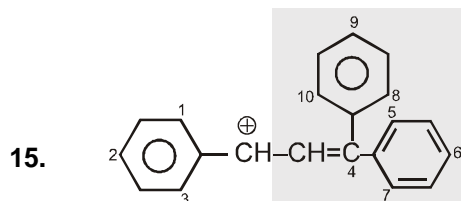
PART - IV



10. On the basis of electronic effect.

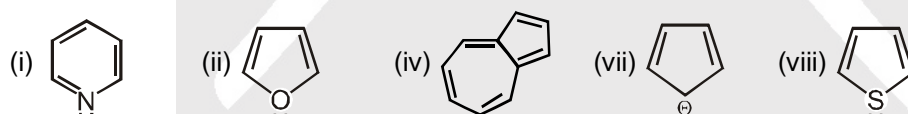


12. A & B are proper resonating structures while C & D violate octet rule.



The negative charge is delocalised on the marked carbon atoms (1 - 7).

17. Aromatic species are :



5 (i, ii, iv, vii, viii)

