Exercise-1

PART - I : SUBJECTIVE QUESTIONS

Section (A) : Electrophilic substitution reaction of aromatic compounds

- A-1. Normally, benzene gives electrophilic substitution reaction rather than electrophilic addition reaction although it has double bonds. Explain why?
- A.2 Which of the following Benzene rings contain deactivating groups ?



A-3. Which of the following Benzene rings contain o-p directing groups ?



A-4. Arrange the following in decreasing order of their reactivity with an electrophile.

	(I)	(II)	(111)
(a)	$\bigcirc \bigcirc \bigcirc \bigcirc$	$\bigcirc \bigcirc$	\bigcirc
(b)		ONa	F O
(c)	OMe OMe OMe		
(d)	\bigcirc		N H

A-5. Why following organic chlorides will not give a Friedel-Craft alkylation product when heated with benzene and AICI₃?

 $CH_2 = CHCI$,

C



Section (B) : Free radical substitution & Free radical addition reaction

- B-1. How do you account for formation of ethane during chlorination of methane ?
- B-2. Give the major product of monobromination of following compounds.

- **B-3.** Predict the product of the reaction given below : $CH_3-CH_2-CH=CH_2 \xrightarrow{HBr}_{Peroxide or light}$
- **B-4.** $CH_2=CH-CH_2-CH_3 \xrightarrow{NBS} B + C$ write structure of B and C.

Section (C) : Electrophilic addition reaction

C-1. What will be order of reactivity of following compounds towards addition of HBr ?

$$CH_{3} - CH = CH - CH_{3}$$

$$CH_{3} - CH = CH - CH_{3}$$

$$CH_{3} - CH_{2} - CH_{3}$$

$$CH_{3} - CH_{3} - CH_{3} - CH_{3}$$

$$CH_{3} - CH_{3} - CH_{3} - CH_{3}$$

$$H - C = CH - CH_{3}$$

- **C-2.** The acid catalysed hydration follows following order $(CH_3)_2C=CH_2 > CH_3CH=CH_2 > CH_2=CH_2$ Explain this order of reactivity.
- **C-3.** Give product of the following reactions.





- C-4. What will happen when Br₂/CCl₄ react with (a) cis But-2-ene (b) trans But-2-ene.
- **C-5.** In the reaction sequence,

$$A \xleftarrow{HBr / (CH_3)_2O_2} \bigcirc CH = CH - CH_3 \xrightarrow{HBr} B$$

What is the relationship between A & B :

PART - II : ONLY ONE OPTION CORRECT TYPE

Section (A) : Electrophilic substitution reaction of aromatic compounds

A-1. The reagent used for Friedel-Craft's reaction is : (A) Dry ether (B) AICl₃ (C) Anhydrous AICl₃ (D) P₂O₅

A-2. Which of the following will undergo sulphonation at fastest rate ?











A-4. The compound X in the reaction is :



- Toluene is o/p orienting with respect to an electrophilic substitution reaction due to A-5.🕰 (A) I effect of the methyl group
 - (B) I as well as +m effect of the methyl group
 - (C) hyperconjugation between the methyl group and the phenyl ring
 - (D) +m effect to the methyl group.
- Which of the following structures correspond to the product expected, when excess of C_6H_6 reacts with A-6. CH₂Cl₂ in presence of anhydrous AlCl₃:



- A-7. For preparing monoalkyl benzene, acylation process is preferred than direct alkylation because (A) In alkylation, a poisonous gas is evolved.
 - (B) In alkylation, large amount of heat is evolved.
 - (C) In alkylation, polyalkylated product is formed.
 - (D) Alkylation is very costly.
- Chlorobenzene is o,p-directing in electrophilic substitution reaction. The directing influence is explained A-8.æ bv:

(A) +m of Ph (B) +I of Cl (C) +m of Cl (D) +I of Ph

Section (B) : Free radical substitution & Free radical addition reaction

- B-1. In the free radical chlorination of methane, the chain initiating step involves the formation of (B) Hydrogen chloride (C) Methyl radical (D) Chloromethyl radical. (A) Chlorine radical
- B-2. Which of the following cannot be considered as a step of mechanism in chain reaction of methane with Cl_2 ?

$(A) Cl_2 \longrightarrow Cl^{\bullet}$	$(B) CH_4 + CI^{\bullet} \longrightarrow CH_3CI +$
(C) $CI^{\bullet} + CH_4 \longrightarrow CH_3^{\bullet} + HCI$	(D) $CI^{\bullet} + CH_{3}^{\bullet} \longrightarrow CH_{3}CI$

B-3. A gaseous hydrocarbon 'X' on reaction with bromine in light forms a mixture of two monobromo alkanes and HBr. The hydrocarbon 'X' is :

(A) CH₃-CH₃ (B) (C) ^

H•

- B-4. The maximum ease of abstraction of a hydrogen atom by a chlorine atom is shown by : $(A) (CH_3)_3C - CH_3$ (C) $C_6H_5CH_3$ (D) CH₂=CHCH₃ (B) (CH₃)₂CH₂
- B-5. Methane reacts with excess of chlorine in diffused sunlight to give the final product as (A) Chloroform (B) Methyl chloride. (D) Carbon tetrachloride
 - (C) Methylene chloride





PART - III : MATCH THE COLUMN

1. Match List I (Reaction) with List II (Type of reaction) and select the correct answer using the code given below the lists :

	List						List			
(P)	CH ₃ -	$CH_3-CH_2-CH_2-CH_3 + Br_2 \xrightarrow{h_{\mathcal{V}}} $						trophilic	addition	
(Q)	CH ₃ -	$CH_3-CH=CH-CH_3 + Br_2 \xrightarrow{CCl_4}$					Nucl	eophilic	addition	
(R)		$Harrow Fe \rightarrow$					Free	radical	subsituti	on
(S)	CH ₃ -	CH ₃ -CH ₂ -CH ₂ -CHO + LiAlH ₄ $\xrightarrow{H_2O}$					Elect	trophilic	subsituti	on
Codes	s :									
	Р	Q	R	S			Ρ	Q	R	S
(A)	2	1	3	4		(B)	3	2	1	4
(C)	4	2	1	3		(D)	3	1	4	2

2. Match the column-I with column-II :

	Column-I		Column-II
	Group		Nature
(A)	–Cl	(p)	Activating
(B)	-CH ₃	(q)	deactivating
(C)	–OH	(r)	o,p-directing
(D)	-NO ₂	(s)	m-directing

Exercise-2

> Marked questions are recommended for Revision.

PART - I : ONLY ONE OPTION CORRECT TYPE

1. Which of the following species is expected to have maximum enthalpy in an electrophilic aromatic substitution reaction ?



2. Which step is used to produce 1–Chloro–3–ethylbenzene CH = C = O = C = CH

$$(A) \bigcirc \xrightarrow{CH_{3}-CI_{2}/AICI_{3}} \xrightarrow{CI_{2}/AICI_{3}} \xrightarrow{Zn - Hg/HCI}$$

$$(B) \bigcirc \xrightarrow{CI_{2}/AICI_{3}} \xrightarrow{CI_{2}/AICI_{3}} \xrightarrow{CI_{2}/AICI_{3}} \xrightarrow{Zn - Hg/HCI}$$

$$(C) \bigcirc \xrightarrow{CH_{3}-CH_{2}-CI}_{AICI_{3}} \xrightarrow{CI_{2}/AICI_{3}}$$

$$(D) \bigcirc \xrightarrow{CI_{2}/Fe} \xrightarrow{CH_{3}-CH_{2}-CI}_{AICI_{3}}$$





PART - II : SINGLE AND DOUBLE VALUE INTEGER TYPE



2.

At which position nitration mainly takes place ?



The substitution will mainly take place at position :

- **3.** When ortho dibromobenzene is subjected to mononitration X number of product are formed and when meta dibormobenzene is subjected to mononitration, Y number of products are formed. Report your answer as XY.
- **4.** The number of possible enantiomer pairs that can be produced during monochlorination of 2-Methylbutane is :

5. For the given reaction how many products are optically active (all isomers) :

$$\begin{array}{ccc} \mathsf{CH}_3 & \mathsf{CH}_3 \\ | & | \\ \mathsf{CH}_3 - \mathsf{C} - \mathsf{CH}_2 - \mathsf{CH} - \mathsf{CH}_3 & \xrightarrow{\mathsf{Br}_2 / \mathsf{h}_0} \\ | \\ \mathsf{CH}_3 & \xrightarrow{\mathsf{CH}_3} \end{array}$$

6. Number of structural isomers which can be obtained on monochlorination of 2-Methylbutane is :

7.2 Me $Et \xrightarrow{HBr} Me$

How many product will be formed in above reaction.

8. When trans-2-butene reacts with Br_2/CCl_4 , X number of products are formed. Whereas when trans-2butene reacts with HBr Y number of products are formed. Report your answer as Y X.

PART - III : ONE OR MORE THAN ONE OPTIONS CORRECT TYPE

1. Electrophilic aromatic substitution can be seen in which of the following cases ?



2. In which of the following reactions correct major product is given ?



3.a. Select the reactions in which the correct orientations have been mentioned in the major products.





5.

Which of the following statements are correct for above reaction.

- (A) Reaction intermediate is carbocation.
- (B) Product is mixture of two enantiomers.
- (C) Reaction intermediate is stabilized by +I, hyperconjugation & resonance.
- (D) Br₂ at high temperature also give same product in the place of NBS.



7. Which of the following compounds will give same major product on acid catalysed hydration ? (A) $Ph - \stackrel{I}{\leftarrow} - CH = CH_2$ (B) $Ph - \stackrel{I}{\leftarrow} - CH = CH_2$ (B) $Ph - \stackrel{I}{\leftarrow} - CH = CH_2$ (C) $\stackrel{CH_3}{\rightarrow} C = C \stackrel{CH_3}{\leftarrow} CH_3$ (C) $\stackrel{CH_3}{\rightarrow} C = C \stackrel{CH_3}{\leftarrow} CH_3$ (D) $\stackrel{CH_3}{\leftarrow} CH \stackrel{C}{\leftarrow} CH_2$ (D) $\stackrel{C}{\leftarrow} CH_3$ (D) \stackrel{C}

- (B) Product obtained is trans isomer.
- (C) Boron atom acts as electrophile.
- (D) two stereoisomers are obtained as product.



10. Identify the incorrect statement(s):

(A) Alkynes are more reactive than alkenes towards electrophilic addition reaction

(B) Alkynes are less reactive than alkenes towards electrophilic addition reaction

(C) Alkynes decolourise Br2 water

(D) Addition of HBr to alkynes in presence of peroxide proceeds via Markownikoff's addition

PART - IV : COMPREHENSION

Read the following passage carefully and answer the questions.

Comprehension #1

Three acyclic alkenes (x, y, z) on catalytic hydrogenation give same alkane. On reaction with HCl, (x, y, z) form same major tertiary halide product. Reductive ozonolysis of mixture of (x, y, z) gives a mixture of two moles of $CH_2=O$ one moles of $CH_3CH=O$ one mole of acetone, one mole of butanone and one mole of 2-methyl propanal. x, y and z do not have any stereoisomers.

- **1.** x, y, z are
 - (A) chain isomers(C) Geometrical isomers

(B) Position isomers(D) Optical isomers

- **2.** $(x, y, z) \xrightarrow{H_3O^+}$ addition product. The correct statement is
 - (A) All three alkenes will give 3 different major hydration products
 - (B) Three alkenes will give same hydration major product
 - (C) Two alkenes form same product but one alkene forms different major product.
 - (D) Addition of HCl and H₃O⁺ both are following different regioselectivity.

3. What is true about x, y, z.

- (A) These have molecular formula C₃H₆
- (B) x, y, z on catalytic hydrogenation give chiral alkanes.
- (C) These are unbranched alkenes.
- (D) These form same carbocation intermediate on reaction with HCl to give the major product.

Comprehension # 2

A Hydrocarbon X (M.F. C_4H_6) produces an aldehyde Y through Hydroboration-Oxidation and a ketone Z through Oxymercuration-Demercuration. Y and Z are functional isomers. X gives P when treated with excess of HOCI and Q when treated with excess of HCI.



 $Z \xleftarrow{Hg(OAc)_2} B_2H_6 \\ H_2O_2,OH^{\circ} Y$ $[X] H_2O_2,OH^{\circ} P$

(C) $CH_2=CH-CH=CH_2$ (D) $CH_2=CH-C=CH$

(D) (IV) (ii) (S)

5. The correct statement is :
(A) P and Q are positional isomers.
(C) P is 1,1-Dichlorobutan-2-one.

(B) Q is 1,2-Dichlorobutane.

(D) P and Q are identical.

Comprehension # 3

Answer Q.6, Q.7 and Q.8 by appropriately matching the information given in the three columns of the following table.

Observe the three columns in which column-1 represents reactants, column-2 represents reagent while column-3 represents reaction conditions.

Column 1	Column 2	Column 3
(I) Ph–C≡CH	(i) Hg++/H ₃ O+	(P) Electrophilic substitution
	(ii) Cl₂/h∨	(Q) Electrophilic addition
	O Ⅱ (iii) CH ₃ –C–H/H ⁺	(R) Carbocation intermediate
	(iv) H+/H2O	(S) Radical intermediate

6.	Ketone is formed by the (A) (I) (i) (Q)	reaction (B) (IV) (iii) (R)	(C) (III) (iv) (Q)	(D) (II) (iii) (P)
7.	Which of the following is (A) (II) (iii) (R)	non correct for substitut (B) (IV) (ii) (S)	ion reaction. (C) (III) (iv) (R)	(D) (IV) (iii) (P)

 8.
 Arenium ion is formed in the reaction.

 (A) (I) (iv) (P)
 (B) (II) (iii) (P)
 (C) (III) (iv) (R)

Exercise-3

* Marked Questions may have more than one correct option.

PART - I : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

1. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti-Markovnikov addition to alkenes because : [IIT-JEE-2001(S), 3/135]

(A) both are highly ionic

- (B) one is oxidising and the other is reducing
- (C) one of the steps is endothermic in both the cases
- (D) all the steps are exothermic in both the cases.



10. $CH_2=CH-CH_3 \xrightarrow{NOCI} X$, X is : [JEE-2006, 3/184] (A) $\begin{array}{c} CH_2 - CH - CH_3 \\ | & | \\ CI & NO \end{array}$ (B) $\begin{array}{c} CH_2 - CH - CH_3 \\ | & | \\ NO & CI \end{array}$ (C) $ON-CH_2-CH_2-CH_2-CI$ (D) $\begin{array}{c} ON - CH - CH_2 - CH_3 \\ | & | \\ OI \end{array}$

11. The major product of monobromination of the given compound with Br₂ / Fe is - [JEE-2006, 3/184]



- 12.The number of stereoisomers obtained by bromination of trans-2-butene is :[IIT-JEE-2007, 3/162](A) 1(B) 2(C) 3(D) 4
- **13.** In the following reaction,

$$\begin{array}{c} & O \\ & &$$

the structure of the major product 'X' is :

[JEE 2007, 3/162]



14. Statement-1 : Bromobenzene upon reaction with Br₂/Fe gives 1,4-dibromobenzene as the major product.

Statement-2 : In bromobenzene, the inductive effect of the bromo group is more dominant than the
mesomeric effect in directing the incoming electrophile.[IIT-JEE-2008, 3/162]

- (A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.
- (B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1
- (C) Statement-1 is True, Statement-2 is False
- (D) Statement-1 is False, Statement-2 is True

16.

15. The compounds P, Q and S were separately subjected to nitration using HNO₃ / H₂SO₄ mixture. The major product formed in each case respectively, is : [IIT-JEE-2010, 5/163]



- (A) a hemiacetal (C) an ether (D) an ester (D) an ester
- 17. The maximum number of isomers (including stereoisomers) that are possible on monochlorination of the following compound, is : [IIT-JEE-2011, 4/160]



18. Different possible thermal decomposition pathways for peroxyesters are shwon below. Match each pathway from List I with an appropriate structure from List II and select the correct answer using the code given below the lists. [IIT-JEE-2014, 3/160]



300°C



21.* Among the following, reaction(s) which gives(give) *tert*-butyl benzene as the major product is(are)





22.* T

The correct statement(s) for the following addition reactions is (are)

[JEE Advanced-2017, 4/122]

[JEE-2016, 3/60]

(A) (M and O) and (N and P) are two pairs of enantiomers

- (B) Bromination proceeds through trans-addition in both the reactions
- (C) **O** and **P** are identical molecules
- (D) (M and O) and (N and P) are two pairs of diastereomers

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

JEE(MAIN) OFFLINE PROBLEMS

1.	What is the product whe (1) CH ₃ COCI	en acetylene reacts with ((2) CICH ₂ CHO	hypochlorous acid ? (3) Cl₂CHCHO	[AIEEE-2002, 3/225] (4) CICH ₂ COOH.
2.	Reaction of one molecu (1) 3-bromobutene under (2) 1-bromo-2-butene under (3) 3-bromobutene under (4) 1-bromo-2-butene under	Ile of HBr with one molec er kinetically controlled conder nder thermodynamically er thermodynamically conder nder kinetically controlled	ule of 1, 3-butadiene at 4 onditions controlled conditions ntrolled conditions. d conditions.	40°C gives predominantly [AIEEE-2005, 3/225]
3.	Acid catalyzed hydration (1) Mixture of secondary (3) Secondary or tertiary	n of alkenes except ether y and tertiary alcohols y alcohol	ne leads to the formation (2) Mixture of primary a (4) Primary alcohol	of [AIEEE-2005, 3/225] nd secondary alcohols
4.	2-Methylbutane on read (1) 1-Bromo-3-methylbu (3) 2-Bromo-3-methylbu	ting with bromine in the p utane utane	presence of sunlight give (2) 1-Bromo-2-methylbu (4) 2-Bromo-2-methylbu	es mainly? [AIEEE-2005, 3/225] utane utane
5.	HBr reacts with CH ₂ =CH (1) CH ₃ CHO and CH ₃ Br (3) BrCH ₂ -CH ₂ -OCH ₃	H–OCH₃ under anhydrou r	s conditions at room tem (2) BrCH ₂ CHO and CH ₃ (4) H ₃ C–CHBr–OCH ₃	nperature to give ₃ Br [AIEEE-2006, 3/165]
6.	The reaction of toluene (1) o- and p-chlorotolue (3) benzoylchloride	with Cl ₂ in presence of F ne	eCl ₃ gives predominantly (2) m-chlorotoluene (4) benzyl chloride	y : [AIEEE-2007, 3/120]
7.	Which of the following r (1) CH_3 -C=CH + 2HBr (3) CH =CH + 2HBr \rightarrow	eactions will yield 2,2-dib \rightarrow	romopropane ? (2) CH ₃ CH=CHBr + HBı (4) CH ₃ –CH=CH ₂ + HBr	[AIEEE-2007, 3/120]
8.	Presence of a nitro grou (1) activates the ring tov (2) renders the ring bas (3) deactivates the ring (4) deactivates the ring	up in a benzene ring wards electrophilic substi ic towards nucleophilic sub towards electrophilic sub	tution stitution. stitution.	[AIEEE-2007, 3/120]



- 4. In the presence of peroxide, HCI and HI do not give anti-Markownikoff's addition to alkenes because: [JEE(Main) 2014 Online (12-04-14), 4/120]
 - (1) One of the steps is endothermic in HCI and HI.
 - (2) Both HCl and HI are strong acids.
 - (3) HCl is oxidizing and the HI is reducing.
 - (4) All the steps are exothermic in HCI and HI.

5. The major product obtained in the photo catalyzed bromination of 2-methylbutane is :

(1) 1-bromo-2-methylbutane

- [JEE(Main) 2014 Online (12-04-14), 4/120] (2) 1-bromo-3-methylbutane
- (3) 2-bromo-3-methylbutane

- (4) 2-bromo-2-methylbutane

CH₂

6.* What is the major product expected from the following reaction ?



Where D is an isotope of hydrogen.



7. Bromination of cyclohexene under conditions given below yields:





(3)



[JEE(Main) 2015 Online (11-04-15), 4/120]

[JEE(Main) 2016 Online (10-04-16), 4/120]

(4)

8. Consider the reaction sequence below : OCH₃



9.







15. The major product of the following reaction is :





(2) γ-hydrogen

(ii) H₂O

 16.
 Which hydrogen in compound (E) is easily replaceable during bromination reaction in presence of light?

 [JEE(Main) 2019 Online (10-01-19), 4/120]

 $\begin{array}{c} CH_3-CH_2-CH=CH_2\\ \delta & \gamma & \beta & \alpha\\ (E) \end{array}$

(1) α –hydrogen

(3) β -hydrogen (4)

OH

OH

CH₃

(4) δ –hydrogen

17. The major product of the following reaction is : CH_3O CH_2CI $(i) AICl_3(anhy d)$ [JEE(Main) 2019 Online (10-01-19), 4/120]

CH₃

[JEE(Main) 2019 Online (11-01-19), 4/120]





18. The major product of the following reaction is : HO_{1}







19. The major product obtained in the following conversion is: [JEE(Main) 2019 Online (11-01-19), 4/120]





20. The major product of the following reactions is :





21. The major product of the following reaction is:





[JEE(Main) 2019 Online (12-01-19), 4/120]



22. The major product in the following conversion is:

[JEE(Main) 2019 Online (12-01-19), 4/120]



Answers

EXERCISE - 1

PART – I

- A-1. Benzene has resonance stabilization due to delocalisation of π -electrons and during electrophilic addition reactions, it loses its aromaticity. In electrophilic substitution reaction aromaticity is retained.
- A.2 A-3. a, b, c, f, h c, e, g, h
- A-4. (a) (l) > (ll) > (lll) (b) (II) > (III) > (I)(C) (II) > (I) > (II)(d) (III) > (I) > (II)
- A-5. In vinyl chloride and chloro benzene lone pair on Cl atom takes part in conjugation. So, partial double bond character between C-CI bond is developed.

(c)

B-1. Chlorination of methane is a free radical reaction which occurs by the following mechanism (CI - CI - Homolytic Fission) 2 CI

Propagation

Initiation

 $CH_3-H + \dot{C}I \longrightarrow \dot{C}H_3 + HCI$ $\dot{CH}_3 + \dot{CI} - CI \longrightarrow CH_3 - CI + CI$ $\dot{C}H_3 + \dot{C}H_3 \longrightarrow CH_3 - CH_3$ Termination $\dot{C}H_3 + \dot{C}I \longrightarrow CH_3 - CI$ ċı + ċı → cı – cı

CH₃-CH₂-CH₂-CH₂-CH₂ B-3.

Вr

B-4.
$$CH_2 = CH - CH - CH_3 + CH_2 - CH = CH - CH_3$$

 $\begin{vmatrix} & & \\ & & \\ Br & & Br \end{vmatrix}$

- IV > III > II > IC-1.
- C-2. Reactivity is based on stability of intermediate carbocation. 3° carbocation > 2° carbocation > 1° carbocation (stability order)



- C-4. (a) Racemic mixture of 2,3-Dibromobutane
- (b) Meso 2,3-Dibromobutane

C-5. Positional isomers

Orga	nic Reaction M	lechanism	s-II /							
	PART – II									
A-1.	(C)	A-2.	(B)	A-3.	(A)	A-4.	(B)	A-5.	(C)	
A-6.	(D)	A-7.	(C)	A-8.	(C)	B-1.	(A)	B-2.	(B)	
B-3.	(C)	B-4.	(C)	B-5.	(D)	B-6.	(B)	B-7.	(A)	
B-8.	(D)	B-9.	(A)	B-10.	(C)	C-1.	(B)	C-2.	(B)	
C-3.	(B)	C-4.	(B)	C-5.	(A)	C-6.	(D)	C-7.	(C)	
C-8.	(B)	C-9.	(D)	C-10.	(A)					
				PAR	T – III					
1.	(D)	2.	(A - q, r) ; (E	8 - p, r) ; (C	; - p. r) ; (D - c	q, s)				
	EXERCISE - 2									
PART – I										
1.	(A)	2.	(A)	3.	(C)	4.	(C)	5.	(A)	
6.	(D)	7.	(D)	8.	(B)	9.	(A)	10.	(C)	
11.	(B)	12.	(A)							
				PAF	RT – II					
1.	3	2.	4	3.	23	4.	2	5.	4	
6.	4	7.	4	8.	21					
				PAR	T – III					
1.	(ABC)	2.	(ABC)	3.	(AC)	4.	(BD)	5.	(BCD)	
6.	(ABCD)	7.	(ABCD)	8.	(ABCD)	9.	(AD)	10.	(AD)	
				PAR	T – IV					
1.	(B)	2.	(B)	3.	(D)	4.	(B)	5.	(C)	
				EXERO	CISE – 3					
	PART – I									
1.	(C)	2.	(B)	3.	(B)	4.	(C)	5.	(B)	
6.	(A)	7.	(B)	8.	(A)	9.	(B)	10.	(B)	
11.	(A)	12.	(A)	13.	(B)	14.	(C)	15.	(C)	
16.	(B)	17.	8	18.	(A)	19.	(D)	20.	5	
21.*	(BCD)	22.*	(BD)							

Orga	anic Reaction	Mechanism	s-II							
				PAF	RT – II					
	JEE(MAIN) OFFLINE PROBLEMS									
1.	(3)	2.	(2)	3.	(3)	4.	(4)	5.	(4)	
6.	(1)	7.	(1)	8.	(4)	9.	(1)	10.	(3)	
11.	(2)	12.	(1)	1 3.	(3)					
			JE	E(MAIN) ONI	LINE PROE	BLEMS				
1.	(3)	2.	(3)	3.	(1)	4.	(1)	5.	(4)	
6.*	(2,3)	7.	(2)	8.	(1)	9.	(4)	10.	(4)	
11.	(1)	12.	(2)	13.	(2)	14.	(1)			
15.	NTA answ	er was (4), l	but correct a	answer is (3).		16.	(2)	17.	(1)	
18.	(2)	19.	(2)	20.	(3)	21.	(4)	22.	(1)	