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Educational Institutions



JEE ADVANCED



Sri Chaitanya IIT Academy., India.

★ A.P ★ T.S ★ KARNATAKA ★ TAMILNADU ★ MAHARASTRA ★ DELHI ★ RANCHI

A right Choice for the Real Aspirant

ICON Central Office, Madhapur – Hyderabad

Sec: Sr.Super60_STERLING BT

JEE-ADV_2023-P1

Date: 15-06-2025

Time: 09.00Am to 12.00Noon

WTA-34

Max. Marks:180

MATHEMATICS

: COMPLETE COMPLEX NUMBERS

PHYSICS

: MAGNETISM AND MATTER: Bar magnet as an equivalent solenoid, Magnetic field lines, Magnetic field due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, Torque on a magnetic dipole in a uniform magnetic field, Para, Dia and ferromagnetic substances, The effect of temperature on magnetic properties, EM Waves

CHEMISTRY :

ALKYL HALIDES :Preparation and Reactions of alkyl halides, Mechanism of Nucleophilic Substitution reactions (SN1, SN2)

Name of the Student: _____

H.T. NO:

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JEE-ADVANCE-2023-P1-Model

Time:3Hr's

IMPORTANT INSTRUCTIONS

Max Marks: 180

MATHEMATICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 1 – 3)	Questions with Multiple Correct Choice with partial mark!	+4	-2	3	12
Sec – II(Q.N : 4 – 7)	Questions with Single Correct Choice	+3	-1	4	12
Sec – III(Q.N : 8 – 13)	Questions with Integer Answer Type	+4	0	6	24
Sec – IV(Q.N : 14 – 17)	Matching Type	+3	-1	4	12
Total				17	60

PHYSICS:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 18 – 20)	Questions with Multiple Correct Choice with partial mark	+4	-2	3	12
Sec – II(Q.N : 21 – 24)	Questions with Single Correct Choice	+3	-1	4	12
Sec – III(Q.N : 25 – 30)	Questions with Integer Answer Type	+4	0	6	24
Sec – IV(Q.N : 31 – 34)	Matching Type	+3	-1	4	12
Total				17	60

CHEMISTRY:

Section	Question Type	+Ve Marks	- Ve Marks	No.of Qs	Total marks
Sec – I(Q.N : 35 – 37)	Questions with Multiple Correct Choice with partial mark	+4	-2	3	12
Sec – II(Q.N : 38 – 41)	Questions with Single Correct Choice	+3	-1	4	12
Sec – III(Q.N : 42 – 47)	Questions with Integer Answer Type	+4	0	6	24
Sec – IV(Q.N : 48 – 51)	Matching Type	+3	-1	4	12
Total				17	60

MATHEMATICS
Max Marks: 60
SECTION – I
(ONE OR MORE CORRECT ANSWER TYPE)

 This section contains **THERE (03)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks :+4 ONLY if (all) the correct option(s) is(are) chosen;

Partial Marks: +3 If all the four options are correct but **ONLY** three options are chosen;

Partial Marks: +2 If three or more options are correct but **ONLY** two options are chosen, both of which are correct ;

Partial Marks: +1 If two or more options are correct but **ONLY** two options are chosen, and it is a correct option ;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -2 In all other cases.

For example, in a question, if (A), (B) and (D) are the **ONLY** three options corresponding to correct answers, then choosing **ONLY** (A), (B) will get +4 marks; choosing **ONLY** (A) and (B) will get +2 marks; choosing **ONLY** (A) and (D) will get +2 marks; choosing **ONLY** (B) and (D) will get +2 marks; choosing **ONLY** (A) will get +1 mark; choosing **ONLY** (B) will get +1 mark; choosing **ONLY** (D) will get +1 mark; choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get -2 marks.

1. Consider the equation $z^2 - (3+i)z + (m+2i) = 0$ ($m \in \mathbb{R}$). If the equation has exactly one real and one-non-real complex root, then which of the following hold(s) good
 - Modulus of the non real complex root is 2
 - The value of m is 3
 - Additive inverse of non-real root is $(-1-i)$
 - Product of real root and imaginary part of non-real complex root is 2
2. If the equation $|Z|(Z+1)^8 = Z^8|Z+1|$ where $Z \in \mathbb{C}$ and $Z(z+1) \neq 0$ has distinct roots $Z_1, Z_2, Z_3, \dots, Z_n$ (where $n \in \mathbb{N}$) then which of the following is/are true?
 - $Z_1, Z_2, Z_3, \dots, Z_n$ are concyclic points
 - $Z_1, Z_2, Z_3, \dots, Z_n$ are collinear points
 - $\sum_{r=1}^n \operatorname{Re}(Z_r) = \frac{-7}{2}$
 - $\sum_{r=1}^n \operatorname{Im}(Z_r) = 0$
3. Let $A_1, A_2, A_3, \dots, A_7$ be a polygon and a_1, a_2, \dots, a_7 be the complex numbers representing vertices A_1, A_2, \dots, A_7 . If, $|a_1| = |a_2| = \dots = |a_7| = R$, then, $\sum_{1 \leq i < j \leq 7} |a_i + a_j|^2$
 - greater than $30R^2$
 - has minimum value as $35R^2$
 - has its minimum value in $(25R^2, 45R^2)$
 - is less than $45R^2$

THE PERFECT HAT-TRICK WITH ALL- INDIA RANK 1 IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023

JEE MAIN 2023 SINGARAJU VENKAT KOUNDINYA MCA CLASS sri chaitanya classmate 300 300 300	RANK 1	JEE Advanced 2023 VAVILALA CHIDVILAS REDDY MCA CLASS sri chaitanya classmate 341 360 360	RANK 1	NEET 2023 BORA VARUN CHAKRAVARTHI B.Sc. Class sri chaitanya classmate 720 720 720	RANK 1
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SECTION – II
(SINGLE CORRECT ANSWER TYPE)

This section contains **FOUR (04)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 If **ONLY** the correct option is chosen;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -1 In all other cases

4. Let $Z_1, Z_2 \& Z_3$ are vertices of acute angled ΔABC in anti clock wise order and origin be the circumcenter of the triangle. If bisector of $\angle A$ meets the circumcircle at point P(Z),

then $\arg\left(\frac{Z}{Z_3 - Z_2}\right)$ is

- A) $\frac{\pi}{2}$ B) $\frac{-\pi}{2}$ C) $\frac{\pi}{6}$ D) none of these

5. If $Z_n = \cos \frac{\pi}{n(n+1)(n+2)} + i \sin \frac{\pi}{n(n+1)(n+2)}, n \in N$, then the value of

$\lim_{k \rightarrow \infty} (z_1 \cdot z_2 \cdot z_3 \dots \cdot z_k)$ is

- A) $\frac{1}{\sqrt{2}} - \frac{i}{\sqrt{2}}$ B) $\frac{-1}{2} + i \frac{\sqrt{3}}{2}$ C) $\frac{-1}{2} - i \frac{\sqrt{3}}{2}$ D) $\frac{1}{\sqrt{2}} + \frac{i}{\sqrt{2}}$

6. If complex numbers Z_1 and Z_2 both satisfy $z + \bar{z} = 2|z - 1|$ and $\arg(z_1 - z_2) = \frac{\pi}{3}$ then

value of $Im(z_1 + z_2)$ is where $Im(z)$ denotes imaginary part of z

- A) $\sin \frac{\pi}{3}$ B) $\cosec \frac{\pi}{3}$ C) $\tan \frac{\pi}{3}$ D) $\cot \frac{\pi}{3}$

7. The mirror image of the curve given by $\arg\left(\frac{z+i}{z-1}\right) = \frac{\pi}{4}$ in the line $x - y = 0$ is

- A) $\arg\left(\frac{z+i}{z+1}\right) = \frac{\pi}{4}$ B) $\arg\left(\frac{z+1}{z-i}\right) = \frac{\pi}{4}$
 C) $\arg\left(\frac{z-i}{z+1}\right) = \frac{\pi}{4}$ D) $\arg\left(\frac{z+i}{z-1}\right) = \frac{\pi}{4}$

SECTION-III**(NON-NEGATIVE INTEGER.)**

This section contains **SIX (06)** questions.

- The answer to each question is a **NON-NEGATIVE INTEGER**.
- For each question, enter the correct integer corresponding to the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme

Full Marks : +4 If ONLY the correct integer is entered; Zero Marks : 0 In all other cases.

8. Let z_1, z_2, z_3 be complex numbers (not all real) such that $|z_1| = |z_2| = |z_3| = 1$ and $2(z_1 + z_2 + z_3) - 3z_1 z_2 z_3$ is real, then, $\text{Max}(\arg(z_1), \arg(z_2), \arg(z_3))$ (Given that argument of z_1, z_2, z_3 is positive) has minimum value as $\frac{k\pi}{6}$ where $(k+2)$ is _____
9. If Z_1, Z_2, Z_3 are three complex numbers, such that $|Z_1| = |Z_2| = |Z_3| = 1$ & $Z_1^2 + Z_2^2 + Z_3^2 = 0$ then $|Z_1^3 + Z_2^3 + Z_3^3|$ is equal to.....
(not equal to 1)
10. The equation $Z^6 + Z^3 + 1 = 0$ has complex roots with argument between 90° and 180° in the complex plane, determine the degree measure of θ is P Then the value of $\frac{P}{40}$
11. If $|z_i| = 12, i = 1, 2, 3, 4, 5$ & $\sum_{i=1}^5 z_i = \sum_{i=1}^3 z_i = 0$ then, maximum value of $\sum_{1 \leq i < j \leq 5} |z_i - z_j|^2$ is equal to
12. If z_1, z_2 are complex numbers, then the maximum value of $\frac{z_1 \bar{z}_2 + \bar{z}_1 z_2 + z_1 z_2 + \bar{z}_1 \bar{z}_2}{|z_1 z_2|}$ is equal to
13. The arithmetic mean of all integral values parameter α for which $|z - (\alpha^2 - 7\alpha + 13 + i)| = 1$ and $\arg z \geq \frac{\pi}{2}$ is satisfied at least one z is equal to λ
then 10λ is equal to _____

SECTION – IV (MATCHING TYPE)

This section contains **FOUR (04)** Matching List Sets.

- Each set has **ONE** Multiple Choice Question.
- Each set has **TWO** lists : **List-I** and **List-II**.
- **List-I** has **Four** entries (I), (II), (III) and (IV) and **List-II** has **Five** entries (P), (Q), (R), (S) and (T).
- **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks: +3 ONLY if the option corresponding to the correct combination is chosen;

Zero Marks: 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks: -1 In all other cases.

14. Let $Z_K = \cos\left(\frac{2k\pi}{10}\right) + i \sin\left(\frac{2k\pi}{10}\right); k = 1, 2, \dots, 9$ Then, match the column

	Column-I		Column-II
A)	For each z_k there exists a z_j such that $z_k \cdot z_j = 1$	1)	True
B)	There exists a $k \in \{1, 2, \dots, 9\}$ such that $z_1 \cdot z = z_k$ has no solutions z in the set of complex numbers	2)	False
C)	$\frac{ 1-z_1 1-z_2 \dots 1-z_9 }{10}$ equal to	3)	1
D)	$1 - \sum_{k=1}^9 \cos\left(\frac{2k\pi}{10}\right)$ equal to	4)	2

A) A-1, B-2, C-4, D-3 B) A-2, B-1, C-3, D-4

C) A-1, B-2, C-3, D-4 D) A-2, B-1, C-4, D-3

15. Let Z be a complex number satisfying $|z|^3 + 2z^2 + 4\bar{z} - 8 = 0$, where \bar{z} denotes the complex conjugate of z . Let the imaginary part of z be nonzero. Match each entry in List-I to the correct entries in List-II

	List-I		List-II
P)	$ z ^2$ is equal to	1)	12
Q)	$ z - \bar{z} ^2$ is equal to	2)	4
R)	$ z ^2 + z + \bar{z} ^2$ is equal to	3)	8
S)	$ z + 1 ^2$ is equal to	4)	10
		5)	7

A) $P \rightarrow 1, Q \rightarrow 3, R \rightarrow 5, S \rightarrow 4$ B) $P \rightarrow 4, Q \rightarrow 1, R \rightarrow 3, S \rightarrow 5$

C) $P \rightarrow 2, Q \rightarrow 1, R \rightarrow 3, S \rightarrow 5$ D) $P \rightarrow 2, Q \rightarrow 3, R \rightarrow 5, S \rightarrow 4$

16. Match the column

	Column-I (complex number z)		Column-II (principle argument of z)
p)	$Z = \frac{(1+i)^5 (1+\sqrt{3}i)^2}{-2i(-\sqrt{3}+i)}$	1)	π
q)	$Z = \sin\left(\frac{6\pi}{5}\right) + i\left(1 + \cos\frac{6\pi}{5}\right)$	2)	$\frac{-7\pi}{18}$
r)	$Z = 1 + \cos\left(\frac{11\pi}{9}\right) + i \sin\left(\frac{11\pi}{9}\right)$	3)	$\frac{9\pi}{10}$
s)	$Z = \sin x \sin(x - 60^\circ) \sin(x + 60^\circ)$	4)	$\frac{-5\pi}{12}$
		5)	0

Where $x \in \left(0, \frac{\pi}{3}\right)$ & $x \in R$

The correct option is

- A) p-3, q-4, r-1, s-2 B) p-3, q-4, r-2, s-1
 C) p-4, q-3, r-2, s-1 D) p-4, q-3, r-1, s-2

 17. Let z_1 lies on $|z|=1$ and z_2 lies on $|z|=2$

	Column I		Column II
p)	Maximum value of $ z_1 + z_2 $	1)	3
q)	Minimum value of $ z_1 - z_2 $	2)	1
r)	Minimum value of $ 2z_1 + 3z_2 $	3)	4
s)	Maximum value of $ z_1 - 2z_2 $	4)	2
		5)	5

- A) p-1, q-2, r-3, s-5 B) p-2, q-1, r-3, s-5
 C) p-4, q-2, r-3, s-1 D) p-1, q-2, r-4, s-3

PHYSICS**Max Marks: 60**

SECTION – I
(ONE OR MORE CORRECT ANSWER TYPE)

This section contains **THERE (03)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks :+4 ONLY if (all) the correct option(s) is(are) chosen;

Partial Marks: +3 If all the four options are correct but **ONLY** three options are chosen;

Partial Marks: +2 If three or more options are correct but **ONLY** two options are chosen, both of which are correct ;

Partial Marks: +1 If two or more options are correct but **ONLY** two options are chosen, and it is a correct option ;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -2 In all other cases.

For example, in a question, if (A), (B) and (D) are the **ONLY** three options corresponding to correct answers, then choosing **ONLY** (A), (B) and (D) will get +4 marks; choosing **ONLY** (A) and (B) will get +2 marks; choosing **ONLY** (A) and (D) will get +2 marks; choosing **ONLY** (B) and (D) will get +2 marks; choosing **ONLY** (A) will get +1 mark; choosing **ONLY** (B) will get +1 mark; choosing **ONLY** (D) will get +1 mark; choosing no option (i.e. the question is unanswered) will get 0 marks; and choosing any other combination of options will get -2 marks.

18. Which of the following statements are incorrect?

- A) Magnetic lines of forces always starts from the north pole of the magnet and end at the south pole inside the magnet
- B) Magnetic line of force are very close to each other near the poles but they are widely separated other places
- C) Magnetic lines of force intersect each other
- D) Closer the magnetic lines of force, lesser is the field strength

19. Which of the following statements are correct about hysteresis?

- A) This effect is common to all ferromagnetic substances
- B) The hysteresis loop area is proportional to the laws of energy developed per unit volume of the material
- C) The hysteresis loop area is independent of the thermal energy developed per unit volume of material
- D) The shape of the hysteresis loop is characteristic of the material

20. Which of the following statements are correct for diamagnetic materials

- A) $\mu_r < 1$
- B) χ is negative and low
- C) χ does not depend on temperature
- D) All the above

SECTION – II
(SINGLE CORRECT ANSWER TYPE)

This section contains **FOUR (04)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 If **ONLY** the correct option is chosen;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -1 In all other cases

21. The magnetic field of an electromagnetic wave is given by

$\vec{B} = 1.6 \times 10^{-6} \cos(2 \times 10^7 z + 6 \times 10^{15} t)(2\hat{i} + \hat{j}) \text{ wb / m}^2$. The associated electric field will be _____

A) $\vec{E} = 1.6 \times 10^{-6} \cos(2 \times 10^7 z + 6 \times 10^{15} t)(2\hat{i} + \hat{j}) \text{ v / m}$

B) $\vec{E} = 4.8 \times 10^2 \cos(2 \times 10^7 z + 6 \times 10^{15} t)(2\hat{j} - \hat{i}) \text{ v / m}$

C) $\vec{E} = 4.8 \times 10^2 \cos(2 \times 10^7 z + 6 \times 10^{15} t)(-2\hat{i} + \hat{j}) \text{ v / m}$

D) $\vec{E} = 4.8 \times 10^2 \cos(2 \times 10^7 z + 6 \times 10^{15} t)(2\hat{i} + \hat{j}) \text{ v / m}$

22. The magnetic susceptibility of aluminum at 300K is 2.5×10^{-5} . The magnetic intensity inside a solenoid with aluminum core is 2000 Am^{-1} . If the temperature of the core is raised to 350K what will be the magnetization at 350K?

A) $2.14 \times 10^{-4} \text{ Am}^{-1}$ B) $4.28 \times 10^{-2} \text{ Am}^{-1}$

C) $4.28 \times 10^{-4} \text{ Am}^{-1}$ D) $2.14 \times 10^{-2} \text{ Am}^{-1}$

23. Time period for small oscillation of a uniform bar magnet in earth's magnetic field is given by T. If bar magnet is cut into two pieces from mid point perpendicular into its length and combined parallelly with same pole in same side. Then the time period of small oscillation of the combined bar magnet at the same place will be

A) $\frac{T}{2}$

B) T

C) $\frac{T}{4}$

D) $\frac{T}{\sqrt{2}}$

24. A magnetic needle lying parallel to a magnetic field requires W units of work to turn it through 60° . The torque required to maintain the needle in this position will be

A) $\sqrt{3} W$

B). W

C). $\frac{\sqrt{3} W}{2}$

D) 2 W

SECTION-III

(NON-NEGATIVE INTEGER.)

This section contains **SIX (06)** questions.

- The answer to each question is a **NON-NEGATIVE INTEGER**.
 - For each question, enter the correct integer corresponding to the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.
 - Answer to each question will be evaluated according to the following marking scheme
- Full Marks : +4 If ONLY the correct integer is entered; Zero Marks : 0 In all other cases..



**THE PERFECT HAT-TRICK WITH ALL- INDIA RANK 1
IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023**

JEE MAIN 2023 SINGARAJU VENKAT KOUNDINYA CUT-OFF CLASS 300 300	RANK 1	JEE Advanced 2023 VAVILALA CHIVILASA REDDY CUT-OFF CLASS 341 360	RANK 1	NEET 2023 BORA VARUN CHAKRAVARTHI CUT-OFF CLASS 720 720	RANK 1
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25. The electric field of a plane electromagnetic wave in vacuum is represented by

$$\vec{E}_x = 0, \vec{E}_y = 0.5 \cos \left[2\pi \times 10^8 \left(t - \frac{x}{c} \right) \right]; \vec{E}_z = 0. \text{ Then find the wave length of the wave}$$

26. A bulb of power 60W and having efficiency of 8.85% is considered as a point source.

Find the mean of the square value (that is square of rms value) of electric field (in V/m)

produced by the radiation coming from it at a distance of $\frac{10}{\sqrt{\pi}}$ metre.

[Take $\epsilon_0 = 8.85 \times 10^{-12} C^2 / Nm^2$]

27. Is an electromagnetic wave, the amplitude of electric field is 10 V/m. The frequency of wave is $5 \times 10^{14} \text{ Hz}$, the wave is propagating along z-axis, then total average energy density of E.M. wave is $\alpha \times 10^{-10} J / m^3$, find the value of α to the nearest integer

28. The magnetic field due to a short magnet at a point on its axis at distance X cm from the middle point of the magnet is 200G. The magnetic field at a point on the equatorial axis at a distance X cm from the middle of the magnet in gauss is 20x. then x=_____

29. The magnetic susceptibility of a paramagnetic material at $-73^\circ C$ is 0.0075. Its value at $-173^\circ C$ is $\frac{a}{2} \times 10^{-2}$. Then a = _____

30. A paramagnetic sample shows a magnetization of $8 Am^{-1}$ when placed in an external magnetic field of 0.6T at a temperature of 4K. When the same sample is placed in an external magnetic field of 1.2T at a temperature of 16K, the magnetization (in Am^{-1}) is _____

SECTION – IV (MATCHING TYPE)

This section contains **FOUR (04)** Matching List Sets.

- Each set has **ONE** Multiple Choice Question.
- Each set has **TWO** lists : **List-I** and **List-II**.
- **List-I** has **Four** entries (I), (II), (III) and (IV) and **List-II** has **Five** entries (P), (Q), (R), (S) and (T).
- **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.

- Answer to each question will be evaluated according to the following marking scheme :

Full Marks: +3 ONLY if the option corresponding to the correct combination is chosen;

Zero Marks: 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks: -1 In all other cases.

31. Match the entries in Column-I with the correct options in Column-II

Column I	Column II
A) The wavelength of an electromagnetic wave in a medium with refractive index n is	P) $\frac{\lambda_0}{n}$
B) The ratio of the magnitudes of electric and magnetic fields in an EM wave is	Q) Speed of light (c)
C) The average intensity of an EM wave is given by	R) $\frac{1}{2}\epsilon_0 c E_0^2$
D) The poynting vector of an electromagnetic wave is	S) $\bar{S} = \frac{1}{\mu_0} (\bar{E} \times \bar{B})$

- A) A-P, B-Q, C-R, D-S B) A-R, B-P, C-S, D-Q
 C) A-P, B-R, C-Q, D-Q D) A-S, B-Q, C-R, D-P

32. Match the entries in Column I with the correct options in Column II

Column I	Column II
A) The magnetic field due to bar magnet on the axial line is	P) $\frac{\mu_0}{4\pi} \frac{2M}{r^3}$
B) The magnetic field due to a bar magnet on the equatorial line is	Q) $\frac{\mu_0}{4\pi} \frac{M}{r^3}$
C) The torque on a magnetic dipole in a uniform magnetic field is	R) $MB \sin \theta$
D) The potential energy of a magnetic dipole in a uniform magnetic field is	S) $-MB \cos \theta$

- A) A-Q, B-P, C-R, D-S B) A-P, B-Q, C-S, D-R
 C) A-P, B-Q, C-R, D-S D) A-R, B-S, C-P, D-Q

33. Match the entries in Column I with the correct options in Column II

Column I	Column II
A) The direction of propagation of an electromagnetic wave is	R) $\frac{1}{\sqrt{\mu_0 \epsilon_0}}$
B) The energy density of an electromagnetic wave is proportional to	S) $E = cB$
C) The speed of electromagnetic waves in a vacuum is	Q) $\epsilon_0 \vec{E}^2 + \frac{1}{\mu_0} \vec{B}^2$
D) The relationship between the magnitudes of the electric and magnetic field is	P) Perpendicular to both \vec{E} and \vec{B}

A) A-R, B-Q, C-S, D-P

B) A-P, B-Q, C-R, D-S

C) A-S, B-R, C-Q, D-P

D) A-Q, B-S, C-P, D-S

34. Match the entries in Column-I with the correct options in Column-II

Column I	Column II
A) The force between two magnetic poles is inversely proportional to	Q. $\frac{1}{r^3}$
B) The magnetic Induction due to a dipole at a distance r is proportional to	S. $MB \sin \theta$
C) The work done in rotating a bar magnet in a uniform magnetic field is proportional to	P. r^2
D). The torque on a magnet in a uniform magnetic field is proportional to	R. $MB(1 - \cos \theta)$

A) A→P, B→R, C→S, D→Q

B) A→Q, B→S, C→R, D→P

C) A→P, B→Q, C→R, D→S

D) A→P, B→S, C→Q, D→R

CHEMISTRY**Max Marks: 60**

SECTION – I
(ONE OR MORE CORRECT ANSWER TYPE)

This section contains **THERE (03)** questions.

- Each question has **FOUR** options (A), (B), (C) and (D). **ONE OR MORE THAN ONE** of these four option(s) is(are) correct answer(s).
- For each question, choose the option(s) corresponding to (all) the correct answer(s).
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks :+4 ONLY if (all) the correct option(s) is(are) chosen;

Partial Marks: +3 If all the four options are correct but **ONLY** three options are chosen;

Partial Marks: +2 If three or more options are correct but **ONLY** two options are chosen, both of which are correct ;

Partial Marks: +1 If two or more options are correct but **ONLY** two options are chosen, and it is a correct option ;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

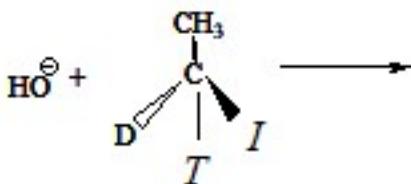
Negative Marks : -2 In all other cases.

For example, in a question, if (A), (B) and (D) are the **ONLY** three options corresponding to correct answers, then choosing **ONLY** (A), (B) and (D) will get +4 marks; choosing **ONLY** (A) and (B) will get +2 marks; choosing **ONLY** (A) and (D) will get +2 marks; choosing **ONLY** (B) and (D) will get +2 marks; choosing **ONLY** (A) will get +1 mark; choosing **ONLY** (B) will get +1 mark; choosing **ONLY** (D) will get +1 mark; choosing **no option** (i.e. the question is unanswered) will get 0 marks; and choosing **any other combination of options** will get -2 marks.

35. R-H can be converted in to R-Cl by using

- A) $Cl_2 / h\nu$ B) SO_2Cl_2 / Δ C) HCl D) $t-BuOCl, \Delta$

36. The correct statement for the following reaction



- A) Transition state contains anion like character
 B) Transition state contains $3C - 4e^-$ bond interaction
 C) Inversion takes place
 D) Bimolecular nucleophilic substitution reaction
37. Ethyl chloride obtained as a product in reaction is/are

- A) $CH_3CH_2OH \xrightarrow{SOCl_2}$ B) $CH_3CH_2OH \xrightarrow{PCl_5}$
 C) $CH_3CH(OH)CH_3 \xrightarrow{PCl_3}$ D) $CH_3CH_2OH \xrightarrow{PCl_3}$

SECTION – II
(SINGLE CORRECT ANSWER TYPE)

This section contains **FOUR (04)** questions.

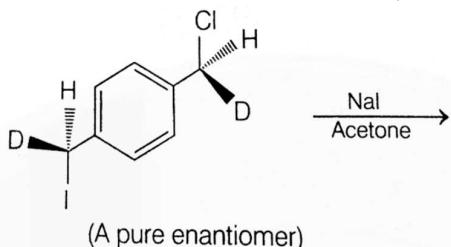
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme:

Full Marks : +3 If **ONLY** the correct option is chosen;

Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks : -1 In all other cases

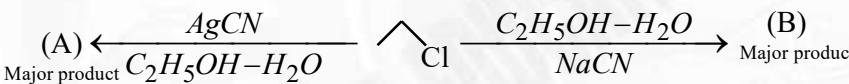
38. In the following reaction, how many different S_N2 products would be formed?



- A) 2 B) 3 C) 4 D) 5

39. In S_N1 reaction, the hybridization changed in rate determining step. Select the correct change among the following.

- A) from sp^3 to sp^2 B) from sp^2 to sp^3
 C) from sp^2 to sp D) from sp to sp^2

40. 
 Considering the above reactions, the compound 'A' and compound 'B' respectively are

- A) $\begin{array}{c} \nearrow \text{N}^+ \text{---} \text{C}^{\ominus}, \nwarrow \text{N}^+ \text{---} \text{C}^{\ominus} \\ | \\ \text{C} \equiv \text{N} \end{array}$ B) $\begin{array}{c} \nearrow \text{C} \equiv \text{N}, \nwarrow \text{C} \equiv \text{N} \\ | \\ \text{N}^+ \text{---} \text{C}^{\ominus} \end{array}$
 C) $\begin{array}{c} \nearrow \text{N}^+ \text{---} \text{C}^{\ominus}, \nwarrow \text{C} \equiv \text{N} \\ | \\ \text{C} \equiv \text{N} \end{array}$ D) $\begin{array}{c} \nearrow \text{C} \equiv \text{N}, \nwarrow \text{N}^+ \text{---} \text{C}^{\ominus} \\ | \\ \text{C} \equiv \text{N} \end{array}$

41. Which one of the two iodine will be more reactive in the S_N1 and S_N2 reaction?



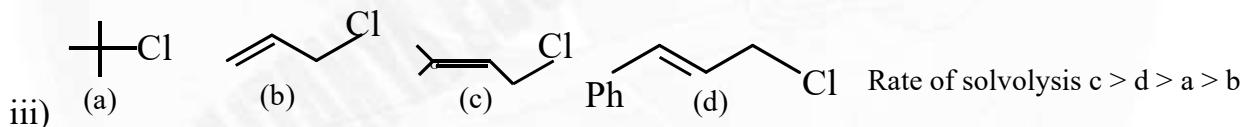
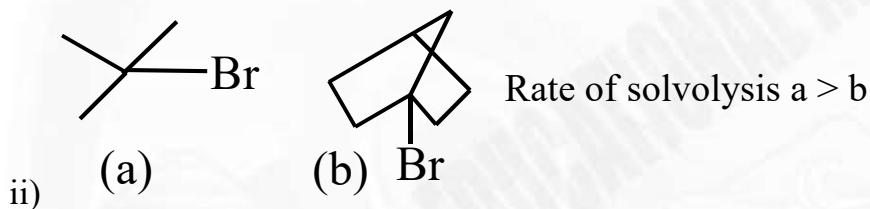
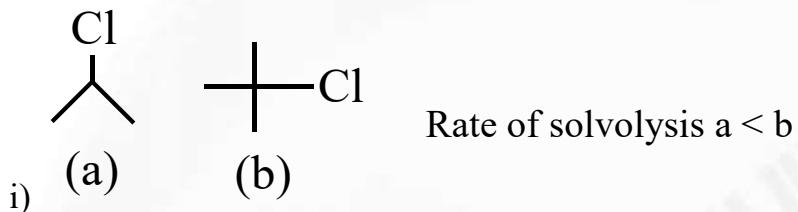
- A) A will be faster in S_N1 reaction but slower in S_N2
 B) A will be faster both in S_N1 and S_N2 reaction
 C) A and B will be equally reactive
 D) B will be faster in S_N1 and S_N2 reactions

SECTION-III
(NON-NEGATIVE INTEGER.)

This section contains **SIX (06)** questions.

- The answer to each question is a **NON-NEGATIVE INTEGER**.
- For each question, enter the correct integer corresponding to the answer using the mouse and the onscreen virtual numeric keypad in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme
 Full Marks : +4 If ONLY the correct integer is entered; Zero Marks : 0 In all other cases.

42. How many of the following are correct

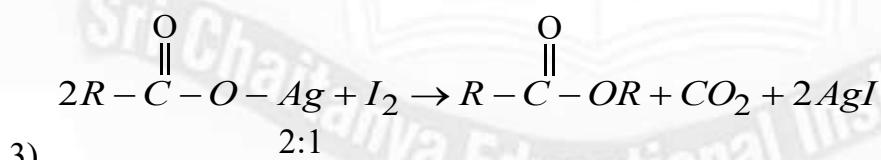


43. The number of different product obtained on chlorination of Ethane is

44. How many of the following are correct

1) Order of reactivity halogens towards alkanes is $F_2 > Cl_2 > Br_2 > I_2$

2) Order of selectivity of halogen towards alkanes is $Br_2 > Cl_2 > F_2$



4) Order of Dipole moment $CH_3Cl > CH_3F > CH_3Br > CH_3I$

5) $R - X + NaI \xrightarrow[SN^2]{Acetone} R - I + NaX$ ($X = Cl, Br$) is called Finkelstien reaction

6) $R - X + AgF \rightarrow R - F + AgX$ ($X = Cl, Br$) is called Swart's reaction



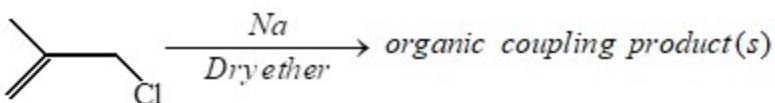
**THE PERFECT HAT-TRICK WITH ALL- INDIA RANK 1
IN JEE MAIN 2023 JEE ADVANCED 2023 AND NEET 2023**

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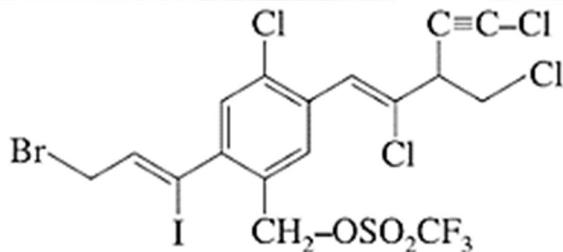
45. How many of the following are correct

- 1) SN^1 is a two step mechanism if negative nucleophile is used and 3 step mechanism if a neutral nucleophile is used
- 2) $R-OH - PCl_5 \rightarrow R-Cl + POCl_3 + HCl$ follows SN^2 mechanism
- 3) $3ROH + PCl_3 \rightarrow 3RCl + H_3PO_3$ follows SN^2 mechanism
- 4) $SOCl_2$ is the best reagent of the preparation of alkyl chlorides from alcohols because the by products in the reaction are gases (SO_2, HCl)

46. Find the number of products formed in the given reaction



47. Consider the following compound



If one mole of above compound is treated with excess of $NaCN$ (in Acetone), how many CN^- group would be incorporated by SN^2 reaction ?

SECTION – IV (MATCHING TYPE)

This section contains **FOUR (04)** Matching List Sets.

- Each set has **ONE** Multiple Choice Question.
- Each set has **TWO** lists : **List-I** and **List-II**.
- **List-I** has **Four** entries (I), (II), (III) and (IV) and **List-II** has **Five** entries (P), (Q), (R), (S) and (T).
- **FOUR** options are given in each Multiple Choice Question based on **List-I** and **List-II** and **ONLY ONE** of these four options satisfies the condition asked in the Multiple Choice Question.
- Answer to each question will be evaluated according to the following marking scheme :

Full Marks: +3 ONLY if the option corresponding to the correct combination is chosen;

Zero Marks: 0 If none of the options is chosen (i.e. the question is unanswered);

Negative Marks: -1 In all other cases..



48. Match the items given in column I with those in column II

	Column-I		Column-II
a)		p)	Inversion
b)	$CH_3 - CH - Cl \xrightarrow[D]{HO^-(aq)}$	q)	Racemization
c)		r)	I st order
d)	$H_2C = CH - CH - Cl \xrightarrow[CH_3]{HS^-}$	s)	II nd order

- A) a-qr, b-ps, c-qr d-ps
C) a-qr, b-ps, c-qs d-pr

- B) a-qs, b-pr, c-qr d-ps
D) a-pr, b-ps, c-qr d-pq

49.

	Column-I (compounds)		Column-II (rate of solvolysis)
a)		p)	0.07
b)		q)	0.12
c)		r)	2100
d)		s)	130000

- A) a-q, b-r, c-p, d-s B) a-s, b-r, c-p, d-q C) a-r, b-s, c-q, d-p D) a-q, b-s, c-p, d-r



**THE PERFECT HAT-TRICK WITH ALL- INDIA RANK 1
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CHIVILAS REDDY
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RANK



NEET

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CHAKRAVARTHI
MCA CLASS
sri chaitanya
classmate720
720

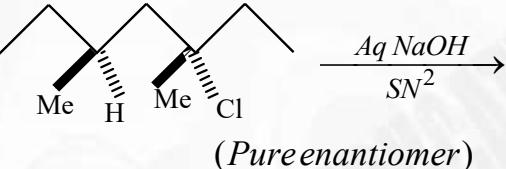
MAINS



RANK

1

50. Match the reactions in Column I with the characteristics of their products in Column II and choose the correct option

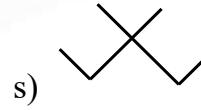
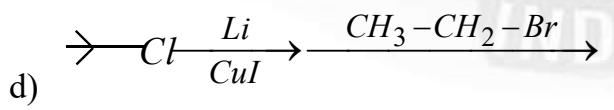
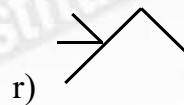
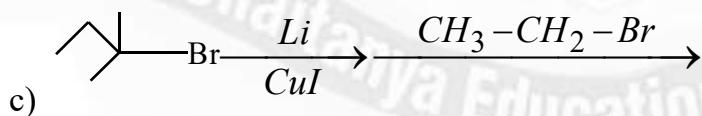
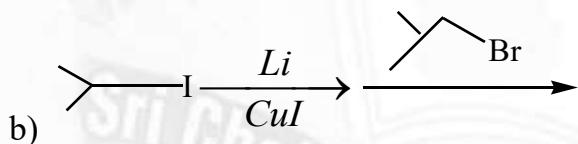
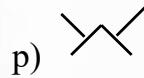
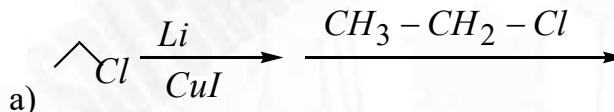
	Column I		Column II
I	$(+)-1\text{-Chloro}-2\text{-ethyl pentane} \xrightarrow[\text{SN}^2]{\text{Aq KOH}}$ (Pure enantiomer)	P	Inversion of Configuration
II	$(+)-2\text{-Chloro Butane} \xrightarrow[\text{SN}^2]{\text{Aq KOH}}$ (Pure enantiomer)	Q	Retention of Configuration
III	$(-)-3\text{-Bromo}-3\text{-methyl hexane} \xrightarrow[\text{SN}^2]{\text{Aq NaOH}}$ (Pure enantiomer)	R	Mixture of enantiomers
IV	 $\xrightarrow[\text{SN}^2]{\text{Aq NaOH}}$ (Pure enantiomer)	S	Mixture of Structural isomers
		T	Mixture of diastereomers

- A) I-P, II-Q, III-T, IV-R B) I-Q, II-P, III-R, IV-T
 C) I-P, II-Q, III-T, IV-S D) I-Q, II-S, III-R, IV-T

51. Match the items given un column I with those in column II

Column I

Column II



- A) a-q, b-p, c-s, d-r B) a-p, b-q, c-r, d-s
 C) a-q, b-r, c-s, d-p D) a-s, b-r, c-q, d-p





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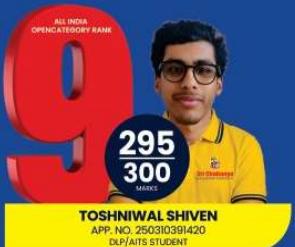
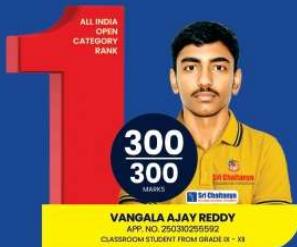
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