



Sri Chaitanya IIT Academy., India.

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A right Choice for the Real Aspirant

ICON Central Office - Madhapur - Hyderabad

SEC: **Sr. Super60 NUCLEUS-BT**

JEE-MAIN

Date: 21-06-2025

Time: 09.00Am to 12.00Pm

WTM-33

Max. Marks: 300

IMPORTANT INSTRUCTION:

1. Immediately fill in the Admission number on this page of the Test Booklet with **Blue/Black Ball Point Pen** only.
2. The candidates should not write their Admission Number anywhere (except in the specified space) on the Test Booklet/ Answer Sheet.
3. The test is of **3 hours** duration.
4. The Test Booklet consists of 90 questions. The maximum marks are **300**.
5. There are **three** parts in the question paper 1,2,3 consisting of **Physics, Chemistry and Mathematics** having **30 questions** in each subject and subject having **two sections**.

(I) Section –I contains 20 **multiple choice** questions with only one correct option.

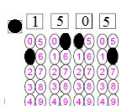
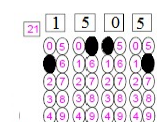
Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

(II) Section-II contains 10 **Numerical Value Type** questions. Attempt any 5 questions only, if more than 5 questions attempted, First 5 attempted questions will be considered.

- The Answer should be within **0 to 9999**. If the Answer is in **Decimal** then round off to the **nearest Integer** value (Example# i.e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11**).

To cancel any attempted question bubble on the question number box.

For example: To cancel attempted question 21. Bubble on 21 as shown below



Question Answered for Marking

Question Cancelled for Marking

Marking scheme: +4 for correct answer, 0 if **not attempt** and -1 in all other cases.

6. Use **Blue / Black Point Pen only** for writing particulars / marking responses on the Answer Sheet. **Use of pencil is strictly prohibited.**
7. No candidate is allowed to carry any textual material, printed or written, bits of papers, mobile phone any electron device etc, except the Identity Card inside the examination hall.
8. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
9. On completion of the test, the candidate must hand over the Answer Sheet to the invigilator on duty in the Hall. **However, the candidate are allowed to take away this Test Booklet with them.**
10. **Do not fold of make any stray marks on the Answer Sheet**

Name of the Candidate (in Capital): _____

Admission Number:

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Candidate's Signature: _____

Invigilator's Signature: _____

**21-06-2025_Sr.Super60_NUCLEUS-BT_Jee-Main-WTM-33_Test Syllabus****MATHEMATICS**

: Conditional probability, Multiplication theorem, Independent events

PHYSICS

: ATOMS: Rutherford's and Geiger-Marsden's experiment nuclear model of atom, Distance of nearest or closest approach: Estimation of nuclear size, Drawbacks of Rutherford's atomic model, Momentum and energy quantisation by coupling quantum concept with classical physics, Atomic spectra, Bohr's theory of hydrogen atom: Bohr's atom model, Speed of electron and fine structure constant, Explanation of the hydrogen spectrum, Energy level diagram of hydrogen atom, Ionisation and excitation potentials, Explanation of Bohr's angular momentum postulate using de Broglie wave equation, Drawbacks and limitations of Bohr's theory, ATOMS: X-rays, X-ray spectra: Continuous spectrum and characteristic spectrum, Origin of continuous spectrum

CHEMISTRY

: Derivatives of Carboxylic acids: preparation, properties & Reactions, test for carboxylic acids, AMINES : Preparation, properties & Reactions of Aliphatic amines, Preparation from nitro compounds, nitriles and amides, Hoffmann bromamide degradation, Gabriel phthalimide synthesis; Reaction with nitrous acid, Carbylamine reaction, Hinsberg test, Alkylation and acylation reactions,, Electrophilic substitution reactions of aniline, Hofmann exhaustive methylation, Aromatic Amines, Preparation of aniline & Derivatives, Azo coupling reaction of diazonium salts of aromatic amines; Sandmeyer and related reactions of diazonium salts;

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6th-12th Class**300
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SCORE**RANK****1****JEE Advanced
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**MATHEMATICS****Max Marks: 100****SECTION-I
(SINGLE CORRECT ANSWER TYPE)**

This section contains **20 Multiple Choice Questions**. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases.

- If a and b are chosen randomly from the set consisting of numbers 1, 2, 3, 4, 5, 6 with replacement. Then probability that $\lim_{x \rightarrow 0} \left(\frac{a^x + b^x}{2} \right)^{2/x} = 6$ is
 1) $\frac{1}{3}$ 2) $\frac{1}{4}$ 3) $\frac{1}{9}$ 4) $\frac{2}{9}$
- When 5-boys and 5-girls sit around a table, then the probability that no two girls sit together is
 1) $\frac{1}{120}$ 2) $\frac{1}{126}$ 3) $\frac{3}{47}$ 4) $\frac{4}{7}$
- The probability that randomly selected positive integer is relatively prime to 6 is
 1) $\frac{1}{2}$ 2) $\frac{1}{3}$ 3) $\frac{1}{6}$ 4) $\frac{5}{6}$
- There are ten pairs of shoes in a cup board out of which 4 shoes are picked up at random one after the other. The probability that there is at least one pair is
 1) $\frac{4}{11}$ 2) $\frac{3}{11}$ 3) $\frac{33}{107}$ 4) $\frac{99}{323}$
- A is a set containing n elements. A subset P of A is chosen at random. The set A is reconstructed by replacing the elements of the subset P . A subset Q of A is again chosen at random then the probability that

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	COLUMN-I		COLUMN-II
A)	$P \cap Q = \Phi$	P)	$\frac{n(3^{n-1})}{4^n}$
B)	$P \cap Q$ is a singleton	Q)	$(3/4)^n$
C)	$P \cap Q$ contain 2 elements	R)	$\frac{2^n C_n}{4^n}$
D)	$ P = Q $ where $ X $ = number of elements in X	S)	$\frac{3^{n-2}(n-1)n}{2(4^n)}$

1) $A-S; B-R; C-P; D-Q$

2) $A-P; B-Q; C-R; D-S$

3) $A-Q; B-P; C-S; D-R$

4) $A-Q; B-S; C-P; D-R$

6. If $P(B) = \frac{3}{4}$, $P(A \cap B \cap \bar{C}) = \frac{1}{3}$ and $P(\bar{A} \cap B \cap \bar{C}) = \frac{1}{3}$, then $P(B \cap C)$ is

1) $\frac{1}{12}$

2) $\frac{1}{6}$

3) $\frac{1}{15}$

4) $\frac{1}{9}$

7. Let ω be a complex cube root of unity with $\omega \neq 1$. A fair die is thrown three times. If r_1, r_2 and r_3 are the numbers obtained on the die, then the probability that

$\omega^{r_1} + \omega^{r_2} + \omega^{r_3} = 0$ is

1) $\frac{1}{18}$

2) $\frac{1}{9}$

3) $\frac{2}{9}$

4) $\frac{1}{36}$

8. If three letters can be posted to any one of the 5 different addresses, then the probability that the three letters are posted to exactly two addresses is:

1) $\frac{4}{25}$

2) $\frac{6}{25}$

3) $\frac{12}{25}$

4) $\frac{18}{25}$

9. $S = \{1, 2, 3, \dots, 20\}$ if 3 numbers are chosen at random from S, the probability that they are in A.P. is

1) $\frac{3}{38}$

2) $\frac{35}{33}$

3) $\frac{33}{35}$

4) $\frac{1}{38}$

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10. Let A and B be two events such that $P(\overline{A \cup B}) = \frac{1}{6}$, $P(A \cap B) = \frac{1}{4}$ and $P(\overline{A}) = \frac{1}{4}$ the events A and B are
- equally likely, but not independent
 - equally likely and mutually exclusive
 - mutually exclusive and independent
 - independent but not equally likely
11. For the three events A , B and C , $P(\text{exactly one of events } A, B \text{ occur}) = P(\text{exactly one of } B, C \text{ occur}) = P(\text{exactly one of } C, A \text{ occur}) = p$ and $P(\text{all three events occur simultaneously}) = p^2$ where $0 < p < \frac{1}{2}$ then the probability of at least one of the three events A , B and C occur is
- $\frac{3p+2p^2}{2}$
 - $\frac{p+3p^2}{4}$
 - $\frac{p+3p^2}{2}$
 - $\frac{3p+2p^2}{4}$
12. A natural number x is chosen at random from the first one hundred natural numbers. The probability that $\frac{(x-20)(x-40)}{x-30} < 0$ is
- $\frac{1}{50}$
 - $\frac{3}{50}$
 - $\frac{3}{25}$
 - $\frac{7}{25}$
13. Consider the system of equations $ax + by = 0$, $cx + dy = 0$ where $a, b, c, d \in \{0, 1\}$
- Statement 1: The probability that the system of equations has a unique solution is $\frac{3}{8}$
- Statement 2: The probability that the system has a solutions is 1
- Both Statements are true
 - Both Statements are false
 - Statement-1 is true, Statement-2 is false
 - Statement-1 is false, Statement-2 is true
14. A bag contains 7 black and 4 white balls two balls are drawn at a time from the bag. The probability at least one white ball is selected is
- $\frac{7}{11}$
 - $\frac{5}{11}$
 - $\frac{28}{55}$
 - $\frac{34}{55}$

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15. Four persons are selected at random out of 3 men, 2 women and 4 children. The probability that there are exactly 2 children in the selection is
- 1) $\frac{11}{21}$ 2) $\frac{9}{21}$ 3) $\frac{10}{21}$ 4) $\frac{8}{21}$
16. Probability that a random chosen three digit number has exactly 3 positive integral factors is
- 1) $\frac{2}{225}$ 2) $\frac{7}{900}$ 3) $\frac{1}{300}$ 4) $\frac{4}{900}$
17. A, B are two independent events such that $P(A) > \frac{1}{2}$ $P(B) > \frac{1}{2}$. If $P(A \cap \bar{B}) = \frac{3}{25}$ and $P(\bar{A} \cap B) = \frac{8}{25}$ then $P(A \cap B) =$
- 1) $\frac{3}{4}$ 2) $\frac{2}{3}$ 3) $\frac{12}{25}$ 4) $\frac{18}{25}$
18. From a bag containing 10 distinct balls, 6 balls are drawn simultaneously and replaced. Then 4 balls are drawn. The probability that exactly 3 balls are common to the drawings is
- 1) $\frac{8}{21}$ 2) $\frac{9}{19}$ 3) $\frac{5}{24}$ 4) $\frac{9}{22}$
19. Consider all the 3digit numbers abc (where $(a \neq 0)$) if a number is selected at random then the probability that the number is such that $a + b + c = 6$ is
- 1) $\frac{2}{15}$ 2) $\frac{7}{75}$ 3) $\frac{7}{600}$ 4) $\frac{7}{300}$
20. The Probability that in a family of 5 members, exactly two members have birthday on Sunday is
- 1) $\frac{12 \times 5^3}{7^5}$ 2) $\frac{10 \times 6^3}{5^7}$ 3) $\frac{12 \times 6^2}{5^7}$ 4) $\frac{10 \times 6^3}{7^5}$

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SECTION-II (NUMERICAL VALUE TYPE)

This section contains **5 Numerical Value Type Questions**. The Answer should be within **0 to 9999**. If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i.e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11**).

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

21. The number of ways of arranging the letters of the word NALGONDA, such that the letters of the word GOD occur in that order (G before and O and O before D), is P then $\frac{P}{420} =$
22. Two numbers are selected at random from set of the first 100 natural numbers simultaneously. The probability that the product obtained is divisible by 3 is k then $\frac{150k}{83}$ is equal to
23. If $\{x, y\}$ is a subset of the first 30 natural numbers, then the probability, that $x^3 + y^3$ is divisible by 3, is $\frac{S}{9}$ then $S =$
24. If p, q are chosen randomly with replacement from the set $\{1, 2, 3, \dots, 10\}$, the probability, that the roots of the equation $x^2 + px + q = 0$ are real, is $\frac{k^2 + 6}{50}$ then $|k| =$
25. If $\frac{1+4p}{4}, \frac{1-p}{4}, \frac{1-2p}{2}$ are the probabilities of three mutually exclusive events in a random experiment then the maximum value of $2p$ is



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PHYSICS

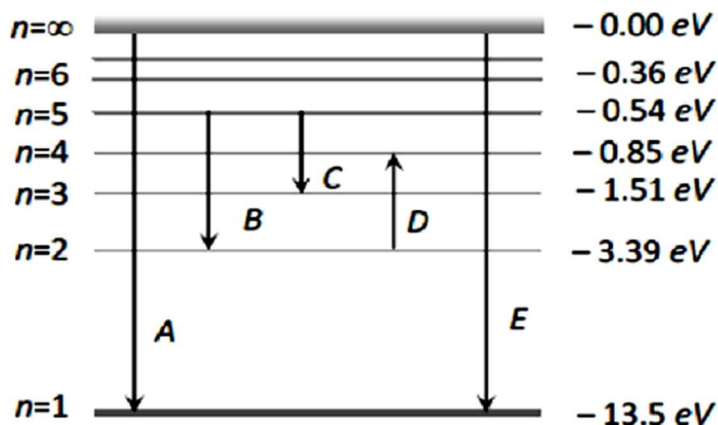
Max Marks: 100

SECTION-I
(SINGLE CORRECT ANSWER TYPE)

This section contains **20 Multiple Choice Questions**. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and -1 in all other cases.

26. The energy levels of the hydrogen spectrum are shown in figure. There are some transitions A, B, C, D and E . Transition A, B and C respectively represent



- 1) First member of Lyman series, third spectral line to Balmer series and the second spectral line of Paschen series
 - 2) Ionization potential of hydrogen, second spectral line of Balmer series and second spectral line of Paschen series
 - 3) Series limit of Lyman series, third spectral line of Balmer series and second spectral line of Paschen series
 - 4) Series limit of Lyman series, second spectral line of Balmer series and third spectral line of Paschen series
27. An electron jumped from the 4th orbit to the 2nd orbit of hydrogen atom. Given the Rydberg's constant $R = 10^5 \text{ cm}^{-1}$. The frequency in Hz of the emitted radiation will be
- 1) $\frac{3}{16} \times 10^5$
 - 2) $\frac{3}{16} \times 10^{15}$
 - 3) $\frac{9}{16} \times 10^{15}$
 - 4) $\frac{3}{4} \times 10^{15}$
28. The ratio between total acceleration of the electron in singly ionized helium atom and hydrogen atom (both in ground state) is
- 1) 1
 - 2) 8
 - 3) 4
 - 4) 16

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Page 8



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Educational Institutions



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29. Which of the following statement is incorrect regarding the limitation of Bohr's model ?
- 1) It could not explain the intensities of the fine spectrum of the spectral lines
 - 2) Justification was given for the principle of the quantization of angular momentum
 - 3) It could not explain why atom should combine to form chemical bond
 - 4) It could not be applied to multi electron atom
30. The wavelength of radiation emitted is λ_0 when an electron jumps from the third to the second orbit of hydrogen atom. For the electron jump from the fourth to the second orbit of the hydrogen atom, the wavelength of radiation emitted will be
- 1) $\frac{16}{25} \lambda_0$
 - 2) $\frac{20}{27} \lambda_0$
 - 3) $\frac{27}{20} \lambda_0$
 - 4) $\frac{25}{16} \lambda_0$
31. Suppose an electron is attracted towards the origin by a force $\frac{k}{r}$ where ' k ' is a constant and ' r ' is the distance of the electron from the origin. By applying Bohr model to this system, the radius of the n th orbital of the electron is found to be ' r_n ' and the kinetic energy of the electron to be ' T_n '. Then which of the following is true?
- 1) $T_n \propto n, r_n \propto n$
 - 2) $T_n \propto \frac{1}{n}, r_n \propto n$
 - 3) $T_n \propto \frac{1}{n}, r_n \propto n^2$
 - 4) $T_n \propto \frac{1}{n}, r_n \propto n^3$
32. Energy levels A, B and C of a certain atom correspond to increasing values of energy, i.e. $E_A < E_B < E_C$. If λ_1, λ_2 and λ_3 are the wavelengths of radiations corresponding to transitions C to B , B to A and C to A respectively, which of the following relations is correct ?
- 1) $\lambda_3 = \lambda_1 + \lambda_2$
 - 2) $\lambda_3 = \frac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$
 - 3) $\lambda_1 + \lambda_2 + \lambda_3 = 0$
 - 4) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$
33. The binding energy of a H - atom, considering an electron moving around a fixed nucleus (proton), is $B = -\frac{me^4}{8n^2 \epsilon_0^2 h^2}$ (m = electron mass). If one decides to work in a frame of reference where the electron is at rest, the proton would be moving around it. By similar arguments, the binding energy would be $B = -\frac{me^4}{8n^2 \epsilon_0^2 h^2}$ (m = proton mass).
- This last expression is not correct, because

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- 1) n would not be integral
- 2) Bohr – quantization applies only to electrons
- 3) the frame in which the electron is at rest is not inertial
- 4) the motion of the proton would not be in circular orbits, even approximately.

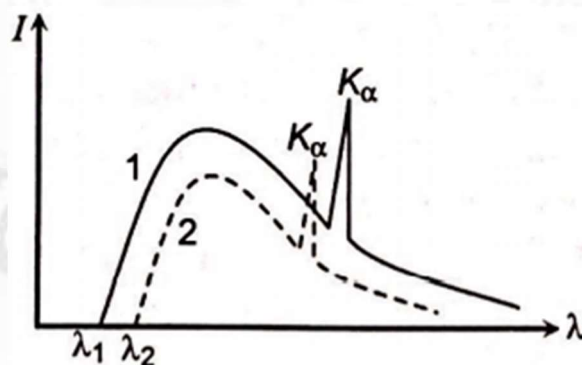
34. For the ground state, the electron in the H – atom has an angular momentum $\frac{h}{2\pi}$, according to the simple Bohr model. Angular momentum is a vector and hence there will be infinitely many orbits with the vector pointing in all possible directions. In actuality, this is not true

- 1) because Bohr model gives incorrect values of angular momentum
- 2) because only one of these would have a minimum energy
- 3) angular momentum must be in the direction of spin of electron
- 4) because electrons go around only in horizontal orbits

35. The ratio of the largest to shortest wavelength in Lyman series of hydrogen spectra is

- 1) $\frac{25}{9}$
- 2) $\frac{7}{16}$
- 3) $\frac{9}{5}$
- 4) $\frac{4}{3}$

36. The intensity distribution of X-rays from two Coolidge tubes operated on different voltages V_1 and V_2 and using different target materials of atomic numbers Z_1 (as 1) and Z_2 (as 2) is shown in the figure. Which one of the following inequalities is true?



- 1) $V_1 > V_2, Z_1 < Z_2$
- 2) $V_1 > V_2, Z_1 > Z_2$
- 3) $V_1 < V_2, Z_1 > Z_2$
- 4) $V_1 = V_2, Z_1 < Z_2$

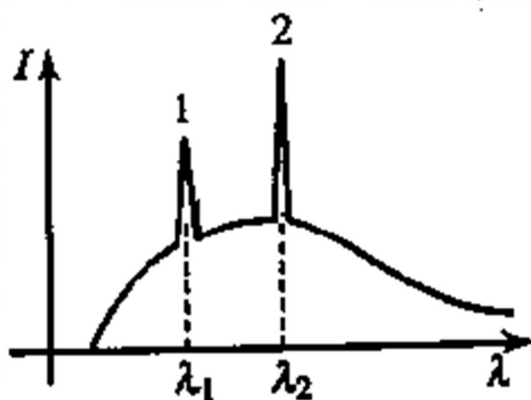
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37. In Coolidge tube set-up, on increasing the filament voltage:

- 1) Increases the temperature of the filament, therefore increasing the number of electrons emitted
- 2) Increases the temperature of the filament but the number of electrons emitted remains same.
- 3) Does not affect the X-ray production
- 4) Changes the cut-off wavelength of continuous spectrum of x-rays

38. A beam of electrons striking a copper target produces X-rays and its spectrum is as shown. Keeping the voltage same if the copper target is replaced with a different metal, the cut-off wavelength and characteristic lines of the new spectrum will change in comparison with old as:



- 1) Cut-off wavelength may remain unchanged while characteristic lines will be different
 - 2) Both cut-off wavelength and characteristic lines may remain unchanged.
 - 3) Both cut-off wavelength and characteristic lines may be different
 - 4) Cut-off wavelength will be different while characteristic lines may remain unchanged
39. Suppose potential energy between electron and proton at separation 'r' is given by $U = K \ln(r)$, where K is a constant. For such a hypothetical hydrogen atom, the ratio of energy difference between energy levels ($n = 1$ and $n = 2$) and ($n = 2$ and $n = 4$) is
- 1) 1
 - 2) 2
 - 3) 3
 - 4) 4



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40. For an orbiting electron in H- like atom, Match the parameters in column I with their dependency on Z (atomic number) and n (principal quantum number) in Column-II

	Column-I		Column-II
A	Frequency of orbiting electron	P	is directly proportional to Z^2
B	Angular momentum of orbiting electron	Q	is directly proportional to n
C	Magnetic moment of orbiting electron	R	is inversely proportional to n^3
D	The average current due to orbiting electron	S	is independent of Z

1) $A - P, Q; B - Q, R; C - S; D - P, S$ 2) $A - P, R; B - Q, S; C - P; D - Q, P$

3) $A - P, R; B - Q, S; C - Q, S; D - P, R$ 4) $A - R; B - R; C - S; D - P$

41. In the gold foil experiment of Geiger and Marsden that paved the way for Rutherford's model of an atom, $\sim 1.00\%$ of the α -particles were found to deflect at angles $> 50^\circ$. If one mole of α -particles were bombarded on the gold foil, compute the number of α -particles that would deflect at angles $< 50^\circ$ (take Avogadro number as 6×10^{23})
- 1) 5.94×10^{24} 2) 6.94×10^{23} 3) 5.94×10^{23} 4) 6.94×10^{24}
42. A point charge q is thrown towards the stationary fixed point Q at speed v , it returns at a distance r from Q . If speed of the projected charge is doubled then distance of closest distance approach will be
- 1) r 2) $2r$ 3) $\frac{r}{2}$ 4) $\frac{r}{4}$
43. A charge q of mass m is projected from a long distance with speed v towards another particle of same mass and charge (which is free to move), then the distance of closest approach of the particles is
- 1) $\frac{q^2}{2\pi\epsilon_0 mv^2}$ 2) $\frac{2q^2}{\pi\epsilon_0 mv^2}$ 3) $\frac{3q^2}{2\pi\epsilon_0 mv^2}$ 4) $\frac{q^2}{\pi\epsilon_0 mv^2}$
44. **Statement – I:** In a hydrogen atom, energy of emitted photon corresponding to transition from $n = 2$ to $n = 1$ is greater as compared to transition from $n = \infty$ to $n = 2$



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Statement – II: Wavelength of photon is directly proportional to the energy of emitted photon.

- 1) Statement-I is True, Statement-II is True; Statement-II is a correct explanation for Statement-I
- 2) Statement-I is True, Statement-II is True; Statement-II is NOT a correct explanation for Statement-I
- 3) Statement-I is True, Statement-II is False
- 4) Statement-I is False, Statement-II is True

45. **Assertion:** If applied potential difference in Coolidge tube is increased, then difference between K_{α} wavelength and cut off wavelength will increase.

Reason: Cut off wavelength is inversely proportional to the applied potential difference in a Coolidge tube.

- 1) If both Assertion and Reason are true and the Reason is correct explanation of the Assertion.
- 2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.
- 3) If Assertion is true, but the Reason is false.
- 4) If Assertion is false but the Reason is true

SECTION-II (NUMERICAL VALUE TYPE)

This section contains **5 Numerical Value Type Questions**. The Answer should be within **0 to 9999**. If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i.e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11**).

Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

46. In a hypothetical system a particle of mass m and charge $-3q$ is moving around a very heavy particle charge q . Assuming Bohr's model to be true to this system, the orbital speed of mass m when it is nearest to heavy particle is $\frac{xq^2}{2\epsilon_0 h}$. Find the value of x ?
(Neglect gravitational force)

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47. A hydrogen like atom (atomic number Z) is in a higher excited state of quantum number n . The excited atom can make a transition to the first excited state by successively emitting two photons of energy 10.2 eV and 17.0 eV respectively. Alternatively, the atom from the same excited state can make a transition to the second excited state by successively emitting two photons of energies 4.25 eV and 5.95 eV respectively. Determine the value of n . (Ionization energy of H-atoms = 13.6 eV)
48. Consider a sample of hydrogen like atom in n^{th} excited state. When these excited atoms make a transition to ground state, the most energetic photons have energy $E_{\text{max}} = 51\text{ eV}$ and the least energetic photons have energy $E_{\text{min}} = 2.644\text{ eV}$. The atomic number of atom is Z . Find the value of $Z + n$?
49. A cobalt target ($Z=27$) is bombarded with electrons and the wavelengths of its characteristic spectrum are measured. A second, fainter, characteristic spectrum is also found because of the impurity in the target. The wavelength of the K_{α} are 178.9 pm (cobalt) and 143.5 pm for impurity. What is the atomic number of impurity?
50. Find the recoil speed (m/s) when a hydrogen atom emits a photon during the transition from $n=5$ to $n=1$? The energy of H-atom in ground state is -13.6 eV . Write the nearest numerical value.



CHEMISTRY

Max Marks: 100

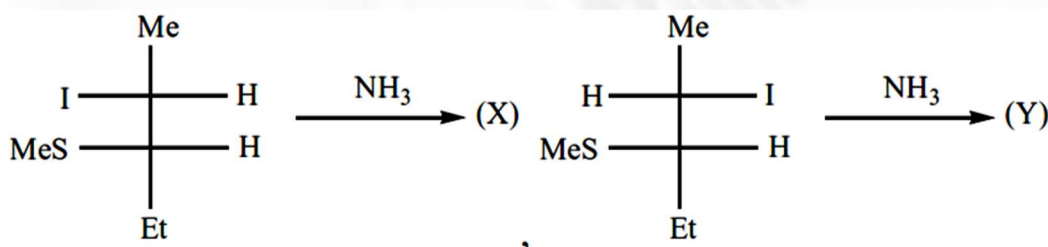
SECTION-I
(SINGLE CORRECT ANSWER TYPE)

This section contains **20 Multiple Choice Questions**. Each question has 4 options (1), (2), (3) and (4) for its answer, out of which **ONLY ONE** option can be correct.

Marking scheme: +4 for correct answer, 0 if not attempted and –1 in all other cases.

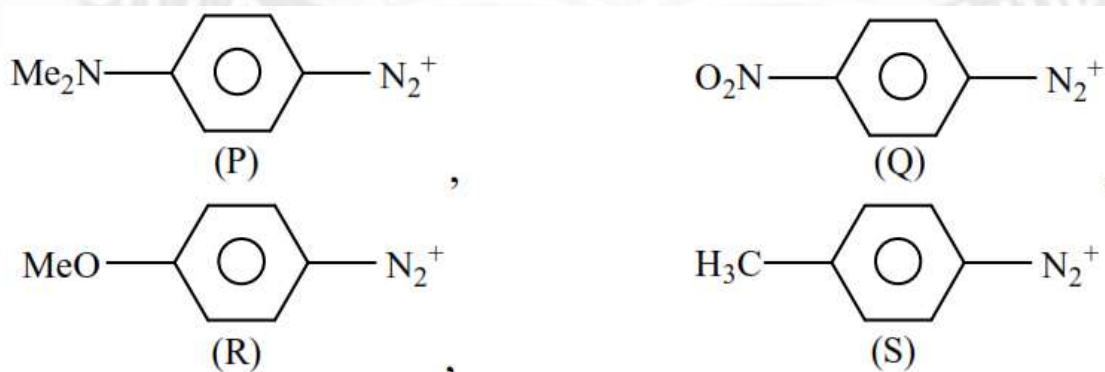
- 51.** An ester (I) with molecular formula $C_9H_{10}O_2$ was treated with excess of CH_3MgBr and the complex so formed was treated with H_2SO_4 to give an olefin(II). Ozonolysis of (II) gave a ketone with molecular formula C_8H_8O which show positive iodoform test. The structure of (I) is
- 1) $C_6H_5COOC_2H_5$ 2) $C_6H_5COOC_6H_5$
- 3) $H_3COCH_2COC_6H_5$ 4) $p-CH_3O-C_6H_4-COCH_3$

52.



Select true statement for above reaction.

- 1) X & Y are same compound and are formed by same mechanism
 - 2) X & Y are same compound and are formed by different mechanism.
 - 3) X & Y are different compounds and are formed by same mechanism.
 - 4) X & Y are different compounds and are formed by different mechanism
- 53.** Consider the following diazonium ion



The order of reactivity towards diazo coupling with phenol in presence of *dil. NaOH*

- 1) $P > Q > R > S$ 2) $Q > S > R > P$
3) $P > R > S > Q$ 4) $S > R > Q > P$

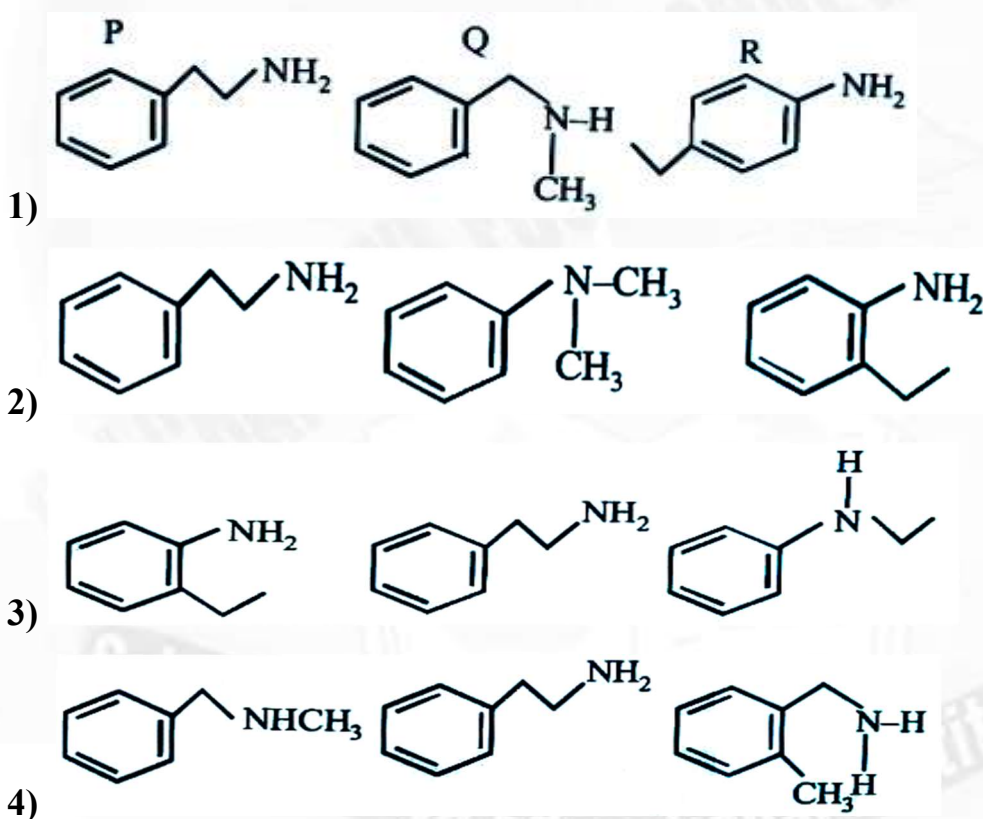
54. Isomeric amines with molecular formula $C_8H_{11}N$ give the following tests

Isomer (P) \Rightarrow Can be prepared by Gabriel phthalimide synthesis

Isomer (Q) \Rightarrow Reacts with Hinsberg's reagent to give solid insoluble in $NaOH$

Isomer (R) \Rightarrow Reacts with *HONO* followed by β -naphthol in *NaOH* to give red dye.

Isomers (P), (Q) and (R) respectively are



55. An organic compound $[A](C_4H_{11}N)$, shows optical activity and gives N_2 gas on treatment with HNO_2 . The compound $[A]$ reacts with $PhSO_2Cl$ producing a compound which is soluble in KOH . The structure of A is:



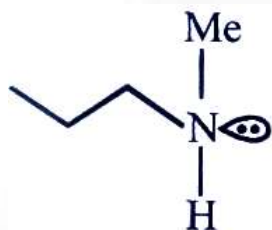
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2)



3)

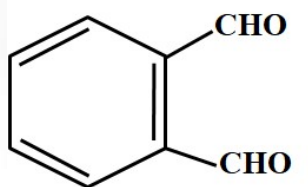


4)

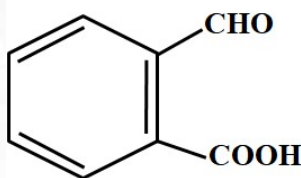


56. An organic compound 'A' on reaction with NH_3 followed by heating gives compound B. Which on further strong heating gives compound C ($C_8H_5NO_2$). Compound C on sequential reaction with ethanolic KOH , alkyl chloride and hydrolysis with alkali gives a primary amine. The compound A is:

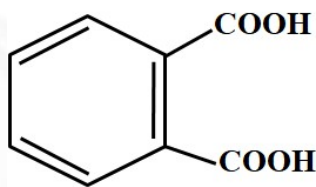
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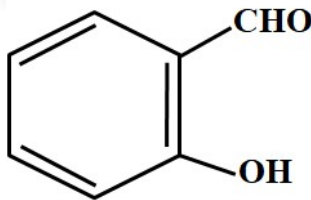
2)



3)



4)



57. The conversion of propan-1-ol to n-butylamine involves the sequential addition of reagents. The correct sequential order of reagents is :

- 1) (i) $SOCl_2$ (ii) KCN (iii) $H_2 / Ni, Na(Hg) / C_2H_5OH$
- 2) (i) HCl (ii) $H_2 / Ni, Na(Hg) / C_2H_5OH$
- 3) (i) $SOCl_2$ (ii) KCN (iii) CH_3NH_2
- 4) (i) HCl (ii) CH_3NH_2

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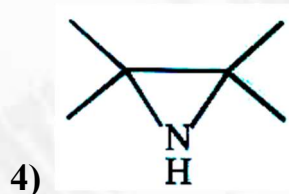
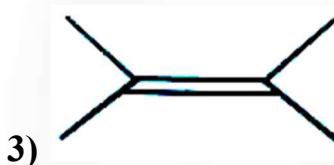
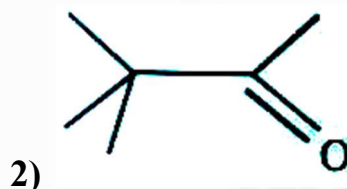
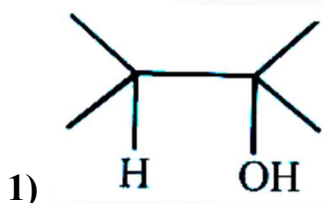
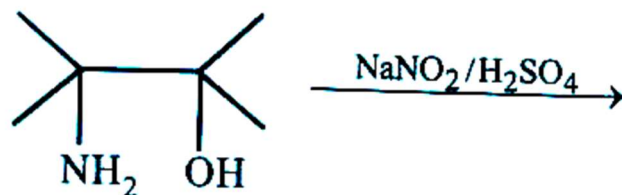
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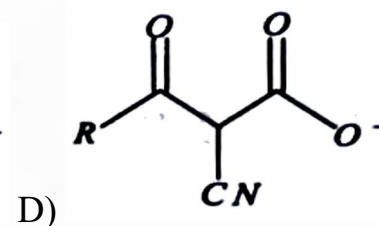
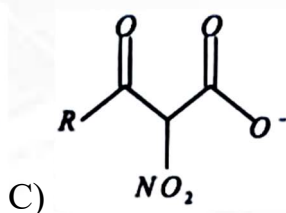
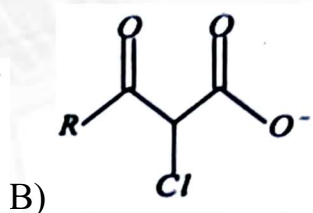
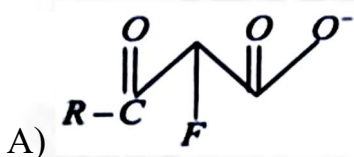
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58. The major product of the reaction



59. Which of the following is the correct order for decarboxylation of β -keto carboxylate anion



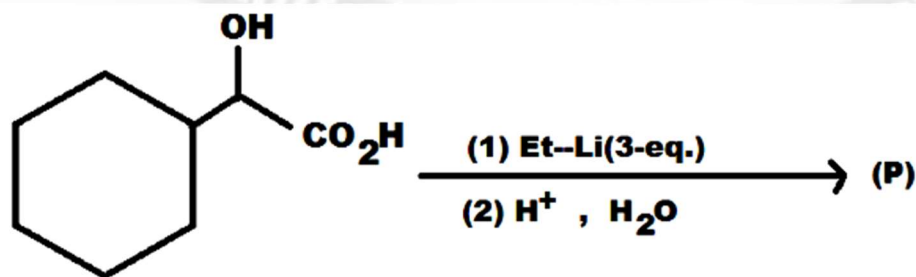
1) $A > B > C > D$

2) $C > D > A > B$

3) $C > D > B > A$

4) $D > C > A > B$

60.



(65% yield) ; Product (P) of the reaction is:

Sec: [Sr.Super60_NUCLEUS-BT](#)

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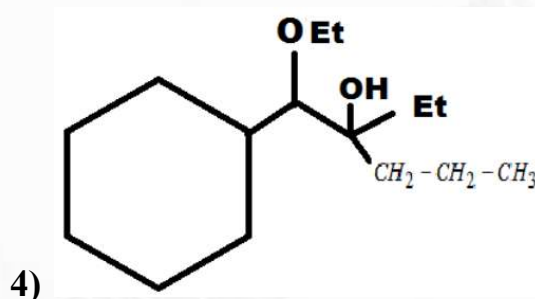
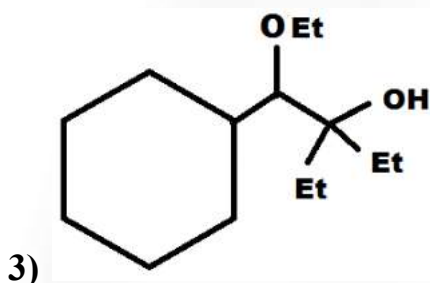
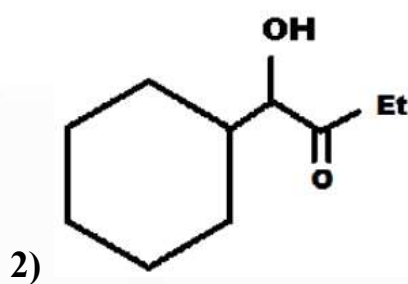
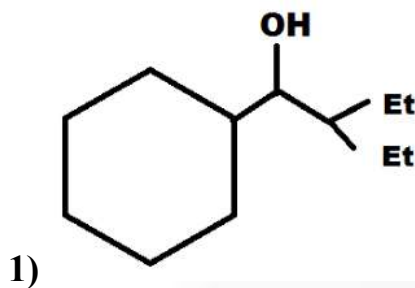
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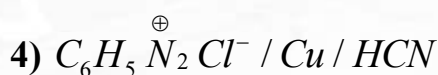
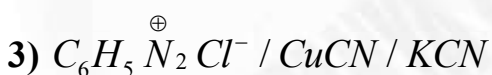
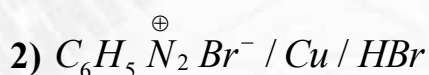
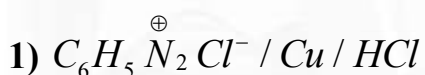


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61. Which one of the following reaction has more yield of product



62. Which one of the following contains tertiary amino group

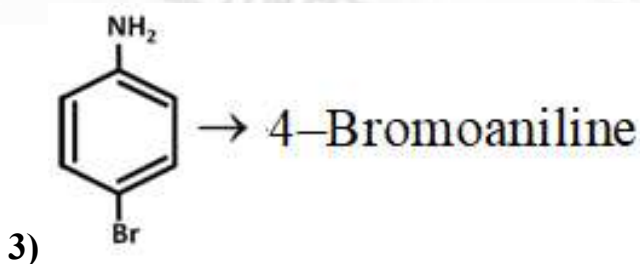
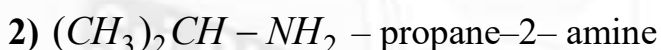
1) Adrenaline

2) Ephedrine

3) Benadryl

4) Surfactants

63. Which one of the compound IUPAC names are incorrect?



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64. Match the following

	Name of the amine		Pkb
A)	Phenylmethanamine	P)	4.22
B)	N,N – Dimethyl methanamine	Q)	8.92
C)	N,N – Dimethyl aniline	R)	4.7
D)	N,N – Dimethyl ethanamine	S)	3.25

- 1) $A - P; B - Q; C - R; D - S$ 2) $A - R; B - S; C - Q; D - P$
 3) $A - P; B - R; C - Q; D - S$ 4) $A - R; B - P; C - Q; D - S$

65. Assertion (A): $C_2H_5N(CH_3)_2$ has less boiling point than $(C_2H_5)_2NH$
 Reason (R): Tertiary amines do not have intermolecular hydrogen bond.

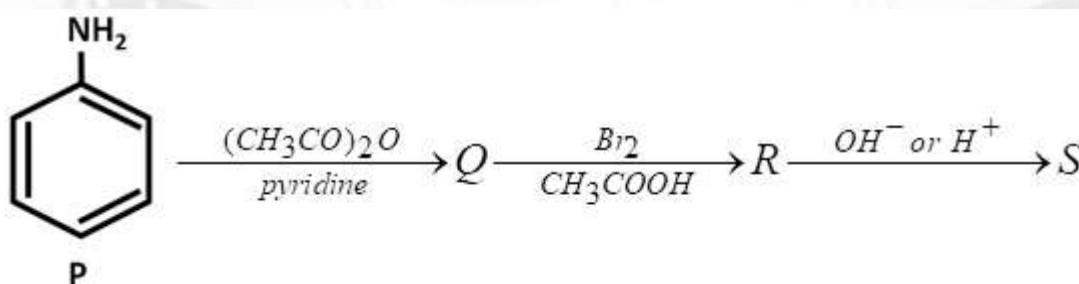
- 1) A and R are true but R is not correct explanation of A
 2) A and R are false
 3) A is false and R is true
 4) A and R are true but R is correct explanation for A.

66. Statement – I: Benzene diazonium chloride is insoluble and Benzene diazonium fluoroborate is water soluble crystalline solid.

Statement – II: The yield of chlorobenzene preparation in Sandmeyer reaction is found to be low than in Gattermann reaction.

- 1) Statement – I is True, Statement – II is True
 2) Statement – I is True, Statement – II is False
 3) Statement – I is False, Statement – II is True
 4) Statement – I is False, Statement – II is False

67.



Then decreasing order of basic strength of P, Q, S respectively

- 1) $P > Q > S$ 2) $S > P > Q$ 3) $P > S > Q$ 4) $Q > P > S$


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68. Assertion (A): N – Ethylbenzene sulphonamide is soluble in alkali
Reason (R): Hydrogen attached to nitrogen in sulphonamide is quite acidic.
- 1) A and R are true but R is not correct explanation of A
 - 2) A and R are false
 - 3) A is false and R is true
 - 4) A and R are true but R is correct explanation for A.
69. Statement – I: Hoffmann’s bromide reaction is given by primary amides.
Statement – II: Primary amines are obtained as a major product by taking large excess of alkyl halide with ammonia.
- 1) Statement –I is True, Statement – II is True and Statement – II is a correct explanation for Statement –I
 - 2) Statement –I is True, Statement – II is True and Statement – II is a not correct explanation for Statement –I
 - 3) Statement –I is True, Statement – II is False
 - 4) Statement –I is False, Statement – II is True
70. An organic compound $(C_3H_9N)(A)$, when treated with nitrous acid in dil. HCl (0° to $5^\circ C$), gave an alcohol and N_2 gas was evolved. (A) on warming with $CHCl_3$ and caustic potash gave (C) which on reduction gave isopropylmethanamine. Predict the structure of (A)
- 1) $(CH_3)_2CH - NH_2$
 - 2) $CH_3CH_2 - NH - CH_3$
 - 3) $(CH_3)_3N$
 - 4) $CH_3CH_2CH_2 - NH_2$

SECTION-II (NUMERICAL VALUE TYPE)

This section contains **5 Numerical Value Type Questions**. The Answer should be within **0 to 9999**. If the Answer is in **Decimal** then round off to the **Nearest Integer** value (Example i.e. If answer is above **10** and less than **10.5** round off is **10** and If answer is from **10.5** and less than **11** round off is **11**).

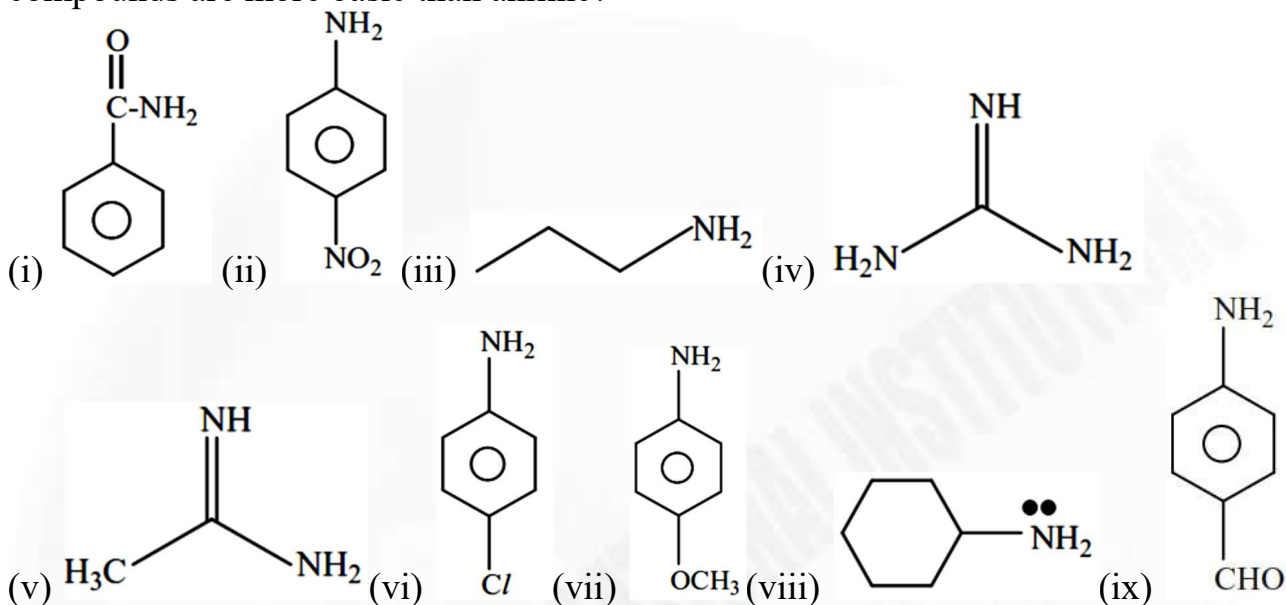
Marking scheme: +4 for correct answer, 0 if not attempt and -1 in all other cases.

71. $C_6H_5CH_2CHMeCONH_2 + Br_2 + 4KOH \longrightarrow X + KBr + K_2CO_3 + H_2O$. The number of stereo Isomers of product ‘X’ is

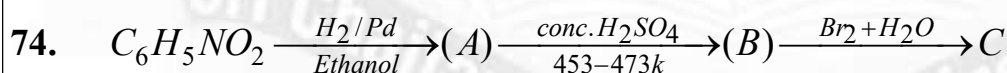
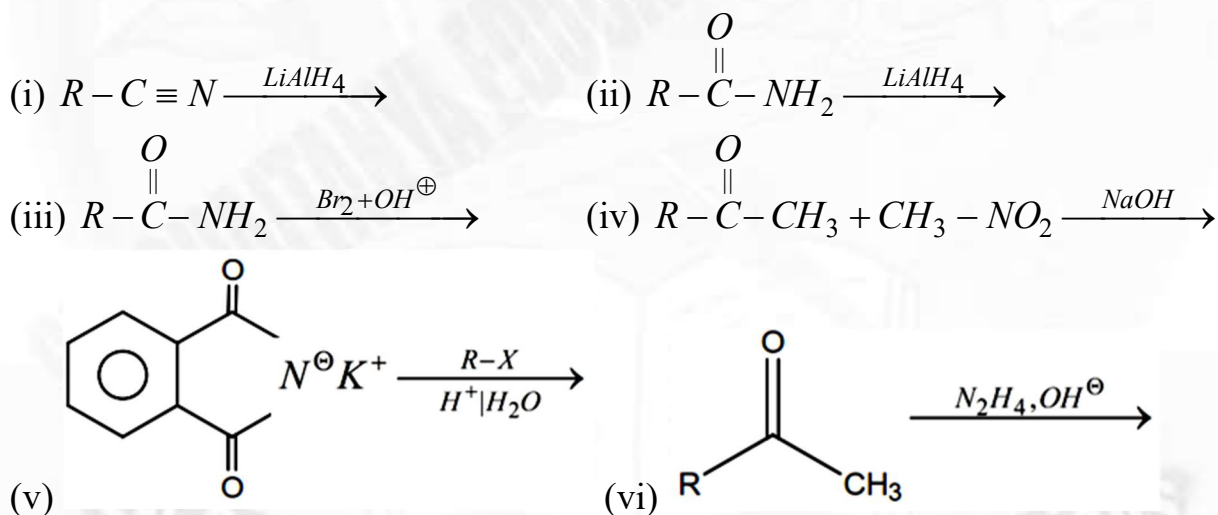




72. Examine the structural formulas of following compounds and identify how many compounds are more basic than aniline?



73. Of the following reactions, how many reactions are used for the preparation of amines.



The sum of the locants of Bromine atoms in the product 'C' is



Degree of unsaturation in the product (B) is





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500
ALL INDIA OPEN
CATEGORY RANKS

95

BELOW
10
ALL INDIA CATEGORY
RANKS COUNT

10

BELOW
100
ALL INDIA CATEGORY
RANKS COUNT

98

BELOW
1000
ALL INDIA CATEGORY
RANKS COUNT

579

TOTAL QUALIFIED RANKS
FOR JEE ADVANCED-2025

22,094

Scan QR Code for
Admissions

