Sri Chaitanya
ACADEMY
An Infinity Learn Initiative

Memory Based Questions and Answers

JEE MAIN 2026

SESSION 1

Test Date: 22nd January 2026 | Shift 1

Instructions

- The test is of **3 hours** duration.
- This test paper consists of 75 questions. Each subject (PCM) has 25 questions. The maximum marks are 300.
- This question paper contains Three Parts. Part-A is Physics, Part-B is Chemistry and Part-C is Mathematics. Each part has only two sections: Section-A and Section-B.
- Section - A: Attempt all questions.
- Section - B: Attempt all questions.
- Section - A (01–20) contains 20 multiple choice questions which have only one correct answer. Each question carries +4 marks for correct answer and –1 mark for wrong answer.
- Section - B (21–25) contains 5 Numerical value based questions. The answer to each question should be rounded off to the nearest integer. Each question carries +4 marks for correct answer and -1 mark for wrong answer.

JEE Main – 22nd January – 2025 (Shift-1)

[Memory-Based Questions]

PHYSICS

1. A projectile is thrown upward at an angle 60° with the horizontal. The speed of the projectile is $20\ \mathrm{m/s}$ when its direction of motion is 45° with the horizontal. The initial speed of the particle is,

   Ans: $(20\sqrt{2})$

2. Matich the following

LIST-1	LIST-2
a) Spring constant	i) $\mathrm{ML^2\,T^{-2}\,K^{-1}}$
b) Thermal conductivity	ii) $\mathrm{ML^{\circ}T^{-2}}$
c) Boltzmann constant	iii) $\mathrm{ML^2\,T^{-2}\,A^{-2}}$
d) Inductance	iv) $\mathrm{MLT^{-3}\,K^{-1}}$

   Ans: (a→ii, b→iv, c→i, d→iii)

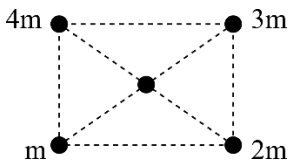
3. The escape velocity from a spherical planet A is $10\ \mathrm{m/sec}$. The escape velocity, for another planet B whose density and radius are 10% of planet A. is ___ m/s

   Ans: (0.32 m/s)

4. In an equilateral prism the incident ray is projected on to it then find the angle of reflected ray at the point of incidence when the emergent ray it grazes to the Surface

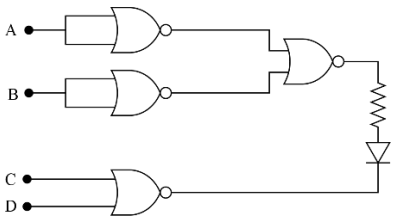
   Ans: (60^0)

5. Gravitational force ratio after interchanging masses



   Ans: (1:1)

6. The following which given



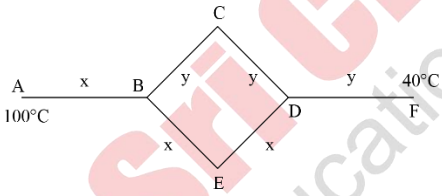
(1) 1101 (2) 0010 (3) 1000 (4) 0001

Ans: (1)

7. Two disc having same moment of inertia of about their axis. Thickness is t_1 & t_2 and they have same densities. If $R_1/R_2 = 1/2$, then find t_1/t_2

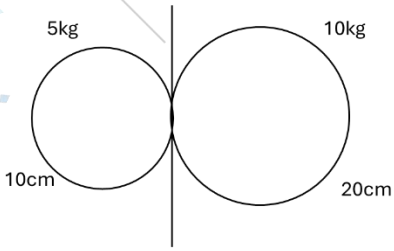
Ans: (16)

8. Six identical Metal rods are arranged as shown, find the temperatures at junction at B & D.



Ans: (T_B=80°c, T_D=60°c)

9. Two solid spheres, masses 5 kg and 10 kg with radius 10 cm and 20 cm respectively, are kept in contact as shown. Find the moment of Inertia of the system about common tangent



Ans: (**0.63 kg-m²**)

10. A simple pendulum has a bob with mass m and charge q. The pendulum string has negligible mass. When a uniform horizontal electric field $\vec{E}$ is applied, the tension in the string changes, the final tension in the string, when pendulum attains equilibrium

Ans: ($T^2=(mg)^2+(qE)^2$)

11. The minimum frequency of photon required to break a particle of mass 15.348 amu into 4α-particle is ___ Hz

Ans: (1.5×10^{23} Hz)

12. 7.9 Mev α-particle scatters from a target material of atomic number 79. Estimate the diameter of nucleus of the target material.

Ans: (5.8×10^{-14} m)

CHEMISTRY

1. Find the energy to excite electron from first Bohr orbit of hydrogen atom to 2nd Bohr's orbit. (in eV)

Ans: (**10.2** eV)

2. Arrange the given metal ions in number in increasing order of unpaired electrons low spin complex formed by $Mn^{3+}, Cr^{3+}, Fe^{3+}, Co^{3+}$

(1) $Co^{3+} < Fe^{3+} < Mn^{3+} < Cr^{3+}$ (2) $Co^{3+} < Mn^{3+} < Fe^{3+} < Cr^{3+}$

(3) $Cr^{3+} < Mn^{3+} < Cr^{3+} < Fe^{3+}$ (4) $Cr^{3+} < Mn^{3+} < Co^{3+} < Fe^{3+}$

Ans: (1)

3. The order of electrophilic substitution when $CHCl_3$ and Methanol is added.

(1) $I^- < F^- < C_6H_5O^- < C_2H_5O^-$ (2) $I^- > F^- > C_6H_5O^- > C_2H_5O^-$

(3) $I^- > F^- > C_2H_5O^- > C_6H_5O^-$ (4) $F^- < I^- < C_6H_5O^- < C_2H_5O^-$

Ans: (3)

4. $K_2Cr_2O_7$ is heated with KCl in presence of conc. H_2SO_4. Find the correct match of product with their oxidation State

(1) $CrO_2Cl_2, +6$ (2) $Cr_2O_2Cl_2, +6$ (3) $Cr_2O_2Cl_2, +5$ (4) $CrO_2Cl_2, +5.$

Ans: (1)

5. Match the following Column-I with Column-II and choose the correct option.

Column-I		Column-II	
(a)	$[Ag(NH_3)_2]^+$	(i)	Fehling's solution
(b)	$Zn - Hg/HCl$	(ii)	Clemmenson's reduction
(c)	$NH_2 - NH_2/KOH$	(iii)	Tollen's reagent
(d)	Cu^{2+}/OH^-	(iv)	Wolff-Kishner reduction

(1) a(i), b(ii), c(iii), d(iv)

(2) a(iv), b(iii), c(ii), d(i)

(3) a(iii), b(ii), c(iv), d(i)

(4) a(i), b(ii), c(iv), d(iii)

Ans: (3)

6. Given below are two statements.

Statement I : Sucrose is dextrorotatory and upon hydrolysis it becomes laevorotatory.

Statement II : Sucrose on hydrolysis gives glucose and fructose such that the laevorotation of glucose is more than the dextrorotation of fructose.

In the light of the above statements, which is the correct option.

1) Both statement-I and statement-II are correct

2) Both statement-I and statement-II are incorrect

3) Statement-I is correct and statement-II is incorrect

4) Statement-I is incorrect and statement-II is correct

Ans: (3)

7. Given below are two statements.

Statement I : 

+ $CHCl_3 \xrightarrow{KOH}$ Major + Minor Major product is ortho substituted and minor product is para substituted.

Statement II : Ortho and para can be separated by steam distillation.

In the light of the above statements, which is the correct option.

1) Both statement-I and statement-II are correct
2) Both statement-I and statement-II are incorrect
3) Statement-I is correct and statement-II is incorrect
4) Statement-I is incorrect and statement-II is correct

Ans: (1)

8. **Statement I :** Otho & Para nitro phenol can be differentiated by steam distillation.

Statement II : Glycerol is separated from spent lie by distillation under reduced pressure

Statement III : Chromatography separation based on differential affinities of components for a Stationary phase.

Statement IV : Aniline is commonly separated from mixture of water by crystallization

Select correct options

(1) Only I & IV (2) Only I, II & III (3) Only I & III (4) All of the above

Ans: (2)

9. Given below are two statements.

Statement I : HX bond length is higher in HCl than HF.

Statement II : The lowest boiling point in hydride of group 15 element is having covalency 4.

In the light of the above statements, which is the correct option.

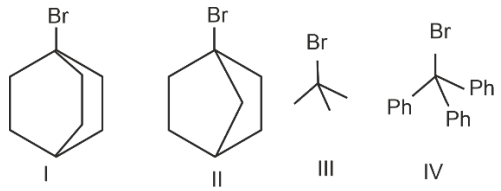
1) Both statement-I and statement-II are correct
2) Both statement-I and statement-II are incorrect
3) Statement-I is correct and statement-II is incorrect
4) Statement-I is incorrect and statement-II is correct

Ans: (**3**)

10. When X and Y react with fluorine then it forms EF_3. The XF_3 is a Lewis acid and YF_3 is a Lewis base. Then hybridization of XF_3 and YF_3 is :

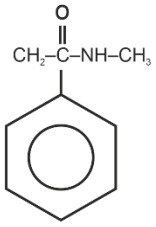
(1) both sp^2 (2) both sp^3 (3) sp^2 and sp^3 (4) sp^3 and sp^2

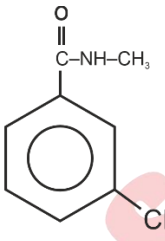
11. Reactivity of following on the basis of SN_1 mechanism.



(1) IV > III > I > II (2) II > IV > III > I (3) III > IV > I > II (4) IV > III > II > I

12. A compound 'A' with molecular formula $C_9H_{11}NO$ reacts with $Br_2/NaOH$ to give (X). (X) on reaction with $NaNO_2$ in dil. HCl gives compound (Y). When (Y) is treated with CuCN, followed by hydrolysis gives (Z). The compound (A) on hydrolysis also oives compound (Z). Identify compound (A).

(1) 

(2) 

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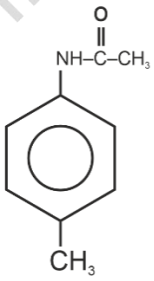
(4) 

MATHEMATICS

1. $\frac{\cos^2 48 - \sin^2 12}{\sin^2 24 - \sin^2 6} = \frac{\alpha + \beta\sqrt{5}}{2}$ where $\alpha, \beta \in N$ then $\alpha + \beta$ _____

Ans: (**4**)

2. Random variable x has the probability distribution.

x	0	1	2	3	4	5	6	7
$P(x)$	0	$2k$	k	$3k$	$2k^2$	$2k$	k^2+k	$7k^2$

Then $P(3 < x < 6)$ is equal to

(1) 0.22 (2) 0.64 (3) 0.34 (4) 0.33

Ans: (1)

3. If $A = \begin{bmatrix} 2 & 3 \\ 3 & 5 \end{bmatrix}$, then the determinant of the matrix $(A^{2025} - 3A^{2024} + A^{2023})$ is

(1) 12 (2) 16 (3) 24 (4) 28

Ans: (2)

4. The coefficient of x^{48} in $(1+x) + 2(1+x)^2 + 3(1+x)^3 + \cdots + 100(1+x)^{100}$ is equal to.

(1) $100\ {}^{101}C_{49}\ {}^{-101}C_{50}$ (2) ${}^{100}C_{50} + {}^{101}C_{49}$

(3) $100.\ {}^{100}C_{49} - {}^{100}C_{48}$ (4) $100.\ {}^{100}C_{49} - {}^{100}C_{50}$

Ans: (1)

5. If the sum of the first 4 terms of an AP is 6 and the sum of 6 terms is 4, then the sum of the first 12 terms of an AP is

(1) -22 (2) -21 (3) -23 (4) -24

Ans: (1)

6. The number of real solutions of the equation: $x|x+4| + 3|x+2| + 10 = 0$ is

(1) (2) (3) (4)

Ans: (1)

7. If the domain of the function $f(x) = \sin^{-1}\left(\frac{5-x}{3+2x}\right) + \frac{1}{\log_e(10-x)}$ is $(-\infty, \alpha] \cup [\beta, \gamma) - \{\delta\}$, then $6(\alpha + \beta + \gamma + \delta) =$

(1) 67 (2) 68 (3) 66 (4) 70

Ans: (4)

8. Two distinct numbers a and b are selected at random from $1,2,3, \ldots 50$. The probability that their product ab is divided by 3 is

(1) $\frac{8}{25}$ (2) $\frac{664}{1225}$ (3) $\frac{561}{1225}$ (4) $\frac{272}{1225}$

Ans: (2)

9. If the image of the point $P(1,2,a)$ in the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{7-z}{2}$ is $Q(5,b,c)$ then $a^2 + b^2 + c^2 =$

(1) 293 (2) 298 (3) 283 (4) 264

Ans: (2)

10. Let $M = \{1,2,3, \ldots 16\}$ and R be a Relation on M defined by xRy. If and only If $4y = 5x - 3$ Then, the number of elements required to be added in R to make it symmetric is

Ans: (**2**)

11. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{dx}{[x]+4}$ is where [.] denotes the greatest integer function

Ans: ()

12. $xdy - ydx = \left(\sqrt{x^2 + y^2}\right)dx, y(1) = 0, y = y(x)$ find $y(3) =$

Ans: (**4**)

13. Chord joining at two points $(x_1, y_1)(x_2, y_2)$ on the parabola $y^2 = 12x$. Intersect at right angle at the vertex then $x_1x_2 - y_1y_2 =$

Ans: (**288**)

14. If the line $\alpha\mathbf{x} + 2\mathbf{y} = 1$, where $\alpha \in R$ does not meet the hyperbola $\mathbf{x}^2 - 9y^2 = 9$ then possible value of α is

(1) 0.5 (2) 0.7 (3) 0.8 (4) 0.6

Ans: (**3**)

15. Let $p(\alpha, \beta, \gamma)$ be point on line $\frac{x-1}{2} = \frac{y+1}{-3} = z$ at a distance $4\sqrt{14}$ from point $(1, -1, 0)$ and nearer to origin. Then the shortest distance between lines $\frac{x-\alpha}{1} = \frac{y-\beta}{2} = \frac{z-\gamma}{3} \& \setminus \& \frac{x+5}{2} = \frac{y-10}{1} = \frac{z-3}{1}$ is equal to

(1) $4\sqrt{\frac{7}{5}}$ (2) $7\sqrt{\frac{5}{4}}$ (3) $4\sqrt{\frac{5}{7}}$ (4) $2\sqrt{\frac{7}{4}}$

Ans: (**1**)

16. Let line $x = -1$ divide the area of region $\{(x, y): 1 + x^2 \leq y \leq 3 - x\}$ in ratio $m : n$. Where gcd $(m, n) = 1$, Then $m + \mathbf{n}$ is =

(1) 27 (2) 26 (3) 25 (4) 28

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Sri Chaitanya
ACADEMY

JEE

@SRICHAITANYAACADEMYJEE

JEE ADVANCED

VAVILALA CHIDVILAS
H.T.No. 236165088

CLASSROOM STUDENT
FROM GRADE VI-XII

NEET

B VARUN CHAKRAVARTHI
H.T.No. 1205120175

CLASSROOM STUDENT
FROM GRADE VI-XII

JEE MAIN

S VENKAT KOUNDINYA
H.T.No. 230310124339

CLASSROOM STUDENT
FROM GRADE I-XII

JEE Main – 22nd January – 2025 (Shift-1)

[Memory-Based Questions]

PHYSICS

1. A projectile is thrown upward at an angle 60° with the horizontal. The speed of the projectile is $20\ \mathrm{m/s}$ when its direction of motion is 45 with the horizontal. The intial speed of the particle is,

(1) $40\sqrt{2}$ (2) 40 (3) $20\sqrt{2}$ (4) $20\sqrt{3}$

Ans: $(20\sqrt{2})$

2. Matich the following

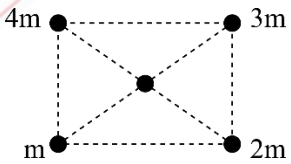
LIST-1	LIST-2
a) Spring constant	i) $\mathrm{ML^2\,T^{-2}\,K^{-1}}$
b) Thermal conductivity	ii) $\mathrm{ML^{\circ}T^{-2}}$
c) Boltzmann constant	iii) $\mathrm{ML^2\,T^{-2}\,A^{-2}}$
d) Inductance	iv) $\mathrm{MLT^{-3}\,K^{-1}}$

Ans: (a→ii, b→iv, c→i, d→iii)

3. The escape velocity from a spherical planet A is 10m/sec. The escape velocity, form another B whose density and radius are 10% of planet A. is ___ $\mathrm{m/s}$

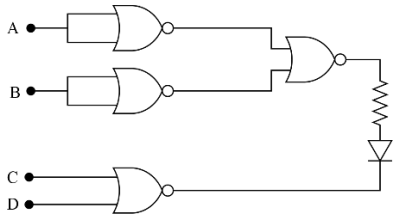
Ans: (0.32 m/s)

4. Arrangement of four masses is shown in the figure, if we put 1 kg mass at the centre than force on 1 kg mass is F_1. Now if 3m and 4m masses are interchanged than force on 1 kg mass is F_2. Find the ratio $\frac{F_1}{F_2}$



Ans: $(\frac{2}{\sqrt{5}})$

5. The input which will make the LED glow



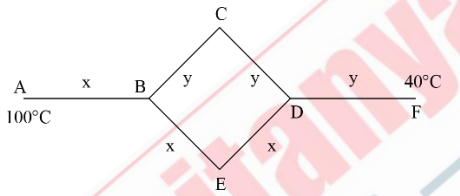
(1) 1101 (2) 0010 (3) 1000 (4) 0001

Ans: (1)

6. Two disc having same moment of inertia of about their axis. Thickness is t_1 & t_2 and they have same densities. If $R_1/R_2 = 1/R$ then find t_1/t_2

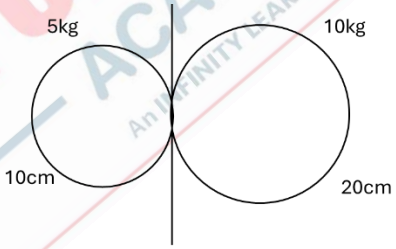
Ans: (16)

7. Six identical Metal rods are arranged as shown, find the temperatures at junction at $B\&D$.



Ans: (T_B=80^{0}c, T_D=60^{0}c)

8. Two solid spheres masses 5 kg and 10 kg with radius 10 cm and 20 cm respectively are kept in contact as Shown. Find the moment of Inertia of the system about Common tangent



Ans: (**0.63 kg-m^2**)

9. A simple pendulum has a bob with mass m and charge q. The pendulum string has negligible mass. when a uniform a horizontal electric field $\vec{E}$ is applied, the tension in the string changes, the final tension in the string, when pendulum attains equilibrium

Ans: ($T = \sqrt{(mg)^2 + (qE)^2}$)

10. The minimum frequency of photon required to break a particle of mass 15.348 amu into 4α-particle is ___

Ans: (1.5×10^{23} Hz)

11. 7.9 Mev α-particle scatters from a target material of atomic number 79 . Estimate the distance of closest approach.

Ans: (2.88×10^{-14} m)

12. In series $R-L$ circuit voltage of battery is 10 V. Resistance and inductance are 10Ω and 10 mH respectively. Find the energy stored in inductor when current reaches $\frac{1}{e}$ times of max value

(1) 0.67 mJ (2) 1.33 mJ (3) 0.33 mJ (4) 0.50 mJ

Ans: (**1**)

13. Electric field in a region is given by $\vec{E} = Ax\hat{\imath} + By\hat{\jmath}$, where $A = 10v/m^2$, $B = 5v/m^2$. If the electric potential at a point (10,20) is 500v, then the electric potential at origin is (in V)

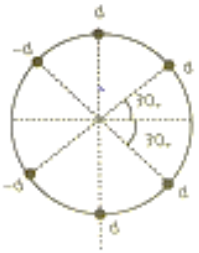
(1) 2000 (2) 1000 (3) 500 (4) 0

Ans: (**1**)

14. During an adiabatic expansion the volume increases to 8 times and temp reduces to 1/4th, What is the adiabatic constant for the gas.

Ans: ($\frac{5}{3}$)

15. Six point charges are kept 60 degree apart from each other on a circumference of a circle of radius R as shown in figure, the electric field at the center of the circle



Ans: ($\frac{\sqrt{3}q}{2\pi\epsilon_0 r^2}(-i)$)

16. The electric field of a plane EM wave travelling in an unknown non-magnetic medium is given by $E_y = 20\sin(3 \times 10^6 x - 4.5 \times 10^{14} t) V/m$. The dielectric constant of the medium is –

Ans: (**4**)

CHEMISTRY

1. Find the energy to excite electron from first Bohr orbit of hydrogen atom to 2nd Bohr's orbit. (in eV)

   Ans: (**10.2** eV)

2. Arrange the given metal ions in number in increasing order of unpaired electrons low spin complex formed by $Mn^{3+}, Cr^{3+}, Fe^{3+}, Co^{3+}$

   (1) $Co^{3+} < Fe^{3+} < Mn^{3+} < Cr^{3+}$ (2) $Co^{3+} < Mn^{3+} < Fe^{3+} < Cr^{3+}$

   (3) $Cr^{3+} < Mn^{3+} < Cr^{3+} < Fe^{3+}$ (4) $Cr^{3+} < Mn^{3+} < Co^{3+} < Fe^{3+}$

   Ans: (**1**)

3. The order of electrophilic substitution when $CHCl_3$ and Methanol is added.

   (1) $I^- < F^- < C_6H_5O^- < C_2H_5O^-$ (2) $I^- > F^- > C_6H_5O^- > C_2H_5O^-$

   (3) $I^- > C_2H_5O^- > C_6H_5O^- > F^-$ (4) $F^- < I^- < C_6H_5O^- < C_2H_5O^-$

   Ans: (**3**)

4. $K_2Cr_2O_7$ is heated with KCl in presence of conc. H_2SO_4. Find the correct match of product with their oxidation State

   (1) $CrO_2Cl_2, +6$ (2) $Cr_2O_2Cl_2, +6$ (3) $Cr_2O_2Cl_2, +5$ (4) $CrO_2Cl_2, +5.$

   Ans: (**1**)

5. Match the following Column-I with Column-II and choose the correct option.

Column-I		Column-II	
(a)	$[Ag(NH_3)_2]^+$	**(i)**	Fehling's solution
(b)	$Zn - Hg/HCl$	**(ii)**	Clemmenson's reduction
(c)	$NH_2 - NH_2/KOH$	**(iii)**	Tollen's reagent
(d)	Cu^{2+}/OH^-	**(iv)**	Wolff-Kishner reduction

(1) a(i), b(ii), c(iii), d(iv)

(2) a(iv), b(iii), c(ii), d(i)

(3) a(iii), b(ii), c(iv), d(i)

(4) a(i), b(ii), c(iv), d(iii)

Ans: (**3**)

6. Given below are two statements.

Statement I : Sucrose is dextrorotatory and upon hydrolysis it becomes levorotatory.

Statement II : Sucrose on hydrolysis gives glucose and fructose such that the levorotation of glucose is more than the dextrorotation of fructose.

In the light of the above statements, which is the correct option.

1) Both statement-I and statement-II are correct

2) Both statement-I and statement-II are incorrect

3) Statement-I is correct and statement-II is incorrect

4) Statement-I is incorrect and statement-II is correct

Ans: (**3**)

7. Given below are two statements.

Statement I : 

+ $CHCl_3 \xrightarrow{KOH}$ Major + Minor Major product is ortho substituted and minor product is para substituted.

Statement II : Ortho and para can be separated by steam distillation.

In the light of the above statements, which is the correct option.

1) Both statement-I and statement-II are correct

2) Both statement-I and statement-II are incorrect

3) Statement-I is correct and statement-II is incorrect

4) Statement-I is incorrect and statement-II is correct

Ans: (**1**)

8. **Statement I :** Otho & Para nitro phenol can be differentiated by steam distillation.

Statement II : Glycerol is separated from spent lie by distillation under reduced pressure

Statement III : Chromatography separation based on differential affinities of components for a Stationary phase.

Statement IV : Aniline is commonly separated from mixture of water by crystallization

Select correct options

(1) Only I & IV (2) Only I, II & III (3) Only I & III (4) All of the above

Ans: (**2**)

9. Given below are two statements.

Statement I : HX bond length is higher in HCl than HF.

Statement II : The lowest boiling point in hydride of group 15 element is having covalency 4.

In the light of the above statements, which is the correct option.

1) Both statement-I and statement-II are correct
2) Both statement-I and statement-II are incorrect
3) Statement-I is correct and statement-II is incorrect
4) Statement-I is incorrect and statement-II is correct

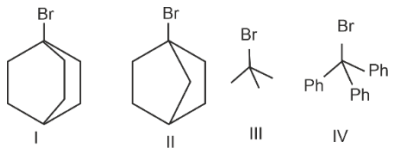
Ans: (**3**)

10. When X and Y react with fluorine then it forms EF_3. The XF_3 is a Lewis acid and YF_3 is a Lewis base. Then hybridization of XF_3 and YF_3 is :

(1) both sp^2 (2) both sp^3 (3) sp^2 and sp^3 (4) sp^3 and sp^2

Ans: (**3**)

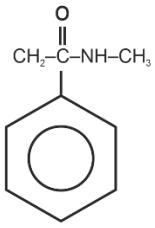
11. Reactivity of following on the basis of SN_1 mechanism.

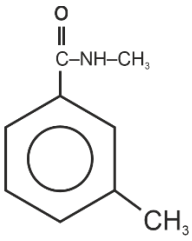


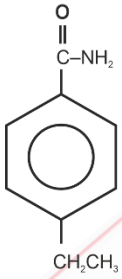
(1) IV > III > I > II (2) II > IV > III > I (3) III > IV > I > II (4) IV > III > II > I

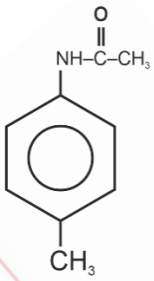
Ans: (**1**)

12. A compound 'A' with molecular formula $C_9H_{11}NO$ reacts with $Br_2/NaOH$ to give (X). (X) on reaction with $NaNO_2$ in dil. HCl gives compound (Y). When (Y) is treated with CuCN, followed by hydrolysis gives (Z). The compound (A) on hydrolysis also gives compound (Z). Identify compound (A).

(1) 

(2) 

(3) 

(4) 

Ans: (**3**)

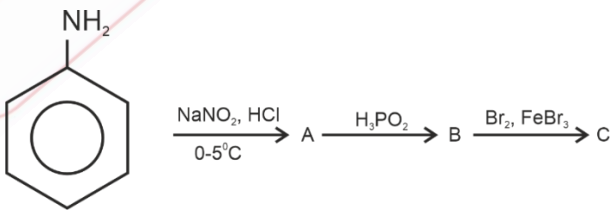
13. Which of the following statement is correct regarding the nature and directive influence of $-NO_2$ group in nitration of benzene.

1) It is an activating group and ortho/para director
2) It is a deactivating group and ortho/para director
3) It is a deactivating group and meta director
4) It is an activating group and meta director

(1) Only I (2) Only II & III (3) Only III (4) Only IV

Ans: (**3**)

14. Consider the following sequence of reaction and identify A, B and C respectively.



(1) $C_6H_5OH, C_6H_6, C_6H_4Br_2$ (2) $C_6H_5N_2{}^+Cl^-, C_6H_6, C_6H_5Br$

(3) $C_6H_5NO_2, C_6H_5OH, C_6H_5Br$ (4) $C_6H_5Cl, C_6H_5OH, C_6H_6$

Ans: (**2**)

15. Four elements from Boron to Oxygen have the following IE_1 values (in $KJmol^{-1}$):
$1086.5,800.6,1313.9,1402.3$
The value of IE_1 for "Nitrogen" is _____ .

Ans: (**1402.3**)

16. If for two reactions first reaction have $K_1 = 10^6 e^{\frac{-30000}{T}}$ & for second reaction $K_2 = 10^4 e^{\frac{-24000}{T}}$ then at which temperature both reactions have same value of rate constant. (Report your answer in nearest integer)

Ans: (**1303**)

17. Given below are two statements.

Statement I : K_H is constant with change in concentration of gas till solution is dilute at given temperature.

Statement II : According to Henry's Law, partial pressure of gas in vapour phase is inversely proportional to mole fraction of gas in solution.

In the light of the above statements, which is the correct option.

1) Both statement-I and statement-II are correct
2) Both statement-I and statement-II are incorrect
3) Statement-I is correct and statement-II is incorrect
4) Statement-I is incorrect and statement-II is correct

Ans: (**3**)

18. An element of p-block forms a hydride EH_4^+.
Gas of hydride is passed through a basic solution of $K_2[HgI_4]$.
Then a brown ppt. is formed.
Select **correct** option(s):

1) Element E has maximum covalency equal to 5.
2) Brown ppt. of $HgO \cdot Hg(NH_2)I$ is formed.
3) Element E has maximum Electron affinity in its group.
4) Gas is phosphine.

(1) Only II (2) Only I, II & III (3) Only I & III (4) Only I

Ans: (**1**)

19. Consider a first order reaction:
$A \rightarrow$ products
3 different solutions are taken rate of reaction
Solution 1: $100\ mL 10M'A' - r_1$
Solution 2: $200\ mL 10M'A' - r_2$
Solution 3: $100\ mL 10M'A' + 100\ mL$ water $- r_3$
The correct order of the rates of reactions is,

(1) $r_1 = r_2 = r_3$ (2) $r_1 = r_2 < r_3$ (3) $r_1 = r_2 > r_3$ (4) $r_1 < r_2 = r_3$

Ans: (**3**)

20. Bohr's radius of H -atom is 2.12×10^{-10} m. Calculate the energy at this level.

(1) -5.44×10^{-19}J (2) -2.176×10^{-18}J (3) -54.4×10^{-19}J (4) -2.3×10^{-19}J

Ans: (**1**)

MATHEMATICS

1. $\frac{\cos^2 48-\sin^2 12}{\sin^2 24-\sin^2 6}=\frac{\alpha+\beta\sqrt{5}}{2}$ where $\alpha, \beta \in N$ then $\alpha+\beta$ _____

Ans: (**4**)

2. Random variable x has the probability distribution.

x	0	1	2	3	4	5	6	7
P(x)	0	2k	k	3k	$2k^2$	2k	k^2+k	$7k^2$

Then $P(3<x<6)$ is equal to

(1) 0.22 (2) 0.64 (3) 0.34 (4) 0.33

Ans: (1)

3. If $A=\begin{bmatrix}2 & 3\\ 3 & 5\end{bmatrix}$, then the determinant of the matrix $(A^{2025}-3A^{2024}+A^{2023})$ is

(1) 12 (2) 16 (3) 24 (4) 28

Ans: (2)

4. The coefficient of x^{48} in $(1+x)+2(1+x)^2+3(1+x)^3+\cdots+100(1+x)^{100}$ is equal to.

(1) $100\ {}^{101}C_{49}\ {}^{-101}C_{50}$ (2) ${}^{100}C_{50}+{}^{101}C_{49}$

(3) $100.\ {}^{100}C_{49}-{}^{100}C_{48}$ (4) $100.\ {}^{100}C_{49}-{}^{100}C_{50}$

Ans: (1)

5. If the sum of the first 4 terms of an AP is 6 and the sum of 6 terms is 4, then the sum of the first 12 terms of an AP is

(1) -22 (2) -21 (3) -23 (4) -24

Ans: (1)

6. The number of real solutions of the equation: $x|x+4|+3|x+2|+10=0$ is

(1) 1 (2) 4 (3) 3 (4) 2

Ans: (1)

7. If the domain of the function $f(x) = \sin^{-1}\left(\frac{5-x}{3+2x}\right) + \frac{1}{\log_e(10-x)}$ is $(-\infty, \alpha] \cup [\beta, \gamma) - \{\delta\}$, then $6(\alpha + \beta + \gamma + \delta) =$

(1) 67 (2) 68 (3) 66 (4) 70

Ans: (4)

8. Two distinct numbers a and b are selected at random from $1,2,3, \ldots 50$. The probability that their product ab is divided by 3 is

(1) $\frac{8}{25}$ (2) $\frac{664}{1225}$ (3) $\frac{561}{1225}$ (4) $\frac{272}{1225}$

Ans: (**2**)

9. If the image of the point $P(1,2,a)$ in the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{7-z}{2}$ is $Q(5,b,c)$ then $a^2 + b^2 + c^2 =$

(1) 293 (2) 298 (3) 283 (4) 264

Ans: (**2**)

10. Let $M = \{1,2,3, \ldots 16\}$ and R be a Relation on M defined by xRy. If and only if $4y = 5x - 3$ Then, the number of elements required to be added in R to make it symmetric is

Ans: (**2**)

11. $xdy - ydx = \left(\sqrt{x^2 + y^2}\right)dx, y(1) = 0, y = y(x)$ find $y(3) =$

(1) 3 (2) 2 (3) 1 (4) 4

Ans: (**4**)

12. Chord joining at two points $(x_1, y_1)(x_2, y_2)$ on the parabola $y^2 = 12x$. Intersect at right angle at the vertex then $x_1x_2 - y_1y_2 =$

Ans: (**288**)

13. If the line $\alpha x + 2y = 1$, where $\alpha \in R$ does not meet the hyperbola $x^2 - 9y^2 = 9$ then the possible value of α is

(1) 0.5 (2) 0.7 (3) 0.8 (4) 0.6

Ans: (**3**)

14. Let $p(\alpha, \beta, \gamma)$ be point on line $\frac{x-1}{2} = \frac{y+1}{-3} = z$ at a distance $4\sqrt{14}$ from point $(1,-1,0)$ and nearer to origin. Then the shortest distance between lines $\frac{x-\alpha}{1} = \frac{y-\beta}{2} = \frac{z-\gamma}{3}$ & \ & $\frac{x+5}{2} = \frac{y-10}{1} = \frac{z-3}{1}$ is equal to

(1) $4\sqrt{\frac{7}{5}}$ (2) $7\sqrt{\frac{5}{4}}$ (3) $4\sqrt{\frac{5}{7}}$ (4) $2\sqrt{\frac{7}{4}}$

Ans: (**1**)

15. Let line $x = -1$ divide the area of the region $\{(x, y): 1 + x^2 \leq y \leq 3 - x\}$ in ratio $m: n$. Where $\gcd(m, n) = 1$, Then $m + n$ is $=$

(1) 27 (2) 26 (3) 25 (4) 28

Ans: (**1**)

16. Let $f: [1, \infty] \to R$ be a differentiable function. If $6\int_1^x f(t)dt = 3xf(x) + x^3 - 4$ for all $x \geq 1$, then the value of $f(2) - f(3)$ is

(1) -3 (2) 4 (3) -4 (4) 3

Ans: (**4**)

17. The number of solutions of $\tan^{-1} 4x + \tan^{-1} 6x = \frac{\pi}{6}$, where $\frac{-1}{2\sqrt{6}} < x < \frac{1}{2\sqrt{6}}$ is equal to

(1) 0 (2) 2 (3) 1 (4) 3

Ans: (**3**)

18. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{dx}{[x]+4}$ is where [.] denotes greatest integer function

Ans: $\left(\frac{7}{60}(3\pi - 1)\right)$

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Sri Chaitanya
ACADEMY

@SRICHAITANYAACADEMYJEE