

NTA JEE Mains Jan 2026

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Subject	B. Tech

Section : Mathematics Section A

~~Q.1~~ Let the solution curve of the differential equation $xdy - ydx = \sqrt{x^2 + y^2} dx, x > 0$,
 $y(1) = 0$, be $y = y(x)$. Then $y(3)$ is equal to

- Options
- 6
 - 4
 - 1
 - 2

Question Type : MCQ

Question ID : 444792169

Option 1 ID : 444792586

Option 2 ID : 444792585

Option 3 ID : 444792583

Option 4 ID : 444792584

Status : Answered

Chosen Option : 4

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

- Options
- 0.5
 - 0.8
 - 0.6
 - 0.7

Question Type : MCQ

Question ID : 444792159

Option 1 ID : 444792543

Option 2 ID : 444792546

Option 3 ID : 444792544

Option 4 ID : 444792545

Status : Answered

Chosen Option : 1

Q.3 If the chord joining the points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ on the parabola $y^2 = 12x$ subtends a right angle at the vertex of the parabola, then $x_1x_2 - y_1y_2$ is equal to

- Options
1. 288
 2. 284
 3. 292
 4. 280

Question Type : MCQ

Question ID : 444792160

Option 1 ID : 444792549

Option 2 ID : 444792548

Option 3 ID : 444792550

Option 4 ID : 444792547

Status : Not Answered

Chosen Option : --

Q.4 Two distinct numbers a and b are selected at random from 1, 2, 3, ..., 50. The probability, that their product ab is divisible by 3, is

- Options
1. $\frac{272}{1225}$
 2. $\frac{664}{1225}$
 3. $\frac{8}{25}$
 4. $\frac{561}{1225}$

Question Type : MCQ

Question ID : 444792157

Option 1 ID : 444792536

Option 2 ID : 444792535

Option 3 ID : 444792538

Option 4 ID : 444792537

Status : Answered

Chosen Option : 4

Q.5 Let the set of all values of r , for which the circles $(x + 1)^2 + (y + 4)^2 = r^2$ and $x^2 + y^2 - 4x - 2y - 4 = 0$ intersect at two distinct points be the interval (α, β) . Then $\alpha\beta$ is equal to

- Options 1. 24
2. 25
3. 20
4. 21

Question Type : MCQ

Question ID : 444792161

Option 1 ID : 444792552

Option 2 ID : 444792551

Option 3 ID : 444792554

Option 4 ID : 444792553

Status : Not Answered

Chosen Option : --

Q.6 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 $a^2 + b^2 + c^2$ is equal to

- Options 1. 293
2. 264
3. 298
4. 283

Question Type : MCQ

Question ID : 444792165

Option 1 ID : 444792569

Option 2 ID : 444792567

Option 3 ID : 444792570

Option 4 ID : 444792568

Status : Not Answered

Chosen Option : --

Q.7 If a 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 $P(3 < x \leq 6)$ is equal to

- Options
1. 0.33
 2. 0.64
 3. 0.22
 4. 0.34

Question Type : MCQ

Question ID : 444792158

Option 1 ID : 444792542

Option 2 ID : 444792540

Option 3 ID : 444792541

Option 4 ID : 444792539

Status : Answered

Chosen Option : 4

Q.8

The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\frac{1}{[x] + 4} \right) dx$, where $[\cdot]$ denotes the greatest integer function, is

- Options
1. $\frac{1}{60}(\pi - 7)$
 2. $\frac{1}{60}(21\pi - 1)$
 3. $\frac{7}{60}(\pi - 3)$
 4. $\frac{7}{60}(3\pi - 1)$

Question Type : MCQ

Question ID : 444792170

Option 1 ID : 444792589

Option 2 ID : 444792590

Option 3 ID : 444792588

Option 4 ID : 444792587

Status : Answered

Chosen Option : 4

Q.9 The coefficient of x^{48} in $(1+x) + 2(1+x)^2 + 3(1+x)^3 + \dots + 100(1+x)^{100}$ is equal to

- Options
1. $100 \cdot {}^{101}C_{49} - {}^{101}C_{50}$
 2. ${}^{100}C_{50} + {}^{101}C_{49}$
 3. $100 \cdot {}^{100}C_{49} - {}^{100}C_{50}$
 4. $100 \cdot {}^{100}C_{49} - {}^{100}C_{48}$

Question Type : MCQ

Question ID : 444792156

Option 1 ID : 444792533

Option 2 ID : 444792532

Option 3 ID : 444792531

Option 4 ID : 444792534

Status : Answered

Chosen Option : 3

Q.10 Let the relation R on the set $M = \{1, 2, 3, \dots, 16\}$ be given by $R = \{(x, y) : 4y = 5x - 3, x, y \in M\}$.

Then the minimum number of elements required to be added in R, in order to make the relation symmetric, is equal to

- Options
1. 2
 2. 1
 3. 4
 4. 3

Question Type : MCQ

Question ID : 444792151

Option 1 ID : 444792511

Option 2 ID : 444792514

Option 3 ID : 444792513

Option 4 ID : 444792512

Status : Answered

Chosen Option : 3

~~Q.11~~ Let $f: [1, \infty) \rightarrow \mathbb{R}$ be a differentiable function. If $6 \int_1^x f(t) dt = 3x f(x) + x^3 - 4$ for all $x \geq 1$, then the value of $f(2) - f(3)$ is

- Options
1. -3
 2. 4
 3. -4
 4. 3

Question Type : MCQ

Question ID : 444792167

Option 1 ID : 444792577

Option 2 ID : 444792575

Option 3 ID : 444792578

Option 4 ID : 444792576

Status : Answered

Chosen Option : 3

~~Q.12~~ The number of distinct real solutions of the equation $x|x+4| + 3|x+2| + 10 = 0$ is

- Options
1. 0
 2. 1
 3. 3
 4. 2

Question Type : MCQ

Question ID : 444792153

Option 1 ID : 444792519

Option 2 ID : 444792520

Option 3 ID : 444792522

Option 4 ID : 444792521

Status : Answered

Chosen Option : 1

Q.13 Let $\overrightarrow{AB} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ and $\overrightarrow{AD} = \hat{i} + 2\hat{j} + \lambda\hat{k}$, $\lambda \in \mathbb{R}$. Let the projection of the vector $\vec{v} = \hat{i} + \hat{j} + \hat{k}$ on the diagonal \overrightarrow{AC} of the parallelogram ABCD be of length one unit. If α, β , where $\alpha > \beta$, be the roots of the equation $\lambda^2 x^2 - 6\lambda x + 5 = 0$, then $2\alpha - \beta$ is equal to

- Options
1. 3
 2. 1
 3. 6
 4. 4

Question Type : MCQ

Question ID : 444792163

Option 1 ID : 444792560

Option 2 ID : 444792559

Option 3 ID : 444792562

Option 4 ID : 444792561

Status : Not Answered

Chosen Option : --

Q.14 If the sum of the first four terms of an A.P. is 6 and the sum of its first six terms is 4, then the sum of its first twelve terms is

- Options
1. -20
 2. -26
 3. -22
 4. -24

Question Type : MCQ

Question ID : 444792155

Option 1 ID : 444792527

Option 2 ID : 444792530

Option 3 ID : 444792528

Option 4 ID : 444792529

Status : Answered

Chosen Option : 3

~~Q.15~~ 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

- Options 1. 1
2. 0
3. 3
4. 2

Question Type : MCQ

Question ID : 444792162

Option 1 ID : 444792556

Option 2 ID : 444792555

Option 3 ID : 444792558

Option 4 ID : 444792557

Status : Answered

Chosen Option : 2

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

- Options 1. 28
2. 27
3. 26
4. 25

Question Type : MCQ

Question ID : 444792168

Option 1 ID : 444792582

Option 2 ID : 444792581

Option 3 ID : 444792580

Option 4 ID : 444792579

Status : Not Answered

Chosen Option : --

~~Q.17~~ Let $f(x) = x^{2025} - x^{2000}$, $x \in [0, 1]$ and the minimum value of the function $f(x)$ in the interval $[0, 1]$ be $(80)^{80} (n)^{-81}$. Then n is equal to

- Options 1. - 40
2. - 41
3. - 81
4. - 80

Question Type : MCQ

Question ID : 444792166

Option 1 ID : 444792573

Option 2 ID : 444792574

Option 3 ID : 444792572

Option 4 ID : 444792571

Status : Answered

Chosen Option : 1

Q.18

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

Options

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

Question Type : MCQ

Question ID : 444792164

Option 1 ID : 444792564

Option 2 ID : 444792563

Option 3 ID : 444792566

Option 4 ID : 444792565

Status : Answered

Chosen Option : 3

Q.19

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 $6(\alpha + \beta + \gamma + \delta)$ is equal to

Options

1. 70
2. 66
3. 68
4. 67

Question Type : MCQ

Question ID : 444792152

Option 1 ID : 444792518

Option 2 ID : 444792515

Option 3 ID : 444792517

Option 4 ID : 444792516

Status : Not Answered

Chosen Option : --

Q.20

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

- Options
1. 28
 2. 24
 3. 12
 4. 16

Question Type : MCQ

Question ID : 444792154

Option 1 ID : 444792526

Option 2 ID : 444792525

Option 3 ID : 444792523

Option 4 ID : 444792524

Status : Answered

Chosen Option : 2

Section : Mathematics Section B

Q.21

Let A be a 3×3 matrix such that $A + A^T = O$. If $A \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} 3 \\ 3 \\ 2 \end{bmatrix}$, $A^2 \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix} = \begin{bmatrix} -3 \\ 19 \\ -24 \end{bmatrix}$

and $\det(\text{adj}(2 \text{adj}(A + I))) = (2)^\alpha \cdot (3)^\beta \cdot (11)^\gamma$, α, β, γ are non-negative integers, then $\alpha + \beta + \gamma$ is equal to _____

Given --
Answer :

Question Type : SA

Question ID : 444792172

Status : Not Answered

Q.22

Let $\alpha = \frac{-1 + i\sqrt{3}}{2}$ and $\beta = \frac{-1 - i\sqrt{3}}{2}$, $i = \sqrt{-1}$. If

$$(7 - 7\alpha + 9\beta)^{20} + (9 + 7\alpha - 7\beta)^{20} + (-7 + 9\alpha + 7\beta)^{20} + (14 + 7\alpha + 7\beta)^{20} = m^{10},$$

then m is _____

Given --
Answer :

Question Type : SA

Question ID : 444792171

Status : Not Answered

Q.23 Let ABC be a triangle. Consider four points p_1, p_2, p_3, p_4 on the side AB, five points p_5, p_6, p_7, p_8, p_9 on the side BC, and four points $p_{10}, p_{11}, p_{12}, p_{13}$ on the side AC. None of these points is a vertex of the triangle ABC. Then the total number of pentagons, that can be formed by taking all the vertices from the points p_1, p_2, \dots, p_{13} , is _____

Given 1284

Answer :

Question Type : SA

Question ID : 444792173

Status : Answered

Q.24 If $\frac{\cos^2 48^\circ - \sin^2 12^\circ}{\sin^2 24^\circ - \sin^2 6^\circ} = \frac{\alpha + \beta\sqrt{5}}{2}$, where $\alpha, \beta \in \mathbb{N}$, then $\alpha + \beta$ is equal to _____

Given --

Answer :

Question Type : SA

Question ID : 444792174

Status : Not Answered

Q.25 If $\int (\sin x)^{\frac{-11}{2}} (\cos x)^{\frac{-5}{2}} dx = -\frac{p_1}{q_1} (\cot x)^{\frac{9}{2}} - \frac{p_2}{q_2} (\cot x)^{\frac{5}{2}} - \frac{p_3}{q_3} (\cot x)^{\frac{1}{2}} + \frac{p_4}{q_4} (\cot x)^{\frac{-3}{2}} + C$, where p_i and q_i are positive integers with $\gcd(p_i, q_i) = 1$ for $i = 1, 2, 3, 4$ and C is the constant of integration, then $\frac{15p_1p_2p_3p_4}{q_1q_2q_3q_4}$ is equal to _____

Given --

Answer :

Question Type : SA

Question ID : 444792175

Status : Not Answered

~~Q.26~~ Electric field in a region is given by $\vec{E} = Ax\hat{i} + By\hat{j}$, where $A = 10 \text{ V/m}^2$ and $B = 5 \text{ V/m}^2$. If the electric potential at a point (10, 20) is 500 V, then the electric potential at origin is _____ V.

Options 1. 2000

2. 1000

3. 500

4. 0

Question Type : MCQ

Question ID : 444792189

Option 1 ID : 444792651

Option 2 ID : 444792650

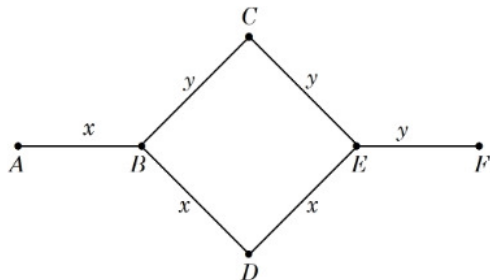
Option 3 ID : 444792649

Option 4 ID : 444792648

Status : Answered

Chosen Option : 3

~~Q.27~~ Rods x and y of equal dimensions but of different materials are joined as shown in figure. Temperatures of end points A and F are maintained at 100°C and 40°C respectively. Given the thermal conductivity of rod x is three times of that of rod y , the temperature at junction points B and E are (close to):



Options 1. 80°C and 60°C respectively

2. 60°C and 45°C respectively

3. 80°C and 70°C respectively

4. 89°C and 73°C respectively

Question Type : MCQ

Question ID : 444792182

Option 1 ID : 444792620

Option 2 ID : 444792621

Option 3 ID : 444792623

Option 4 ID : 444792622

Status : Answered

Chosen Option : 1

Q.28 Match the LIST-I with LIST-II

List-I		List-II	
A.	Spring constant	I.	$ML^2T^{-2}K^{-1}$
B.	Thermal conductivity	II.	ML^0T^{-2}
C.	Boltzmann constant	III.	$ML^2T^{-3}A^{-2}$
D.	Inductive reactance	IV.	$MLT^{-3}K^{-1}$

Choose the **correct** answer from the options given below:

- Options
1. A-III, B-II, C-IV, D-I
 2. A-I, B-IV, C-II, D-III
 3. A-II, B-I, C-IV, D-III
 4. A-II, B-IV, C-I, D-III

Question Type : MCQ

Question ID : 444792176

Option 1 ID : 444792597

Option 2 ID : 444792596

Option 3 ID : 444792599

Option 4 ID : 444792598

Status : Answered

Chosen Option : 4

Q.29 7.9 MeV α -particle scatters from a target material of atomic number 79. From the given data the estimated diameter of nuclei of the target material is (approximately) _____m.

$$\left[\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2/\text{C}^2 \text{ and electron charge} = 1.6 \times 10^{-19} \text{ C} \right]$$

- Options
1. 5.76×10^{-14}
 2. 1.69×10^{-12}
 3. 2.88×10^{-14}
 4. 1.44×10^{-13}

Question Type : MCQ

Question ID : 444792193

Option 1 ID : 444792667

Option 2 ID : 444792664

Option 3 ID : 444792665

Option 4 ID : 444792666

Status : Not Answered

Chosen Option : --

Q.30 Given below are two statements:

Statement I: Pressure of a fluid is exerted only on a solid surface in contact as the fluid-pressure does not exist everywhere in a still fluid.

Statement II: Excess potential energy of the molecules on the surface of a liquid, when compared to interior, results in surface tension.

In the light of the above statements, choose the **correct** answer from the options given below

- Options
1. Both Statement I and Statement II are true
 2. Statement I is true but Statement II is false
 3. Both Statement I and Statement II are false
 4. Statement I is false but Statement II is true

Question Type : MCQ

Question ID : 444792183

Option 1 ID : 444792624

Option 2 ID : 444792626

Option 3 ID : 444792625

Option 4 ID : 444792627

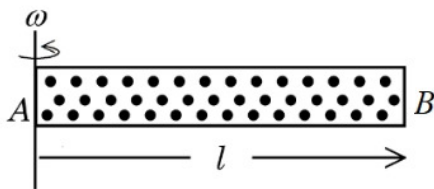
Status : Answered

Chosen Option : 4

Q.37

A cylindrical tube AB of length l , closed at both ends contains an ideal gas of 1 mol having molecular weight M . The tube is rotated in a horizontal plane with constant angular velocity ω about an axis perpendicular to AB and passing through the edge at end A , as shown in the figure. If P_A and P_B are the pressures at A and B respectively, then

(Consider the temperature is same at all points in the tube)



- Options
1. $P_B = P_A \exp(M\omega^2 l^2 / 3RT)$
 2. $P_B = P_A \exp(M\omega^2 l^2 / RT)$
 3. $P_B = P_A$
 4. $P_B = P_A \exp(M\omega^2 l^2 / 2RT)$

Question Type : MCQ

Question ID : 444792184

Option 1 ID : 444792630

Option 2 ID : 444792631

Option 3 ID : 444792628

Option 4 ID : 444792629

Status : Answered

Chosen Option : 3

Q.32 The volume of an ideal gas increases 8 times and temperature becomes $(1/4)^{\text{th}}$ of initial temperature during a reversible change. If there is no exchange of heat in this process ($\Delta Q = 0$) then identify the gas from the following options (Assuming the gases given in the options are ideal gases):

- Options
1. CO_2
 2. He
 3. O_2
 4. NH_3

Question Type : MCQ

Question ID : 444792185

Option 1 ID : 444792635

Option 2 ID : 444792634

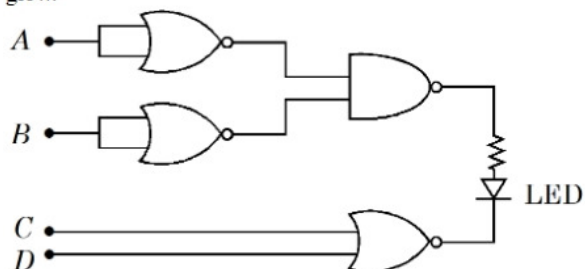
Option 3 ID : 444792633

Option 4 ID : 444792632

Status : Answered

Chosen Option : 2

Q.33 Find the correct combination of A, B, C and D inputs which can cause the LED to glow.



- Options
1. 0100
 2. 1101
 3. 1000
 4. 0011

Question Type : MCQ

Question ID : 444792195

Option 1 ID : 444792674

Option 2 ID : 444792673

Option 3 ID : 444792675

Option 4 ID : 444792672

Status : Answered

Chosen Option : 3

~~Q.34~~ A projectile is thrown upward at an angle 60° with the horizontal. The speed of the projectile is 20 m/s when its direction of motion is 45° with the horizontal. The initial speed of the projectile is _____ m/s.

Options 1. 40

2. $20\sqrt{2}$

3. $20\sqrt{3}$

4. $40\sqrt{2}$

Question Type : MCQ

Question ID : 444792179

Option 1 ID : 444792608

Option 2 ID : 444792610

Option 3 ID : 444792611

Option 4 ID : 444792609

Status : Answered

Chosen Option : 3

Q.35 The minimum frequency of photon required to break a particle of mass 15.348 amu into 4 α particles is _____ kHz.

[mass of He nucleus = 4.002 amu, 1 amu = 1.66×10^{-27} kg, $h = 6.6 \times 10^{-34}$ J.s and $c = 3 \times 10^8$ m/s]

Options 1. 9×10^{19}

2. 14.94×10^{19}

3. 14.94×10^{20}

4. 9×10^{20}

Question Type : MCQ

Question ID : 444792194

Option 1 ID : 444792671

Option 2 ID : 444792669

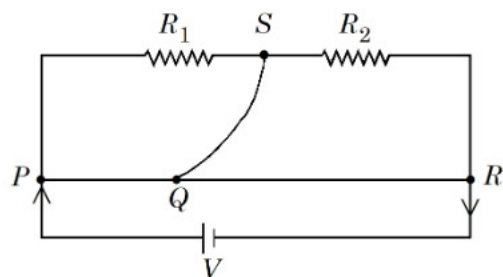
Option 3 ID : 444792670

Option 4 ID : 444792668

Status : Not Answered

Chosen Option : --

Q.36 A meter bridge with two resistances R_1 and R_2 as shown in figure was balanced (null point) at 40 cm from the point P . The null point changed to 50 cm from the point P , when $16\ \Omega$ resistance is connected in parallel to R_2 . The values of resistances R_1 and R_2 are _____.



Options

1. $R_2 = 8\ \Omega$, $R_1 = \frac{16}{3}\ \Omega$
2. $R_2 = 12\ \Omega$, $R_1 = \frac{12}{3}\ \Omega$
3. $R_2 = 4\ \Omega$, $R_1 = \frac{4}{3}\ \Omega$
4. $R_2 = 16\ \Omega$, $R_1 = \frac{16}{3}\ \Omega$

Question Type : MCQ

Question ID : 444792177

Option 1 ID : 444792601

Option 2 ID : 444792602

Option 3 ID : 444792600

Option 4 ID : 444792603

Status : Answered

Chosen Option : 1

Q.37 A simple pendulum has a bob with mass m and charge q . The pendulum string has negligible mass. When a uniform and horizontal electric field \vec{E} is applied, the tension in the string changes. The final tension in the string, when pendulum attains an equilibrium position is _____.
(g : acceleration due to gravity)

- Options
1. $\sqrt{m^2 g^2 + q^2 E^2}$
 2. $mg + qE$
 3. $mg - qE$
 4. $\sqrt{m^2 g^2 - q^2 E^2}$

Question Type : MCQ

Question ID : 444792188

Option 1 ID : 444792645

Option 2 ID : 444792644

Option 3 ID : 444792646

Option 4 ID : 444792647

Status : Not Answered

Chosen Option : --

Q.38 A solid sphere of mass 5 kg and radius 10 cm is kept in contact with another solid sphere of mass 10 kg and radius 20 cm. The moment of inertia of this pair of spheres about the tangent passing through the point of contact is _____ kg.m^2 .

- Options
1. 0.72
 2. 0.63
 3. 0.36
 4. 0.18

Question Type : MCQ

Question ID : 444792181

Option 1 ID : 444792619

Option 2 ID : 444792616

Option 3 ID : 444792618

Option 4 ID : 444792617

Status : Not Answered

Chosen Option : --

Q.39 The escape velocity from a spherical planet A is 10 km/s . The escape velocity from another planet B whose density and radius are 10% of those of planet A , is _____ m/s .

- Options
1. $200\sqrt{5}$
 2. $100\sqrt{10}$
 3. $1000\sqrt{2}$
 4. 1000

Question Type : **MCQ**

Question ID : **444792178**

Option 1 ID : **444792607**

Option 2 ID : **444792606**

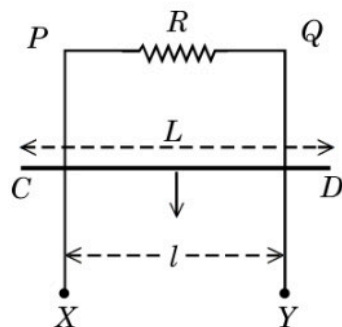
Option 3 ID : **444792605**

Option 4 ID : **444792604**

Status : **Answered**

Chosen Option : **2**

Q.40 $XPQY$ is a vertical smooth long loop having a total resistance R where PX is parallel to QY and separation between them is l . A constant magnetic field B perpendicular to the plane of the loop exists in the entire space. A rod CD of length L ($L > l$) and mass m is made to slide down from rest under the gravity as shown in figure. The terminal speed acquired by the rod is _____ m/s. (g = acceleration due to gravity)



Options

1. $\frac{mgR}{B^2 l^2}$
2. $\frac{2mgR}{B^2 l^2}$
3. $\frac{2mgR}{B^2 L^2}$
4. $\frac{8mgR}{B^2 l^2}$

Question Type : MCQ

Question ID : 444792186

Option 1 ID : 444792636

Option 2 ID : 444792637

Option 3 ID : 444792638

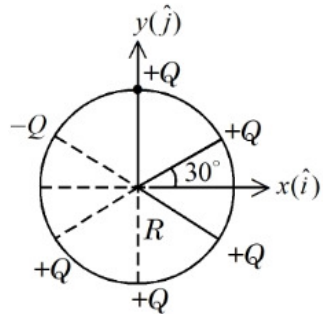
Option 4 ID : 444792639

Status : Answered

Chosen Option : 3

Q.41 Six point charges are kept 60° apart from each other on the circumference of a circle of radius R as shown in figure. The net electric field at the center of the circle is _____.

(ϵ_0 is permittivity of free space)



Options

1. $-\left(\frac{5Q}{8\pi\epsilon_0 R^2}\right)(\hat{i} - 3\hat{j})$
2. $-\frac{5Q}{8\pi\epsilon_0 R^2}(\hat{i} + \sqrt{3}\hat{j})$
3. $\frac{Q}{4\pi\epsilon_0 R^2}(\sqrt{3}\hat{i} - \hat{j})$
4. $-\frac{Q}{4\pi\epsilon_0 R^2}(\sqrt{3}\hat{i} - \hat{j})$

Question Type : MCQ

Question ID : 444792187

Option 1 ID : 444792641

Option 2 ID : 444792640

Option 3 ID : 444792643

Option 4 ID : 444792642

Status : Answered

Chosen Option : 2

Q.42 Three identical coils C_1 , C_2 and C_3 are closely placed such that they share a common axis. C_2 is exactly midway. C_1 carries current I in anti-clockwise direction while C_3 carries current I in clockwise direction. An induced current flows through C_2 will be in clockwise direction when

- Options
1. C_1 and C_3 move with equal speeds away from C_2
 2. C_1 moves towards C_2 and C_3 moves away from C_2
 3. C_1 and C_3 move with equal speeds towards C_2
 4. C_1 moves away from C_2 and C_3 moves towards C_2

Question Type : MCQ

Question ID : 444792190

Option 1 ID : 444792653

Option 2 ID : 444792654

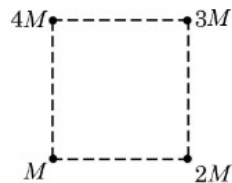
Option 3 ID : 444792652

Option 4 ID : 444792655

Status : Answered

Chosen Option : 4

Q.43 Net gravitational force at the center of a square is found to be F_1 when four particles having mass M , $2M$, $3M$ and $4M$ are placed at the four corners of the square as shown in figure and it is F_2 when the positions of $3M$ and $4M$ are interchanged. The ratio $\frac{F_1}{F_2}$ is $\frac{\alpha}{\sqrt{5}}$. The value of α is _____.



- Options
1. 3
 2. $2\sqrt{5}$
 3. 1
 4. 2

Question Type : MCQ

Question ID : 444792180

Option 1 ID : 444792615

Option 2 ID : 444792614

Option 3 ID : 444792612

Option 4 ID : 444792613

Status : Answered

Chosen Option : 2

Q.44 Consider an equilateral prism (refractive index $\sqrt{2}$). A ray of light is incident on its one surface at a certain angle i . If the emergent ray is found to graze along the other surface then the angle of refraction at the incident surface is close to _____.

- Options
1. 15°
 2. 30°
 3. 40°
 4. 20°

Question Type : MCQ

Question ID : 444792192

Option 1 ID : 444792660

Option 2 ID : 444792661

Option 3 ID : 444792663

Option 4 ID : 444792662

Status : Answered

Chosen Option : 3

Q.45 A thin convex lens of focal length 5 cm and a thin concave lens of focal length 4 cm are combined together (without any gap) and this combination has magnification m_1 when an object is placed 10 cm before the convex lens. Keeping the positions of convex lens and object undisturbed a gap of 1 cm is introduced between the lenses by moving the concave lens away, which lead to a change in

magnification of total lens system to m_2 . The value of $\left| \frac{m_1}{m_2} \right|$ is _____.

- Options
1. $\frac{3}{2}$
 2. $\frac{5}{27}$
 3. $\frac{5}{9}$
 4. $\frac{25}{27}$

Question Type : MCQ

Question ID : 444792191

Option 1 ID : 444792659

Option 2 ID : 444792658

Option 3 ID : 444792656

Option 4 ID : 444792657

Status : Answered

Chosen Option : 2

Q.46 Inductance of a coil with 10^4 turns is 10 mH and it is connected to a dc source of 10 V with internal resistance of $10\ \Omega$. The energy density in the inductor when the current reaches $\left(\frac{1}{e}\right)$ of its maximum value is $\alpha\pi \times \frac{1}{e^2}\ \text{J/m}^3$. The value of α is _____.

$(\mu_0 = 4\pi \times 10^{-7}\ \text{Tm/A}).$

Given --
Answer :

Question Type : SA
Question ID : 444792198
Status : Not Answered

Q.47 A circular disc has radius R_1 and thickness T_1 . Another circular disc made of the same material has radius R_2 and thickness T_2 . If the moment of inertia of both discs are same and $\frac{R_1}{R_2} = 2$ then $\frac{T_1}{T_2} = \frac{1}{\alpha}$. The value of α is _____.

Given 2
Answer :

Question Type : SA
Question ID : 444792196
Status : Answered

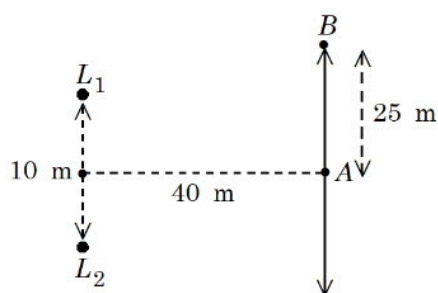
Q.48 A parallel beam of light travelling in air (refractive index 1.0) is incident on a convex spherical glass surface of radius of curvature 50 cm. Refractive index of glass is 1.5. The rays converge to a point at a distance x cm from the centre of the curvature of the spherical surface. The value of x is _____ cm.

Given 25
Answer :

Question Type : SA
Question ID : 444792200
Status : Answered

Q.49

Two loudspeakers (L_1 and L_2) are placed with a separation of 10 m, as shown in figure. Both speakers are fed with an audio input signal of same frequency with constant volume. A voice recorder, initially at point A , at equidistance to both loud speakers, is moved by 25 m along the line AB while monitoring the audio signal. The measured signal was found to undergo 10 cycles of minima and maxima during the movement. The frequency of the input signal is _____ Hz (Speed of sound in air is 324 m/s and $\sqrt{5} = 2.23$)



Given --

Answer :

Question Type : SA

Question ID : 444792197

Status : Not Answered

Q.50

The electric field of a plane electromagnetic wave, travelling in an unknown non-magnetic medium is given by,

$$E_y = 20 \sin(3 \times 10^6 x - 4.5 \times 10^{14} t) \text{ V/m}$$

(where x , t and other values have S.I. units). The dielectric constant of the medium is _____

(speed of light in free space is 3×10^8 m/s)

Given --

Answer :

Question Type : SA

Question ID : 444792199

Status : Not Answered

~~Q.51~~ Two p-block elements X and Y form fluorides of the type EF_3 . The fluoride compound XF_3 is a Lewis acid and YF_3 is a Lewis base. The hybridizations of the central atoms of XF_3 and YF_3 respectively are

- Options
1. Both sp^2
 2. sp^2 and sp^3
 3. sp^3 and sp^2
 4. Both sp^3

Question Type : MCQ

Question ID : 444792209

Option 1 ID : 444792713

Option 2 ID : 444792716

Option 3 ID : 444792715

Option 4 ID : 444792714

Status : Answered

Chosen Option : 3

~~Q.52~~ The correct order of reactivity of CH_3Br in methanol with the following nucleophiles is

F^- , I^- , $C_2H_5O^-$ and $C_6H_5O^-$

- Options
1. $I^- > C_2H_5O^- > F^- > C_6H_5O^-$
 2. $I^- > C_2H_5O^- > C_6H_5O^- > F^-$
 3. $I^- > C_6H_5O^- > F^- > C_2H_5O^-$
 4. $I^- > F^- > C_6H_5O^- > C_2H_5O^-$

Question Type : MCQ

Question ID : 444792214

Option 1 ID : 444792736

Option 2 ID : 444792735

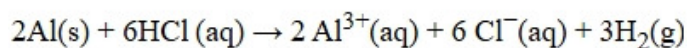
Option 3 ID : 444792734

Option 4 ID : 444792733

Status : Answered

Chosen Option : 4

Q53 In the reaction,



Options 1. 12 L HCl(aq) is consumed for every 6L H₂(g) produced.

2.

33.6 L H₂(g) is produced regardless of temperature and pressure for every mole of Al that reacts.

3. 67.2 L H₂(g) at STP is produced for every mole of Al that reacts.

4. 11.2 L H₂(g) at STP is produced for every mole of HCl consumed.

Question Type : MCQ

Question ID : 444792201

Option 1 ID : 444792681

Option 2 ID : 444792682

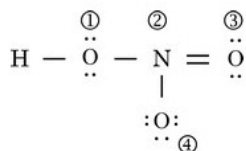
Option 3 ID : 444792683

Option 4 ID : 444792684

Status : Answered

Chosen Option : 1

Q54 The formal charges on the atoms marked as (1) to (4) in the Lewis representation of HNO₃ molecule respectively are



Options 1. 0, -1, 0, +1

2. +1, 0, 0, -1

3. 0, +1, 0, -1

4. 0, 0, -1, +1

Question Type : MCQ

Question ID : 444792203

Option 1 ID : 444792690

Option 2 ID : 444792692

Option 3 ID : 444792689

Option 4 ID : 444792691

Status : Answered

Chosen Option : 1

Q.55 Match the **LIST-I** with **LIST-II**

List-I Reagents		List-II Name of Reaction involving carbonyl compounds	
A.	$\text{NH}_2 - \text{NH}_2$, KOH	I.	Tollen's Test
B.	$\text{Ag}(\text{NH}_3)_2\text{OH}$	II.	Clemmensen Reduction
C.	Aq. CuSO_4 , Sodium Potassium tartarate, KOH	III.	Wolff - Kishner Reduction
D.	Zn - Hg, HCl	IV.	Fehling's Test

Choose the *correct* answer from the options given below:

Options 1. A-IV, B-III, C-II, D-I

2. A-III, B-IV, C-I, D-II

3. A-III, B-I, C-IV, D-II

4. A-II, B-I, C-IV, D-III

Question Type : MCQ

Question ID : 444792218

Option 1 ID : 444792749

Option 2 ID : 444792752

Option 3 ID : 444792750

Option 4 ID : 444792751

Status : Answered

Chosen Option : 3

Q.56 Given below are two statements:

Statement I: The Henry's law constant K_H is constant with respect to variations in solution's concentration over the range for which the solution is ideally dilute.

Statement II: K_H does not differ for the same solute in different solvents.

In the light of the above statements, choose the *correct* answer from the options given below

- Options
1. Both Statement I and Statement II are false
 2. Statement I is true but Statement II is false
 3. Both Statement I and Statement II are true
 4. Statement I is false but Statement II is true

Question Type : MCQ

Question ID : 444792205

Option 1 ID : 444792698

Option 2 ID : 444792699

Option 3 ID : 444792697

Option 4 ID : 444792700

Status : Answered

Chosen Option : 3

Q.57 Given below are two statements:

Statement I: Phenol on treatment with $\text{CHCl}_3/\text{aq. KOH}$ under refluxing condition, followed by acidification produces *p*-hydroxy benzaldehyde as the major product and *o*-hydroxy benzaldehyde as the minor product.

Statement II: The mixture of *p*-hydroxybenzaldehyde and *o*-hydroxybenzaldehyde can be easily separated through steam distillation.

In the light of the above statements, choose the *correct* answer from the options given below

- Options
1. Statement I is false but Statement II is true
 2. Statement I is true but Statement II is false
 3. Both Statement I and Statement II are true
 4. Both Statement I and Statement II are false

Question Type : MCQ

Question ID : 444792213

Option 1 ID : 444792732

Option 2 ID : 444792731

Option 3 ID : 444792729

Option 4 ID : 444792730

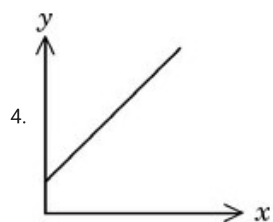
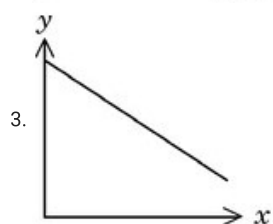
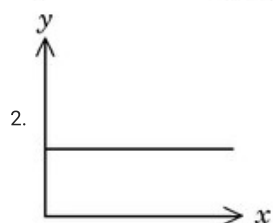
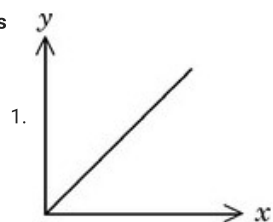
Status : Answered

Chosen Option : 1

Q.58 Consider a solution of $\text{CO}_2(\text{g})$ dissolved in water in a closed container.

Which one of the following plots correctly represents variation of \log (partial pressure of CO_2 in vapour phase above water) [y-axis] with \log (mole fraction of CO_2 in water) [x-axis] at 25°C ?

Options



Question Type : MCQ

Question ID : 444792206

Option 1 ID : 444792701

Option 2 ID : 444792704

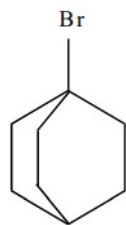
Option 3 ID : 444792702

Option 4 ID : 444792703

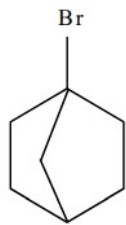
Status : Answered

Chosen Option : 4

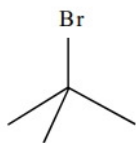
~~Q.59~~ The correct order of the rate of reaction of the following reactants with nucleophile by S_N1 mechanism is :
(Given : Structures I and II are rigid)



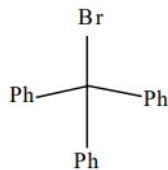
(I)



(II)



(III)



(IV)

- Options
1. $I < II < III < IV$
 2. $IV < III < II < I$
 3. $III < I < II < IV$
 4. $II < I < III < IV$

Question Type : MCQ

Question ID : 444792216

Option 1 ID : 444792742

Option 2 ID : 444792743

Option 3 ID : 444792741

Option 4 ID : 444792744

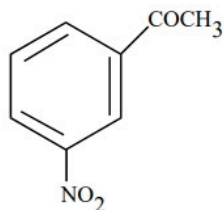
Status : Answered

Chosen Option : 2

Q.60 Given below are two statements:

Statement I: Benzene is nitrated to give nitrobenzene, which on further treatment

with $\text{CH}_3\text{COCl} / \text{AlCl}_3$ will give



Statement II: $-\text{NO}_2$ group is a *m*-directing, and deactivating group.

In the light of the above statements, choose the **most appropriate** answer from the options given below

- Options
1. Both Statement I and Statement II are incorrect
 2. Statement I is correct but Statement II is incorrect
 3. Both Statement I and Statement II are correct
 4. Statement I is incorrect but Statement II is correct

Question Type : MCQ

Question ID : 444792215

Option 1 ID : 444792738

Option 2 ID : 444792739

Option 3 ID : 444792737

Option 4 ID : 444792740

Status : Not Answered

Chosen Option : --

Q.61 Given below are two statements:

Statement I: Sucrose is dextrorotatory. However, sucrose upon hydrolysis gives a solution having mixture of products. This solution shows laevorotation.

Statement II: Hydrolysis of sucrose gives glucose and fructose. Since the laevorotation of glucose is more than the dextrorotation of fructose, the resulting solution becomes laevorotatory.

In the light of the above statements, choose the *correct* answer from the options given below

- Options
1. Both Statement I and Statement II are false
 2. Both Statement I and Statement II are true
 3. Statement I is false but Statement II is true
 4. Statement I is true but Statement II is false

Question Type : MCQ

Question ID : 444792220

Option 1 ID : 444792758

Option 2 ID : 444792757

Option 3 ID : 444792760

Option 4 ID : 444792759

Status : Not Answered

Chosen Option : --

Q.62 $A \rightarrow \text{product}$ (First order reaction).

Three sets of experiment were performed for a reaction under similar experimental conditions:

Run 1 \Rightarrow 100 mL of 10 M solution of reactant A

Run 2 \Rightarrow 200 mL of 10 M solution of reactant A

Run 3 \Rightarrow 100 mL of 10 M solution of reactant A + 100 mL of H_2O added.

The correct variation of rate of reaction is

- Options
1. Run 3 < Run 1 = Run 2
 2. Run 1 = Run 2 = Run 3
 3. Run 1 < Run 2 < Run 3
 4. Run 3 < Run 1 < Run 2

Question Type : MCQ

Question ID : 444792208

Option 1 ID : 444792710

Option 2 ID : 444792709

Option 3 ID : 444792712

Option 4 ID : 444792711

Status : Answered

Chosen Option : 1

Q.63 Given below are two statements:

Statement I: The halogen that makes longest bond with hydrogen in HX, has the smallest covalent radius in its group.

Statement II: A group 15 element's hydride EH_3 has the lowest boiling point among corresponding hydrides of other group 15 elements. The maximum covalency of that element E is 4.

In the light of the above statements, choose the *correct* answer from the options given below

- Options
1. Both Statement I and Statement II are true
 2. Both Statement I and Statement II are false
 3. Statement I is false but Statement II is true
 4. Statement I is true but Statement II is false

Question Type : MCQ

Question ID : 444792210

Option 1 ID : 444792717

Option 2 ID : 444792718

Option 3 ID : 444792720

Option 4 ID : 444792719

Status : Answered

Chosen Option : 3

Q.64 The energy required by electrons, present in the first Bohr orbit of hydrogen atom to be excited to second Bohr orbit is _____ J mol^{-1} .

Given: $R_H = 2.18 \times 10^{-11}$ ergs.

- Options
1. 1.635×10^{-18}
 2. 9.835×10^{12}
 3. 9.835×10^5
 4. 1.635×10^{-11}

Question Type : MCQ

Question ID : 444792202

Option 1 ID : 444792688

Option 2 ID : 444792687

Option 3 ID : 444792686

Option 4 ID : 444792685

Status : Answered

Chosen Option : 4

Q.65

Match the LIST-I with LIST-II

List-I		List-II	
Thermodynamic Process		Magnitude in kJ	
A.	Work done in reversible, isothermal expansion of 2 mol of ideal gas from 2 dm^3 to 20 dm^3 at 300 K.	I.	4
B.	Work done in irreversible isothermal expansion of 1 mol ideal gas from 1 m^3 to 3 m^3 at 300 K against a constant pressure of 3kPa.	II.	11.5
C.	Change in internal energy for adiabatic expansion of a 1 mol ideal gas with change of temperature = 320 K and $\bar{C}_V = \frac{3}{2} R$.	III.	6
D.	Change in enthalpy at constant pressure of 1 mol ideal gas with change of temperature = 337 K and $\bar{C}_p = \frac{5}{2} R$.	IV.	7

Choose the *correct* answer from the options given below:

Options 1. A-II, B-III, C-I, D-IV

2. A-III, B-II, C-IV, D-I

3. A-II, B-I, C-III, D-IV

4. A-I, B-II, C-III, D-IV

Question Type : MCQ

Question ID : 444792204

Option 1 ID : 444792693

Option 2 ID : 444792696

Option 3 ID : 444792694

Option 4 ID : 444792695

Status : Answered

Chosen Option : 3

~~Q.60~~ As compared with chlorocyclohexane, which of the following statements correctly apply to chlorobenzene?

- A. The magnitude of negative charge is more on chlorine atom.
- B. The C – Cl bond has partial double bond character.
- C. C – Cl bond is less polar.
- D. C – Cl bond is longer due to repulsion between delocalised electrons of the aromatic ring and lone pairs of electrons of chlorine.
- E. The C – Cl bond is formed using sp^2 hybridised orbital of carbon.

Choose the correct answer from the options given below:

- Options
1. B, C and D Only
 2. B, C and E Only
 3. A, D and E Only
 4. A, C and E Only

Question Type : MCQ

Question ID : 444792217

Option 1 ID : 444792747

Option 2 ID : 444792745

Option 3 ID : 444792746

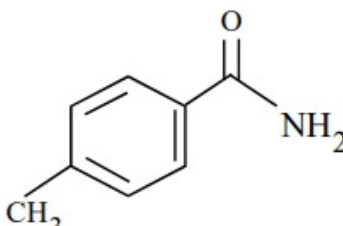
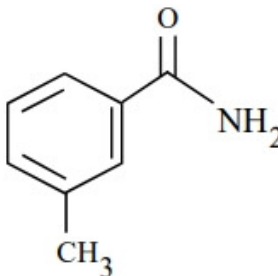
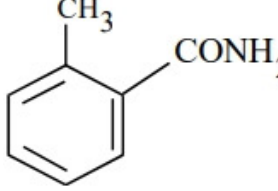
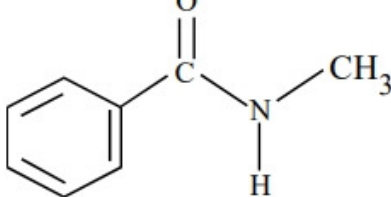
Option 4 ID : 444792748

Status : Answered

Chosen Option : 3

Q.67. 'A' is a neutral organic compound (M. F : C_8H_9ON). On treatment with aqueous $Br_2/HO^{(-)}$, 'A' forms a compound 'B' which is soluble in dilute acid. 'B' on treatment with aqueous $NaNO_2 / HCl$ ($0-5^\circ C$) produces a compound 'C' which on treatment with $CuCN/NaCN$ produces 'D'. Hydrolysis of 'D' produces 'E' which is also obtainable from the hydrolysis of 'A'. 'E' on treatment with acidified $KMnO_4$ produces 'F'. 'F' contains two different types of hydrogen atoms. The structure of 'A' is

Options

1. 
2. 
3. 
4. 

Question Type : MCQ

Question ID : 444792219

Option 1 ID : 444792754

Option 2 ID : 444792756

Option 3 ID : 444792755

Option 4 ID : 444792753

Status : Answered

Chosen Option : 4

Q.68 A 'p'-block element (E) and hydrogen form a binary cation $(EH_x)^+$, while EH_3 on treatment with K_2HgI_4 in alkaline medium gives a precipitate of basic mercury(II)amido-iodine. Given below are first ionisation enthalpy values ($kJ\ mol^{-1}$) for first element each from group 13, 14, 15 and 16. Identify the correct first ionisation enthalpy value for element E.

- Options
1. 1402
 2. 1312
 3. 801
 4. 1086

Question Type : MCQ

Question ID : 444792207

Option 1 ID : 444792707

Option 2 ID : 444792708

Option 3 ID : 444792705

Option 4 ID : 444792706

Status : Not Answered

Chosen Option : --

~~**Q.69**~~ A first row transition metal (M) does not liberate H_2 gas from dilute HCl. 1 mol of aqueous solution of MSO_4 is treated with excess of aqueous KCN and then $H_2S(g)$ is passed through the solution. The amount of MS (metal sulphide) formed from the above reaction is _____ mol.

- Options
1. 2
 2. 3
 3. 1
 4. 0

Question Type : MCQ

Question ID : 444792211

Option 1 ID : 444792722

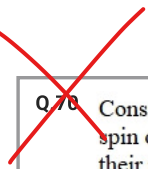
Option 2 ID : 444792721

Option 3 ID : 444792724

Option 4 ID : 444792723

Status : Answered

Chosen Option : 3

 Q.70 Consider the transition metal ions Mn^{3+} , Cr^{3+} , Fe^{3+} and Co^{3+} and all form low spin octahedral complexes. The correct decreasing order of unpaired electrons in their respective d-orbitals of the complexes is

- Options
1. $\text{Cr}^{3+} > \text{Fe}^{3+} > \text{Co}^{3+} > \text{Mn}^{3+}$
 2. $\text{Mn}^{3+} > \text{Fe}^{3+} > \text{Co}^{3+} > \text{Cr}^{3+}$
 3. $\text{Cr}^{3+} > \text{Mn}^{3+} > \text{Fe}^{3+} > \text{Co}^{3+}$
 4. $\text{Fe}^{3+} > \text{Co}^{3+} > \text{Mn}^{3+} > \text{Cr}^{3+}$

Question Type : MCQ

Question ID : 444792212

Option 1 ID : 444792725

Option 2 ID : 444792726

Option 3 ID : 444792728

Option 4 ID : 444792727

Status : Answered

Chosen Option : 1

Section : Chemistry Section B

Q.71 The cycloalkene (X) on bromination consumes one mole of bromine per mole of (X) and gives the product (Y) in which C:Br ratio is 3:1. The percentage of bromine in the product (Y) is _____. (Nearest integer)


(Given : molar mass in g mol^{-1} H : 1, C : 12, O : 16, Br : 80)

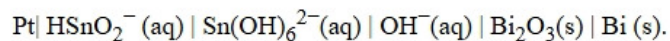
Given --
Answer :

Question Type : SA

Question ID : 444792224

Status : Not Answered

 Q.72 Consider the following electrochemical cell at 298K



If the reaction quotient at a given time is 10^6 , then the cell EMF (E_{cell}) is _____ $\times 10^{-1}$ V (Nearest integer).

Given the standard half-cell reduction potential as

$$E^\circ_{\text{Bi}_2\text{O}_3/\text{Bi}, \text{OH}^-} = -0.44 \text{ V} \text{ and } E^\circ_{\text{Sn}(\text{OH})_6^{2-}/\text{HSnO}_2^-, \text{OH}^-} = -0.90 \text{ V}$$

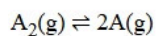
Given 4
Answer :

Question Type : SA

Question ID : 444792222

Status : Answered

- Q.73** Dissociation of a gas A_2 takes place according to the following chemical reaction.
At equilibrium, the total pressure is 1 bar at 300K.



The standard Gibbs energy of formation of the involved substances has been provided below:

Substance	$\Delta G_f^\circ / \text{kJ mol}^{-1}$
A_2	-100.00
A	-50.832

The degree of dissociation of $A_2(g)$ is given by $(x \times 10^{-2})^{1/2}$ where $x =$ _____. (Nearest integer).

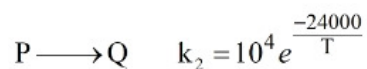
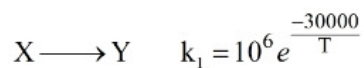
[Given: $R = 8 \text{ J mol}^{-1} \text{ K}^{-1}$, $\log 2 = 0.3010$, $\log 3 = 0.48$]

Assume degree of dissociation is not negligible.

Given --
Answer :

Question Type : SA
Question ID : 444792221
Status : Not Answered

- Q.74** The temperature at which the rate constants of the given below two gaseous reactions become equal is _____ K. (Nearest integer)



Given: $\ln 10 = 2.303$

Given --
Answer :

Question Type : SA
Question ID : 444792223
Status : Not Answered

Q.75 Sodium fusion extract of an organic compound (Y) with CHCl_3 and chlorine water gives violet color to the CHCl_3 layer. 0.15g of (Y) gave 0.12 g of the silver halide precipitate in Carius method. Percentage of halogen in the compound (Y) is _____. (Nearest integer)

(Given : molar mass g mol^{-1} C : 12, H : 1, Cl : 35.5, Br : 80, I : 127)

Given --

Answer :

Question Type : **SA**

Question ID : **444792225**

Status : **Not Answered**