Question Number : 1  Question Id : 1017174641  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Let \( f: A \rightarrow B \) and \( g: B \rightarrow C \) be any two functions and \( gof: A \rightarrow C \) is one-one, then

\[ f: A \rightarrow B, \quad g: B \rightarrow C \text{ are both one-one}, \quad gof: A \rightarrow C \text{ is one-one}. \]

**Options:**

1. \( f, g \) are both one-one
2. \( f \) is one-one and \( g \) need not be one-one
3. \( g \) is one-one and \( f \) need not be one-one
4. both \( f, g \) need not be one-one

Question Number : 2  Question Id : 1017174642  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Match the following

<table>
<thead>
<tr>
<th>Function</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) ( x - \lfloor x \rfloor, (x \in \mathbb{R}) )</td>
<td>a) ([0, 2])</td>
</tr>
<tr>
<td>ii) ( \sqrt{4 - x^2}, (</td>
<td>x</td>
</tr>
<tr>
<td>iii) ( \frac{1}{2 - \cos 3x}, (x \in \mathbb{R}) )</td>
<td>c) ([-1, 9])</td>
</tr>
<tr>
<td>iv) ( 3\sin x - 4\cos x + 4, (x \in \mathbb{R}) )</td>
<td>d) ([0, 1])</td>
</tr>
</tbody>
</table>

Options:
1. i) \( \rightarrow \) d \( ii) \rightarrow \) b \( iii) \rightarrow \) a \( iv) \rightarrow \) c
2. i) \( \rightarrow \) a \( ii) \rightarrow \) d \( iii) \rightarrow \) c \( iv) \rightarrow \) b
3. i) \( \rightarrow \) d \( ii) \rightarrow \) a \( iii) \rightarrow \) c \( iv) \rightarrow \) b
4. i) \( \rightarrow \) d \( ii) \rightarrow \) a \( iii) \rightarrow \) b \( iv) \rightarrow \) c

Question Number : 3 Question Id : 1017174643 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For any integer \( n \geq 1 \), the remainder when the expression \( n^5 - 5n^3 + 4n + 139 \) is divided by 120 is

\[ \text{\( \frac{n^5 - 5n^3 + 4n + 139}{120} \)} \]

Options:
1. 9
2. 19
3. 29
4. 39
If $\alpha = \cos \frac{\pi}{3} + i \sin \frac{\pi}{3}$ then the value of the determinant \[
\begin{vmatrix}
1 & \alpha & \alpha^2 \\
\alpha^2 & 1 & \alpha \\
\alpha & \alpha^2 & 1
\end{vmatrix}
\]
is

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

Question Number: 5  Question Id: 1017174645  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

The values of $\lambda$ and $\mu$ for which the system of equations

\[x + y + z = 6, \ x + 2y + 3z = 10, \ x + 2y + \lambda z = \mu\]

has infinitely many solutions are

\[x + y + z = 6, \ x + 2y + 3z = 10, \ x + 2y + \lambda z = \mu\]

Options:
1. $\lambda = 3, \mu = 7$
2. $\lambda = 3, \mu = 10$
3. $\lambda = 3, \mu = 10$
4. $\lambda = 3, \mu \neq 10$

Question Number: 6  Question Id: 1017174646  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical
If \( A = \begin{bmatrix} -2 & 1 \\ 3 & 4 \end{bmatrix} \) and \( A = P + Q \), where \( P \) is symmetric matrix and \( Q \) is Skew-Symmetric matrix; then \( Q \) is

\[
A = \begin{bmatrix} -2 & 1 \\ 3 & 4 \end{bmatrix} = P + Q
\]

Options:
1. \( \begin{bmatrix} 0 & -2 \\ 2 & 0 \end{bmatrix} \)
2. \( \begin{bmatrix} 0 & 2 \\ -2 & 0 \end{bmatrix} \)
3. \( \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \)
4. \( \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} \)

The points \( P, Q \) denote the complex numbers \( Z_1, Z_2 \) in the Argand plane. 'O' is the origin. If \( Z_1 \overline{Z}_2 + \overline{Z}_1 Z_2 = 0 \) and \( \overline{POQ} = \theta \) then \( \sin \theta = \)

Options:
1. \( \frac{1}{2} \)
2. \( \sqrt{3} \)
3. \( \frac{2}{3} \)
4. \( \frac{1}{\sqrt{2}} \)

Question Number : 8 Question Id : 1017174648 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical
If \( Z \neq 0 \) is a complex number such that \( Z^2 + Z|Z| + |Z|^2 = 0 \) then \( Z \) is in the set 
(Here \( \omega \) is a complex cube root of unity)

\[
\omega + \omega^2 + \omega^3 = 0 \quad \text{and} \quad |\omega + \omega^2 + \omega^3| = 0
\]

Options:
1. \( \{1\} \)
2. \( \{i, -i\} \)
3. \( \{\omega, \omega^2\} \)
4. \( \emptyset \)

Question Number : 9  Question Id : 1017174649  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( z_1 = -\sqrt{3} + i \) and \( z_2 = -\sqrt{3} - i \) then the principal amplitude of the complex number \( \frac{z_1}{z_2} \) is

\[
z_1 = -\sqrt{3} + i \quad \text{and} \quad z_2 = -\sqrt{3} - i
\]

Options:
1. \( \frac{\pi}{3} \)
2. \( \frac{5\pi}{6} \)
3. \( -\frac{\pi}{3} \)
4. \( \frac{5\pi}{3} \)

Question Number : 10  Question Id : 1017174650  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
For a non real root $z$ of the equation $z^4 + z^2 + 1 = 0$, the value of

$$(z + \frac{1}{z})^3 + (z^2 + \frac{1}{z^2})^2 + (z^3 + \frac{1}{z^3})^3$$

is

$$z^4 + z^2 + 1 = 0$$

Options:

1. $-6$
2. $3$
3. $-8$
4. $8$

Question Number: 11  Question Id: 1017174651  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

Match the following

<table>
<thead>
<tr>
<th>Quadratic expression</th>
<th>The minimum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) $x^2 - 8x + 15$</td>
<td>a) $\frac{7}{2}$</td>
</tr>
<tr>
<td>ii) $x^2 - 8x + 17$</td>
<td>b) $-1$</td>
</tr>
<tr>
<td>iii) $2x^2 + 4x + 7$</td>
<td>c) $1$</td>
</tr>
<tr>
<td>iv) $\left(x + \frac{5}{3}\right)^2 + \frac{7}{2}$</td>
<td>d) $5$</td>
</tr>
</tbody>
</table>

Options:

1. i) $\rightarrow$ c  ii) $\rightarrow$ b  iii) $\rightarrow$ d  iv) $\rightarrow$ a
2. i) $\rightarrow$ a  ii) $\rightarrow$ c  iii) $\rightarrow$ d  iv) $\rightarrow$ b
3. i) $\rightarrow$ b  ii) $\rightarrow$ d  iii) $\rightarrow$ c  iv) $\rightarrow$ a
4.

If \( f : [1, 2] \rightarrow \mathbb{R} \) defined by \( f(x) = x^2 + 2kx + k \) is always negative then the interval in which \( k \) lies is

\[ f : [1, 2] \rightarrow \mathbb{R} \text{ as } f(x) = x^2 + 2kx + k \text{ is always negative, so } k \text{ must lie in } k \in (-\infty, \frac{4}{5}) \]

Options:

1. \( \left( \frac{4}{5}, \infty \right) \)
2. \( (-\infty, \frac{4}{5}) \)
3. \( \left( -\infty, \frac{4}{5} \right) \)
4. \( \left( \frac{4}{5}, \infty \right) \)

Question Number : 13  Question Id : 1017174653  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If one root of \( x^3 - 7x^2 + 36 = 0 \) is twice the other, then the sum of those two roots is

\[ x^3 - 7x^2 + 36 = 0 \text{ has } x = x \text{ and } x = 2x \text{ as roots. Therefore, } x + 2x = x + 2x = 3x \]

Options:

1. 6
2. 9
3. -9
4. 12

Question Number : 14  Question Id : 1017174654  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
If the roots of the equation \( x^3 + 3px^2 + 3qx - 8 = 0 \) are in an arithmetic progression then

\[
2p^3 - 3pq =
\]

Options:

1. 8
2. -8
3. 4
4. -4

Question Number: 15 Question Id: 1017174655 Display Question Number: Yes Single Line Question Option: No Option Orientation: Vertical

A question paper contains 4 questions each having 4 alternative answers. The number of ways that a candidate can answer one or more questions is

Options:

1. 255
2. 256
3. 624
4. 625

Question Number: 16 Question Id: 1017174656 Display Question Number: Yes Single Line Question Option: No Option Orientation: Vertical

If \((n-1) C_r = (k^2 - 3) \binom{n}{r+1}\), then an interval containing the values of \(k\), is

\[
(n-1) C_r = (k^2 - 3) \binom{n}{r+1}
\]

Options:

1. \((-\infty, -3]
2. \([-2, -\sqrt{3})
3. \([-\sqrt{3}, \sqrt{3}]
4. \([\sqrt{3}, \infty)

If the letters of the word “CAPITAL” are permuted in all possible ways and the words are arranged in a dictionary order, then the rank of the word “CAPITAL” is

Options :
1. 802
2. 803
3. 720
4. 712

The sum of the coefficients of the last 19 terms in the binomial expansion of \((1 + x)^{37}\) is

\((1 + x)^{37}\) యొక్క మూడవ స్థానానికి మధ్యమ సీలు ఎన్నికి మొత్తం 19 వ సీలు కాని సూత్రం ఉంటుంది

Options :
1. \(2^{36}\)
2. \(2^{37}\)
3. \(2^{38}\)
4. \(2^{36} - 1\)

If \(t_r\) is the \(r\)th term in the expansion of \((2^x + 4^{-x})^8\) and if \(t_3 = 7t_2\) then \(x =\)

\((2^x + 4^{-x})^8\) యొక్క \(r\) వ సీలు \(t_r\) అనే పదము, \(t_3 = 7t_2\) ఎంతా హోవిని \(x =\)

Options :

1. \(\frac{1}{2}\)
2. \(\frac{1}{4}\)
Question Number : 20  Question Id : 1017174660  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

\[
\frac{x^2 - 3x + 1}{(x-1)(x-2)(x-3)} = \frac{A}{x-3} + \frac{B}{(x-1)(x-2)} + \frac{C}{(x-1)(x-2)(x-3)} \quad \text{then } B =
\]

\[
\frac{x^2 - 3x + 1}{(x-1)(x-2)(x-3)} = \frac{A}{x-3} + \frac{B}{(x-1)(x-2)} + \frac{C}{(x-1)(x-2)(x-3)}
\]

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

Question Number : 21  Question Id : 1017174661  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

\[
\sin^4 \frac{\pi}{8} + \cos^4 \frac{\pi}{8} + \sin^4 \frac{3\pi}{8} + \cos^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \cos^4 \frac{5\pi}{8} + \sin^4 \frac{7\pi}{8} + \cos^4 \frac{7\pi}{8} =
\]

Options :
1. 3
2. 2
3. 4
4. 8

Question Number : 22  Question Id : 1017174662  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

\[
\cos 12^\circ + \cos 60^\circ + \cos 84^\circ + \cos 132^\circ + \cos 156^\circ =
\]

Options :
1. \(-\frac{1}{4}\)
2. \(-\frac{1}{2}\)
Question Number : 23  Question Id : 1017174663  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( \sin(270^\circ - x^\circ) = \cos 292^\circ \) then a value of \( x \) is

\[ \sin(270^\circ - x^\circ) = \cos 292^\circ \]

Options :
1. 120
2. 60
3. 113
4. 112

Question Number : 24  Question Id : 1017174664  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The range of \( \sin^{-1} x + \cos^{-1} x + \tan^{-1} x \) is

\[ \sin^{-1} x + \cos^{-1} x + \tan^{-1} x \]

Options :
1. \( \left(0, \frac{\pi}{2}\right)\)
2. \(0, \pi]\)
3. \(\left[\frac{\pi}{4}, \frac{3\pi}{4}\right]\)
4. \([0, \pi]\)

Question Number : 25  Question Id : 1017174665  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( \tanh^2 x = \tan^2 \theta \) then \( \cosh 2x = \)

\[ \tanh^2 x = \tan^2 \theta \]

\[ \cosh 2x = \]
Question Number : 26  Question Id : 1017174666  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

In ΔABC, if \(a:b:c = 4:5:6\), then \(\cos A : \cos B : \cos C =\)

\[Δ ABC \quad a:b:c = 4:5:6\]  
\[\therefore \quad \cos A : \cos B : \cos C =\]

Options :
1. 12:9:2
2. 6:5:4
3. 7:8:9
4. 14:11:6

Question Number : 27  Question Id : 1017174667  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

In a triangle ABC, if \(\tan \left(\frac{A - B}{2}\right) = \frac{1}{3} \tan \left(\frac{A + B}{2}\right)\) then \(a:b =\)

\[\triangle ABC \quad \tan \left(\frac{A - B}{2}\right) = \frac{1}{3} \tan \left(\frac{A + B}{2}\right)\]  
\[\therefore \quad a:b =\]

Options :
1. 2:1
2. 3:1
3. 4:1
4. 1:3

Question Number : 28  Question Id : 1017174668  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

In a triangle ABC if \(2r_1 = 3r_2 = r_3\) then \(a:b:c =\)

\[\triangle ABC \quad 2r_1 = 3r_2 = r_3\]  
\[\therefore \quad a:b:c =\]

Options :
In $\triangle ABC$, if $\text{``S''}$ is the circumcentre and $\text{``O''}$ is the orthocentre then $\overline{OA} + \overline{OB} + \overline{OC} =$

$\triangle ABC$ లో $\text{``S''}$ నియమిత సరైనది, $\text{``O''}$ నియమిత యోగ్య సరైనది $\overline{OA} + \overline{OB} + \overline{OC} =$

Options :
1. $2\left(\overline{AS} + \overline{BS} + \overline{CS}\right)$
2. $\overline{OS}$
3. $2\overline{SO}$
4. $\overline{SO}$

Let $\vec{a}, \vec{b}$ and $\vec{c}$ be non-coplanar vectors. If $P$, $Q$, $R$ and $S$ are four points with position vectors $-\vec{a} + 4\vec{b} - 3\vec{c}$, $3\vec{a} + 2\vec{b} - 5\vec{c}$, $-3\vec{a} + 8\vec{b} - 5\vec{c}$ and $-3\vec{a} + 2\vec{b} + \vec{c}$ respectively then the ordered pair $(x, y)$ of real numbers such that $\overrightarrow{PQ} = x \cdot \overrightarrow{PR} + y \cdot \overrightarrow{PS}$ is

$\vec{a}, \vec{b}, \vec{c}$ అనే నియమితాలు చాలా నియమిత కూర్పడలేదా. ప్రతి పంచే సమీకరణం $P$, $Q$, $R$, $S$ అనే యొక్క నియమిత కూర్పడలేదా

$\overrightarrow{PQ} = x \cdot \overrightarrow{PR} + y \cdot \overrightarrow{PS}$ అనే సమీకరణం చాలా నియమిత కూర్పడలేదా $(x, y)$

Options :
1. $(1, -1)$
2. $(-1, 1)$
3. $(-1, -1)$
4. $(1, 1)$
Let \( \overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c} \) be such that \( \overrightarrow{a} \neq \overrightarrow{0}, \overrightarrow{b} \neq \overrightarrow{0}, \overrightarrow{a} \times \overrightarrow{c} = \overrightarrow{b} \) and \( \overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{a} \). Then

\[ \overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c} \quad \text{and} \quad \overrightarrow{a} \neq \overrightarrow{0}, \overrightarrow{b} \neq \overrightarrow{0}, \overrightarrow{a} \times \overrightarrow{c} = \overrightarrow{b}, \overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{a} \]

Options:
1. \(|\overrightarrow{c}| = |\overrightarrow{b}|\)
2. \(|\overrightarrow{a}| = |\overrightarrow{c}|\)
3. \(|\overrightarrow{b}| = |\overrightarrow{a}|\)
4. \(\overrightarrow{c} = \overrightarrow{b}\)

Question Number: 32  Question Id: 1017174672  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

If \( \overrightarrow{a}, \overrightarrow{b}, \overrightarrow{c} \) are vectors such that \( |\overrightarrow{a}| = \frac{|\overrightarrow{b}|}{2} = \frac{|\overrightarrow{c}|}{3} = 1 \); \( \overrightarrow{b} \) and \( \overrightarrow{c} \) are perpendicular; and the projections of \( \overrightarrow{b} \) and \( \overrightarrow{c} \) on \( \overrightarrow{a} \) are equal then \( |\overrightarrow{a} - \overrightarrow{b} + \overrightarrow{c}| = \)

Options:
1. 4
2. \(\sqrt{14}\)
3. \(2\sqrt{3}\)
4. \(\sqrt{10}\)

Question Number: 33  Question Id: 1017174673  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

If the vectors \( \overrightarrow{p}, \overrightarrow{q}, \overrightarrow{r} \) are such that \((\overrightarrow{q} \times \overrightarrow{r}) \times (\overrightarrow{r} \times \overrightarrow{p}) = 3\overrightarrow{r} \) then \([\overrightarrow{p} \times \overrightarrow{q}, \overrightarrow{q} \times \overrightarrow{r}, \overrightarrow{r} \times \overrightarrow{p}] = \)

Options:
1. 3
If \( \overrightarrow{p}, \overrightarrow{q}, \overrightarrow{r} \) are three mutually perpendicular vectors of equal magnitude and if a vector \( \overrightarrow{x} \) satisfies the equation \( \overrightarrow{p} \times ((\overrightarrow{x} - \overrightarrow{q}) \times \overrightarrow{p}) + \overrightarrow{q} \times ((\overrightarrow{x} - \overrightarrow{r}) \times \overrightarrow{q}) + \overrightarrow{r} \times ((\overrightarrow{x} - \overrightarrow{p}) \times \overrightarrow{r}) = \overrightarrow{0} \) then \( \overrightarrow{x} \) is

\[
\overrightarrow{x} = \frac{1}{4}(\overrightarrow{p} - \overrightarrow{q} + \overrightarrow{r})
\]

Options:
1. \( \frac{1}{4}(\overrightarrow{p} - \overrightarrow{q} + \overrightarrow{r}) \)
2. \( \frac{2}{3}(\overrightarrow{p} + \overrightarrow{q} - \overrightarrow{r}) \)
3. \( \frac{3}{4}(\overrightarrow{p} + 2\overrightarrow{q} + \overrightarrow{r}) \)
4. \( \frac{1}{2}(\overrightarrow{p} + \overrightarrow{q} + \overrightarrow{r}) \)
Consider the following data:

<table>
<thead>
<tr>
<th>Daily wage (Rs.)</th>
<th>30-40</th>
<th>40-50</th>
<th>50-60</th>
<th>60-70</th>
<th>70-80</th>
<th>80-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of workers</td>
<td>17</td>
<td>28</td>
<td>21</td>
<td>15</td>
<td>13</td>
<td>6</td>
</tr>
</tbody>
</table>

The coefficient of variation of the above distribution of wages, if its standard deviation is 14.72, is

Options :
1. 14.73
2. 23.73
3. 26.91
4. 20.82

The mean deviation about the median of the numbers 2, 3, 5, 20, 17, 15, 13, 11, 9, 7 is

Options :
1. 10
2. 4.8
3. 5.4
4. 5
A box contains 4 black, 2 white and 6 red balls. Another box contains 3 black and 5 white balls. Throwing an unbiased die, a ball is drawn from the first box if either 1 or 2 appears on the die otherwise a ball is drawn from the second box. If the drawn ball is black then the probability that 2 appeared on the die is

Options:

1. \frac{1}{13}
2. \frac{2}{13}
3. \frac{5}{13}
4. \frac{8}{13}

If A, B and C are mutually exclusive and exhaustive events of a random experiment such that \( P(A) = \frac{2}{3} P(B) \) and \( P(B) = 2P(C) \) then \( P(A \cup C) = \)

Options:

1. \frac{3}{13}
2. \frac{5}{13}
The probability distribution of a random variable $X$ is

<table>
<thead>
<tr>
<th>$X = x_i$</th>
<th>3</th>
<th>5</th>
<th>7</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(X = x_i)$</td>
<td>$k$</td>
<td>$2k$</td>
<td>$3k$</td>
<td>$4k$</td>
</tr>
</tbody>
</table>

Then the standard deviation of $X$ is

Options:
1. 1
2. 2
3. 4
4. 7

A die is thrown $(2n + 1)$ times. The probability of getting 1 or 3 or 4 atmost $n$ times on it is

Options:
1. $\frac{1}{n}$
2. $\frac{1}{2n+1}$
A variable line through the point $P(-1, 2)$ cuts the coordinate axes at $A$ and $B$ respectively. If $Q$ is a point on $AB$ such that $PA$, $PQ$, and $PB$ are in a harmonic progression, then the locus of $Q$ is

$$P(-1, 2) \text{ is the point at which the line cuts the coordinate axes at } A \text{ and } B \text{ respectively. } PA, PQ, \text{ and } PB \text{ are in a harmonic progression. Then the locus of } Q \text{ is}$$

Options:

1. $y^2 = 2x$
2. $x^2 + y^2 = 1$
3. $y = 2x$
4. $x^2 = 4y$

When the coordinate axes are rotated through an angle $\frac{\pi}{4}$ in the positive direction, an equation is transformed to $x^2 + y^2 - 6x + 8y + 21 = 0$. Then the original equation is

Options:

1. $x^2 + y^2 - 7\sqrt{2}x + \sqrt{2}y + 21 = 0$
2. $\sqrt{2}x^2 + \sqrt{2}y^2 - 7x + y + 21\sqrt{2} = 0$
3. $x^2 + y^2 - 14x + 2y + 21 = 0$
4. $x^2 + y^2 - 7\sqrt{2}x + \sqrt{2}y + 21\sqrt{2} = 0$
The point on the line $3x + y + 4 = 0$ which is equidistant from $(-5, 6)$ and $(3, 2)$ is 

$$(-5, 6), (3, 2)$$

Options:

1. $\left(-\frac{7}{5}, \frac{1}{5}\right)$
2. $\left(\frac{7}{5}, -\frac{1}{5}\right)$
3. $(2, -2)$
4. $(-2, 2)$

If $k_1 > k_2$ are the two values of $k$ such that the lines $y - 3kx + 4 = 0$ and $(2k - 1)x - (8k - 1)y - 6 = 0$ are perpendicular, then the equation of the line passing through $(k_1, k_2)$ and having the slope $\left(\frac{k_2}{k_1}\right)$ is

Options:

1. $3x + 2y = 0$
2. $6x - 2y = 3$
3. $12x - 5y = 7$
4. $6x + y = 0$

The in-center of the triangle formed by the lines $x = 0$, $y = 0$ and $3x + 4y = 12$ is

$x = 0, y = 0$  $3x + 4y = 12$  $x = 0, y = 0$  $3x + 4y = 12$  $\text{in-center}$

Options:
The equation of the pair of lines is given by a second degree homogenous equation. If one of them is perpendicular to the line \( x + 2y + 7 = 0 \) and another line is parallel to the line \( 3x + 4y + 5 = 0 \), then the equation of that pair of lines is:

\[
\begin{bmatrix}
\frac{1}{2} & \frac{1}{2} \\
1 & 1 \\
\frac{1}{2} & \frac{1}{2} \\
1 & 1
\end{bmatrix}
\]

Options:
1. \( 6x^2 - 5xy + 4y^2 = 0 \)
2. \( 6x^2 + 5xy + 4y^2 = 0 \)
3. \( 6x^2 - 5xy - 4y^2 = 0 \)
4. \( 6x^2 + 5xy - 4y^2 = 0 \)

The lines \( 3x^2 + 8xy - 3y^2 + 2x - 4y - 1 = 0 \) and \( 4x - 3y - 2 = 0 \)

Options:
1. form an equilateral triangle
2. form a right angled triangle
form a right angled isosceles triangle

3. are concurrent

4. 

Question Number : 48  Question Id : 1017174688  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If the chord $x + y = 1$ of the circle $x^2 + y^2 = a^2$ subtends a right angle at the origin, then $a =$

Options :
1. 4
2. $\sqrt{2}$
3. 1
4. 2

Question Number : 49  Question Id : 1017174689  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The angle between the tangents drawn from a point $(4, 3)$ to the circle $x^2 + y^2 - 2x - 4y = 0$ is

Options :
1. $\pi$
2. $\frac{\pi}{6}$
3. $\frac{\pi}{4}$
4. $\frac{\pi}{3}$
5. $\frac{\pi}{2}$

Question Number : 50  Question Id : 1017174690  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
The equation of circle whose diameter is the diagonal of the rectangle with sides 
\( x = 4, \ x = -2, \ y = 5, \ y = -2 \) is 
\[ x = 4, \ x = -2, \ y = 5, \ y = -2 \] 
Options:
1. \( x^2 + y^2 - 2x - 3y - 18 = 0 \)
2. \( x^2 + y^2 + 2x + 3y - 18 = 0 \)
3. \( x^2 + y^2 - 2x + 3y - 18 = 0 \)
4. \( x^2 + y^2 - 2x + 3y + 18 = 0 \)

Question Number: 51 Question Id: 1017174691 Display Question Number: Yes Single Line Question Option: No Option Orientation: Vertical

If \((3, -1)\) is one end of a diameter of the circle \( x^2 + y^2 - 2x + 4y = 0 \), then the equation of the tangent at the other end of that diameter is
\[ x^2 + y^2 - 2x + 4y = 0 \] 
Options:
1. \( 2x + y - 5 = 0 \)
2. \( 2x + y + 5 = 0 \)
3. \( x + 2y + 5 = 0 \)
4. \( x + 2y - 5 = 0 \)

Question Number: 52 Question Id: 1017174692 Display Question Number: Yes Single Line Question Option: No Option Orientation: Vertical

The equation of a circle which touches the straight lines \( x + y = 2, \ x - y = 2 \) and also touches the circle \( x^2 + y^2 = 1 \) is
\[ x + y = 2, \ x - y = 2 \] 
Options:
1. \( (x + \sqrt{2})^2 + y^2 = 2 \)
2. \((x - \sqrt{2})^2 + (y - \sqrt{3})^2 = 2\)

3. \((x - \sqrt{2})^2 + y^2 = (\sqrt{2} - 1)^2\)

4. \(x^2 + (y - \sqrt{2})^2 = (\sqrt{2} + 1)^2\)

Question Number: 53  Question Id: 1017174693  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

The locus of centres of all circles which touch the line \(x = 2a\) and cut the circle \(x^2 + y^2 = a^2\) orthogonally is

\(x = 2a\) and \(x^2 + y^2 = a^2\) are the two equations for centres. We need to find the equation of the other one.

Options:
1. \(y^2 + 4ax - 5a^2 = 0\)
2. \(y^2 + 4ax + 5a^2 = 0\)
3. \(y^2 = 4ax - 5a^2\)
4. \(y^2 = 4ax + 5a^2\)

Question Number: 54  Question Id: 1017174694  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

The circles \(x^2 + y^2 + 2x + 3y - 7 = 0\) and \(x^2 + y^2 + 4x - 7y + 5 = 0\) intersect at the points A and B. The equation of the circle, having \(AB\) as a diameter is

A. B \(\Rightarrow\) \(x^2 + y^2 + 2x + 3y - 7 = 0\) and \(x^2 + y^2 + 4x - 7y + 5 = 0\) are the two equations for the circle. \(AB\) is the diameter. \(AB\) is the equation of the circle.

Options:
1. \(26x^2 + 26y^2 + 77x - 47y + 32 = 0\)
2. \(26x^2 + 26y^2 + 77x + 47y - 32 = 0\)
3. \(26x^2 + 26y^2 + 77x - 47y - 32 = 0\)
4. \(26x^2 + 26y^2 + 77x + 47y + 32 = 0\)

Question Number: 55  Question Id: 1017174695  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical
The locus of the point of intersection of the normals to the parabola \( x^2 = 8y \), which are at right angles to each other, is

\[ x^2 = 8y \]

Options:
1. \( y^2 = 2x - 5 \)
2. \( y^2 = x - 12 \)
3. \( x^2 = y - 10 \)
4. \( x^2 = 2y - 12 \)

Question Number : 56 Question Id : 1017174696 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A point on the parabola whose axis is parallel to the X-axis and which passes through the points \((0, 1), (3, 0), (0, -2)\) is

Options:
1. \((3, -1)\)
2. \((2, -3)\)
3. \((3, 2)\)
4. \((-2, 2)\)

Question Number : 57 Question Id : 1017174697 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

The product of the lengths of the perpendiculars drawn from the foci of the ellipse

\[ \frac{x^2}{9} + \frac{y^2}{25} = 1 \]

to the tangent at any point on the ellipse is

Options:
If the eccentric angles of the extremities of a focal chord (other than the major axis) of the ellipse \( \frac{x^2}{25} + \frac{y^2}{9} = 1 \) are \( \alpha \) and \( \beta \) then \( \frac{\cot \left( \frac{\alpha}{2} \right)}{\tan \left( \frac{\beta}{2} \right)} = \)

\[
\frac{x^2}{25} + \frac{y^2}{9} = 1 \quad \text{is a real number and} \quad \frac{x^2}{c-12} + \frac{y^2}{7-c} = 1 \quad \text{represents a hyperbola, then}
\]

\[
c \in \mathbb{R} \quad \text{and} \quad \frac{x^2}{c-12} + \frac{y^2}{7-c} = 1 \quad \text{is a real number and} \quad \text{represents a hyperbola, then}
\]
1. \(7 < c < 12\)
2. \(c < 7\)
3. \(c > 12\)
   \[c < 7 \text{ or } c > 12\]
4. \(c < 7 \text{ or } c > 12\)

Question Number : 60  Question Id : 1017174700  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If the direction cosines of a line \(L\) are \((pq, q, q)\) and the angle between the line \(L\) with the positive direction of the X-axis is \(\frac{\pi}{3}\), then \(p^2 : q^2 = \) 

\[\text{వస్తు నిర్దేశాంశులు } L \text{ యెందుకు నిర్దేశాంశులు } (pq, q, q) \text{ లేదా నిర్దేశాంశులు } L \text{ లో } X-	ext{ అకృతి రెంటి } \frac{\pi}{3} \text{ అయితే } p^2 : q^2 = \]

Options :
1. 2:3
2. 3:4
3. 8:9
4. 16:9

Question Number : 61  Question Id : 1017174701  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The circumcentre of the triangle formed by the points \((3, 4, 5), (2, 3, 1)\) and \((-1, 6, 1)\) is 

\((3, 4, 5), (2, 3, 1), (-1, 6, 1)\) పద్మారుణ కోట్ రెంటి వెనుక రెంటి, యెందుకు పెద్దబడ్డం 

Options :
1. \(\left(\frac{1}{2}, \frac{9}{2}, 1\right)\)
2. \((2, 3, 1)\)
3. \((1, 5, 3)\)
4. \(\left(\frac{4}{3}, \frac{13}{3}, \frac{7}{3}\right)\)

Question Number : 62  Question Id : 1017174702  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
The equation of the plane which is bisecting the line segment joining the points A(2, 3, 4), B(−4, 1, −2) and is perpendicular to it, is

A(2, 3, 4), B(−4, 1, −2) యందుపాయం చేసిన చిహ్నాల పైనిపు వ్యాపిపడి యుగుతానికి బాగా యుగుతున్న నేల ఫలితాన్ని కానుకుండా యుగుతానికి చేసిన బాగా యుగుతున్న 

Options:
1. $6x + 2y + 6z - 3 = 0$
2. $3x - y - 3z + 6 = 0$
3. $3x + y + 3z - 21 = 0$
4. $3x + y + 3z - 2 = 0$

If $f(x) = \frac{\sqrt{\pi} - \sqrt{\cos^{-1} x}}{\sqrt{1+x}}$ for $x > -1$ then $\lim_{x \to -1^+} f(x) = \ldots$

$x > -1 \Rightarrow f(x) = \frac{\sqrt{\pi} - \sqrt{\cos^{-1} x}}{\sqrt{1+x}} \Rightarrow \lim_{x \to -1^+} f(x) = \ldots$

Options:
1. $\sqrt{\pi}$
2. $\sqrt{2}$
3. $\sqrt{\pi}$
4. $\sqrt{2\pi}$

If $f: (-7, 7) \to \mathbb{R}$ is defined by $f(x) = [x]$ for all $x \in (-7, 7)$, then the number of discontinuities of $f$ is

$(\forall x \in (-7, 7) \& f: (-7, 7) \to \mathbb{R} \& f(x) = [x] \Rightarrow \text{ discontinuous at } f \text{ is } \ldots$
Question Number : 65 Question Id : 1017174705 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

\[ y = \log \left( \frac{\sqrt{x^2 + 1} - x}{\sqrt{x^2 + 1} + x} \right) \Rightarrow \frac{dy}{dx} = \]

Options :

1. \( \frac{1}{\sqrt{1 + x^2}} \)
2. \( \frac{2}{\sqrt{1 + x^2}} \)
3. \( \frac{-1}{\sqrt{1 + x^2}} \)
4. \( \frac{-2}{\sqrt{1 + x^2}} \)

---

Question Number : 66 Question Id : 1017174706 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If \( y = x \tan^{-1} \left( \frac{x}{y} \right) \), then \( \frac{dy}{dx} = \)

\[ y = x \tan^{-1} \left( \frac{x}{y} \right) \Rightarrow \frac{dy}{dx} = \]

Options :

1. \( \frac{xy^2}{x^2 + y^2} \)
2. \( \frac{xy}{x^2 + y^2} \)
3. \( \frac{y}{x} \)
If, for \( a \neq 0 \), \( x = a(1 - \sin t) \), \( y = a(t + \cos t) \), then \( \frac{d^2y}{dx^2} = \)

\[ a \neq 0 \quad \text{and} \quad x = a(1 - \sin t), \; y = a(t + \cos t) \implies \frac{d^2y}{dx^2} = \]

Options:

1. \( \frac{1 - \sin t}{a \cos^2 t} \)
2. \( \frac{1}{4a} \csc^4 \left( \frac{t}{2} \right) \)
3. \( \frac{\sin t - 1}{a \cos^3 t} \)
4. \( \frac{1}{4a} \sec^4 \left( \frac{t}{2} \right) \)

An angle between the curves \( x^2y = 1 \) and \( y(x^2 + 1) = 2 \) is

\( x^2y = 1, \; y(x^2 + 1) = 2 \)

Options:

1. \( \tan^{-1} \frac{8}{9} \)
2. \( \tan^{-1} 2 \)
3. \( \tan^{-1} \frac{1}{2} \)
4. \( \tan^{-1} \frac{1}{3} \)
The function \( f(x) = x \cdot e^{x(1-x)} \) is

\[
f(x) = x \cdot e^{x(1-x)}
\]

Options:

1. Increasing in \( \left[-\frac{1}{2}, 1\right] \)

2. Decreasing in \( \left[-\frac{1}{2}, 1\right] \)

3. Increasing in \( \mathbb{R} \)

4. Decreasing in \( \mathbb{R} \)

The value of \( k \) for which the equation \( x^2 - 3x + k = 0 \) has at least one real root in \([0, 1]\) is

\[
x^2 - 3x + k = 0 \quad \text{in} \quad [0, 1] \quad \text{has a real root in} \quad [0, 1] \quad \text{when} \quad k = \frac{1}{2}
\]

Options:

1. 5
2. 2
3. 7
4. 6
5. 3
6. 20
7. 7
A manufacturer can sell $x$ items at a price of rupees $\left(\frac{5-x}{100}\right)$ each. The cost price of $x$ items is Rs. $\left(\frac{x}{5}+500\right)$. The number of items that the manufacturer should sell to earn the maximum profit is

\[\frac{x}{5} + 500\]

Options:
1. 230
2. 240
3. 260
4. 376

Question Number : 72  Question Id : 1017174712  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

\[\int \frac{\sin(x-a)}{\sin(x-b)} \, dx = Ax + B \log|\sin(x-b)| + C \Rightarrow (A, B) = \]

Options:
1. $(\cos(b-a), \sin(b-a))$
2. $(\cos(b-a), \sin(a-b))$
3. $(-\cos(b-a), \sin(b-a))$
4. $(-\cos(b-a), \sin(a-b))$

Question Number : 73  Question Id : 1017174713  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

\[\int \frac{\log_e x}{(1+\log_e x)^2} \, dx = \]

Options:
1. $-\frac{x}{1+\log_e x} + C$
\[ \frac{x}{(1 + \log_e x)^2} + C \]

\[ \frac{x}{(1 + \log_e x)} + C \]

\[ \frac{-x}{(1 + \log_e x)^2} + C \]

Question Number : 74  Question Id : 1017174714  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( \int \frac{x^2}{(x-1)(x-2)(x-3)} \, dx = \log_e f(x) \) then \( f(x) = \)

\[ \int \frac{x^2}{(x-1)(x-2)(x-3)} \, dx = \log_e f(x) \]

Options :

1. \( C \frac{(x-1)(x-3)^9}{(x-2)^4} \)

2. \( C \frac{\sqrt{|x-1|} \sqrt{|x-3|^9}}{(x-2)^4} \)

3. \( C \frac{(x-1)^2 \cdot (x-2)^4}{(x-3)^9} \)

4. \( C \frac{(x-1)^3 \cdot (x-2)^5}{(x-3)^4} \)

Question Number : 75  Question Id : 1017174715  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( I_n = \int \frac{t^{2n}}{1 + t^2} \, dt \), then \( I_{n+1} = \)

\[ I_n = \int \frac{t^{2n}}{1 + t^2} \, dt \]

Options :
\[
\frac{t^{2n+1}}{2n+1} + I_{2n}
\]

\[
\frac{t^{2n+1}}{2n+1} + I_{n}
\]

\[
\frac{t^{2n+1}}{2n+1} - I_{2n}
\]

\[
\frac{t^{2n+1}}{2n+1} - I_{n}
\]

Question Number : 76  Question Id : 1017174716  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

\[
\lim_{n \to \infty} \left\{ \frac{1}{\sqrt{4n^2 - 1^2}} + \frac{1}{\sqrt{4n^2 - 2^2}} + \frac{1}{\sqrt{4n^2 - 3^2}} + \ldots + \frac{1}{\sqrt{4n^2 - n^2}} \right\} =
\]

Options :
1. \( \pi \)
2. \( \frac{\pi}{2} \)
3. \( \frac{\pi}{3} \)
4. \( \frac{\pi}{4} \)
5. \( \frac{\pi}{6} \)

Question Number : 77  Question Id : 1017174717  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( \int_{-1}^{4} f(x) \, dx = 4 \) and \( \int_{2}^{4} (3 - f(x)) \, dx = 7 \) then \( \int_{-1}^{2} f(x) \, dx = \)

\[
\int_{-1}^{4} f(x) \, dx = 4 \quad \int_{2}^{4} (3 - f(x)) \, dx = 7 \quad \int_{-1}^{2} f(x) \, dx =
\]

Options :
1. 5
2. -5
3. 4
4. -4
The area (in square units) enclosed between the curves \( y = \sin x \) and \( y = \cos x \) for \( \frac{\pi}{4} \leq x \leq \frac{5\pi}{4} \) is

\[ y = \sin x, \quad y = \cos x \]

Options:
1. \( \sqrt{2} \)
2. 2
3. 2\( \sqrt{2} \)
4. 4

The differential equation formed by eliminating \( A \) and \( B \) from \( Ax^2 + By^2 = 1 \) is

\[ Ax^2 + By^2 = 1 \]

Options:
1. \( xy \cdot \frac{d^2 y}{dx^2} - x \left( \frac{dy}{dx} \right)^2 = \frac{dy}{dx} \)
2. \( xy \cdot \frac{d^2 y}{dx^2} + x \left( \frac{dy}{dx} \right)^2 = y \cdot \frac{dy}{dx} \)
3. \( xy \cdot \frac{d^2 y}{dx^2} + x \left( \frac{dy}{dx} \right)^2 = \frac{dy}{dx} \)
4. \( xy \cdot \frac{d^2 y}{dx^2} - x \left( \frac{dy}{dx} \right)^2 = y \cdot \frac{dy}{dx} \)
If the form of the solution of the differential equation

\[(y^3 + x) \frac{dy}{dx} = y\]  
when \(y(4) = 2\) is \(y^3 = ax + b\), then \(4a + 12b^2 = \)

\[y(4) = 2\]  
\[\left( y^3 + x \right) \frac{dy}{dx} = y\]  
\[\text{सश्रव शिविरमें तीरे,} \]  
\[\text{शिक्षान्} \ y^3 = ax + b\]  
\[\text{रबरूस} \ कोटै, \ अज्ञात \ 4a + 12b^2 = \]

Options:
1. 2
2. 4
3. 8
4. 16

If \(A, B, C\) and \(D\) represent velocity, acceleration, inductance and capacitance respectively, then \(A^{-1} BCD\) has the dimensions of

A. \(B, C \) नन्दे, \(D \) नले सश्रव, सश्रव, शिविरमें तीरे, शिक्षान् \(A^{-1} BCD\) नन्दे, \(B\)

Options:
1. नन्दे
2. Mass
3. दिन्दे
4. Time
5. वेगातील (वेग)

6. Electric Current
The distance covered by a stone dropped from the top of a building in the last second of its motion is 0.36 times the total distance travelled by it. The height of the building is (acceleration due to gravity = 9.8 m/s²)

Options:
1. 98.6 m
2. 78.4 m
3. 122.5 m
4. 245 m

A body is projected into vertical X-Y plane with X-axis along horizontal and Y-axis along vertical with an initial velocity \((10\hat{i} + p\hat{j})\). If the maximum height reached by the body is 50% of its range, then the value of \(p\) is

Options:
1. 20
2. 10
3. 5
4. 2
Two bodies are projected from points (0, 0) and \((\sqrt{3} - 1, 0)\) with velocities 10 ms\(^{-1}\) and \(v\) ms\(^{-1}\) respectively, as shown in the figure. The time after which they collide in space is

Options:
1. 0.8 s
2. 0.6 s
3. 0.4 s
4. 0.2 s

Question Number: 85 Question Id: 1017174725 Display Question Number: Yes Single Line Question Option: No Option Orientation: Vertical

Two cars are moving on a banked circular path of radius 8 m having angle of banking 45\(^{\circ}\). If the coefficients of static friction between the road and the tyres of the two cars are 0.5 and 0.4 respectively, then the ratio of maximum permissible speeds of the cars to avoid slipping is

Options:
1. \(\sqrt{7} : \sqrt{5}\)
2. \(\sqrt{9} : \sqrt{7}\)
3. \(\sqrt{11} : \sqrt{7}\)
4. \(\sqrt{13} : \sqrt{11}\)

Question Number : 86  Question Id : 1017174726  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Two unequal masses ‘A’ and ‘B’ moving along a straight line are brought to rest by equal retarding forces. If ‘A’ takes double the time taken by ‘B’ to come to rest and ‘A’ travels \(\frac{2}{3}\)rd of the distance covered by ‘B’ before coming to rest, then the ratio of masses of ‘A’ and ‘B’ is ________

Options :
1. 1 : 6
2. 6 : 1
3. 1 : 12
4. 12 : 1

Question Number : 87  Question Id : 1017174727  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

A car of mass 1000 kg has a motor of efficiency 20%. If burning of one litre of petrol supplies \(6 \times 10^7\) J of energy, the amount of petrol used in accelerating the car from rest to 43.2 km h\(^{-1}\) is

Options :
1. 6 cc
2. 12 cc
3. 18 cc
4. 24 cc
Two identical balls A and B of equal mass are lying on a smooth surface as shown in the figure. If ball ‘A’ hits ball ‘B’ at rest with a velocity 16 ms⁻¹, then the co-efficient of restitution between A and B so that B just reaches the highest point of the smooth inclined plane is (g = 10 ms⁻²)

Options:
1. 2
2. 3
3. 1
4. 4
Three circular discs of same material and same thickness of radii \( r \), \( 2r \) and \( 3r \) are placed on a horizontal plane such that their centres lie along a straight line. The radius of the middle disc is \( 2r \) and it touches the other two discs. The distance of the centre of mass of the system from the centre of the smaller disc is ________.

Options:
1. \( 2r \)
2. \( 4r \)
3. \( 6r \)
4. \( 8r \)

Question Number: 90  Question Id: 1017174730  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

A solid sphere rolls down without slipping on an inclined plane of angle of inclination \( \sin^{-1}\left(\frac{21}{50}\right) \). If the acceleration due to gravity is \( 10 \text{ m/s}^2 \), the acceleration of the rolling sphere is ________.

Options:
1. \( 3 \text{ m/s}^2 \)
2. \( 7 \text{ m/s}^2 \)
3. \( 10 \text{ m/s}^2 \)
4. \( 2 \text{ m/s}^2 \)

Question Number: 91  Question Id: 1017174731  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical
A particle starting from mean position executes simple harmonic motion with a period 8 s. The minimum time in which its potential energy becomes half of the total energy is ________.

Options:
1. 8 s
2. 4 s
3. 1 s
4. 0.5 s

The masses of two fixed spheres are M and 2M and the radius of each sphere is R. Their centres are 10R apart. The minimum speed with which a particle of mass \( \frac{M}{10} \) be projected from the mid-point of the line joining the centres of the two spheres so that it escapes to infinity is ________.

Options:
1. \( \sqrt{\frac{6GM}{7R}} \)
2. \( \sqrt{\frac{7GM}{5R}} \)
3. \( \sqrt{\frac{5GM}{6R}} \)
4. \[ \sqrt{\frac{6GM}{5R}} \]

Question Number : 93 Question Id : 10171774733 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

One end of a steel wire of radius ‘r’ is fixed to a ceiling and a load of 3 kg is attached to the free end of the wire. Another wire made of copper of radius ‘2r’ is attached to the bottom of 3 kg load and a 2 kg load is attached to the free end of the copper wire. The ratio of longitudinal strains produced in copper and steel wires is

(Young modulus of steel = \(20 \times 10^{10}\) Nm\(^{-2}\))
(Young modulus of copper = \(12 \times 10^{10}\) Nm\(^{-2}\))

Options :
1. 6 : 1
2. 1 : 6
3. 2 : 3
4. 3 : 2

Question Number : 94 Question Id : 10171774734 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

In S.I. system, the total energy of the free surface of a liquid drop is \(2\pi\) times the surface tension of the liquid. The diameter of the drop is ______

S.I. రెండు సముదాయాలు కలిగిన సింగియాలను సాధారణ సింగియాలు చేయడం కంటే, లిటర్ సింగియాలను చేయడం 2\(\pi\) వంటి ప్రతి సింగియాలు సేటి ప్రాంతము ______

Options :
1. \(\sqrt{3}\) m
2. \(\sqrt{2}\) m
3. \(\sqrt{5}\) m
If equal masses of 10 liquids of specific heats s, 2s, 3s, .... 10s at temperatures 10°C, 20°C, 30°C, .... 100°C respectively are mixed, the resultant temperature of the mixture is ________

Options:
1. 60°C
2. 50°C
3. 70°C
4. 80°C

Two closed containers of same dimensions made of different materials are completely filled with ice. The ice in the first container takes 20 minutes and that in the second container takes 10 minutes, respectively for complete melting. The ratio of the thermal conductivities of the materials of the two containers is ________.

Options:
1. 1 : 2
2. 2 : 1
3. 3 : 1
4. 1 : 3

Question Number : 97  Question Id : 1017174737  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Two moles of helium gas \( \left( \gamma = \frac{5}{3} \right) \) at 27°C is expanded at constant pressure until its volume is doubled. Then it undergoes an adiabatic change until the temperature returns to its initial value. The work done during adiabatic process is ______

(universal gas constant = 8.3 J mol\(^{-1}\) K\(^{-1}\))

27 °C చీల చిన్న సంఖ్య పండ్ల వేసిన రకార్థం \( \left( \gamma = \frac{5}{3} \right) \) తో నియంతప్రస్తుతం యోగ్య వాయుని నియంతం వయు యోగ్యం 

(నియంతాంత్రిక విస్తారం = 8.3 J mol\(^{-1}\) K\(^{-1}\))

Options:
1. 7470 J
2. 7070 J
3. 4770 J
4. 4077 J

---

On tripling the absolute temperature of the source, the efficiency of a Carnot’s heat engine becomes double that of the initial efficiency. Then the initial efficiency of the engine is ______

వేసిన సంఖ్య విస్తారం, రకార్థం ప్రధాన ప్రాంతం ప్రధాన ప్రాంతం ప్రధాన ప్రాంతం ప్రధాన ప్రాంతం 

Options:
1. 20%
2. 50%
3. 60%
4. 40%
If \( v_1 \) is the speed of sound in a diatomic gas at 273 °C and \( v_2 \) is the r.m.s. speed of its molecules at 273 K, then \( \frac{v_1}{v_2} = \) 

273 °C ప్రమాణ మూలానికి మాత్రమే ఉండగానిందుకు భావించడం లేవు కాని \( v_1 \) మూలానికి 273 K ప్రమాణ మూలానికి భావించడం లేదు. రమ్యము మూలానికి \( v_2 \) ఎదిగా ఉండాలి, \( \frac{v_1}{v_2} = \) 

Options:

1. \( \frac{\sqrt{15}}{14} \)
2. \( \frac{\sqrt{14}}{15} \)
3. \( \frac{\sqrt{7}}{8} \)
4. \( \frac{\sqrt{8}}{7} \)

Question Number : 100  Question Id : 1017174740  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

When a train is approaching the stationary observer, the apparent frequency of the whistle of the train is \( n_1 \) and when the train is moving away from the observer, the apparent frequency is \( n_2 \). The frequency of the whistle noticed by the observer when he moves with the train is _______

నేటికి ఉన్న ఉమాయాలు కాని నియంత్రించడం ప్రమాణ ఒక విషయం కాని నేటిక ఉన్న ఉమాయాలు కాని నియంత్రించడం ప్రమాణ ఒక విషయం. \( n_1 \) ఒక విషయం కాని నియంత్రించడం ప్రమాణ ఒక విషయం. \( n_2 \) ఒక విషయం కాని నియంత్రించడం ప్రమాణ ఒక విషయం. నియంత్రించడం ప్రమాణ ఒక విషయం. నియంత్రించడం ప్రమాణ ఒక విషయం. _______

Options:

1. \( \frac{2n_1 n_2}{n_1 + n_2} \)
2. \( \frac{n_1 n_2}{n_1 + n_2} \)
The depth of the sea measured by means of an echo. If the time between the moment of the sound produced and received is 3.52 s, then the depth of the sea is

\[
\frac{2 n_1 n_2}{n_1 - n_2} = \frac{n_1 n_2}{n_1 - n_2}
\]

(The compressibility of sea water is \(4.84 \times 10^{-10} \text{ m}^2 \text{N}^{-1}\) and its density is 1024 kg m\(^{-3}\)) is

\[
\text{Options:}
\begin{array}{ll}
1. & 1.5 \text{ km} \\
2. & 1.9 \text{ km} \\
3. & 2.5 \text{ km} \\
4. & 2.9 \text{ km}
\end{array}
\]

A plano convex lens of material of refractive index \(\mu_1\) exactly fits into a plano concave lens of material of refractive index \(\mu_2\). If \(R\) is the radius of curvature of the curved surfaces of the lenses and the plane surfaces of the lenses are parallel, the focal length of the combination is

\[
\frac{R (\mu_1 - \mu_2)}{\mu_1 - \mu_2}
\]

\[
\text{Options:}
\begin{array}{ll}
1. & R (\mu_1 - \mu_2) \\
2. & \frac{R}{\mu_1 - \mu_2}
\end{array}
\]
In Young’s double slit experiment, the slits separated by 0.6 mm are illuminated with light of 6600 Å. Interference pattern is obtained on a screen placed at 4 m from slits. The minimum distance from the central maximum at which the average intensity is 50% of the maximum value is ______

Options:
1. 0.21 mm
2. 2.1 mm
3. 0.11 mm
4. 1.1 mm

Two identical simple pendulums each of length 5 cm are suspended from the same support. When the bobs are given equal charge of 2 μC each, distance between the bobs becomes 6 cm. Mass of each bob is (g = 10 m/s²).

Options:
1. \( \frac{4}{3} \) kg
2. \( \frac{3}{4} \) kg
‘N’ point charges are distributed into two groups and separated by a fixed distance. Then the ratio of maximum to minimum forces between the two groups is \((N\text{ is even and greater than } 2)\).

‘N’ పేరిచి వెంకితం బహుళం సాధారణ ప్రత్యామనం పొందాయి. అ పొడవు పొడవు చేసే, ఎక్కడ పోషణ చేయ (N ఎందుకు ఎదురు ఉంటే 2 ఎందుకు ఎదురు).

Options:

1. \(\frac{(N-1)^2}{4N^2}\)
2. \(\frac{4N^2}{N-1}\)
3. \(\frac{N^2}{4(N-1)}\)
4. \(\frac{2N^2}{N-1}\)
Three charges $Q$, $+q$ and $+q$ are placed at the vertices of a right angled isosceles triangle as shown in the figure. If the net electrostatic potential energy of the system is zero, the value of $Q$ is

$$Q = \frac{-2q}{2 + \sqrt{2}}$$

Options:
1. $\frac{-2q}{2 + \sqrt{2}}$
2. $\frac{+q}{2 + \sqrt{2}}$
3. $\frac{+2q}{2 + \sqrt{2}}$
4. $\frac{-q}{2 + \sqrt{2}}$
A fully charged capacitor of capacity \( C \) is discharged through a small resistance wire embedded in a solid block of specific heat \( s \) and mass \( m \) under thermally isolated conditions. If the temperature of the block is raised by \( \Delta T \), the initial potential difference across the capacitor is

\[
\left( \frac{ms\Delta t}{C} \right)^2
\]

\[
\left( \frac{2ms\Delta t}{C} \right)^{\frac{1}{2}}
\]

\[
\frac{ms\Delta t}{C}
\]

\[
\frac{3ms\Delta t}{C}
\]

Options:

1. \( \left( \frac{ms\Delta t}{C} \right)^2 \)
2. \( \left( \frac{2ms\Delta t}{C} \right)^{\frac{1}{2}} \)
3. \( \frac{ms\Delta t}{C} \)
4. \( \frac{3ms\Delta t}{C} \)

Question Number : 108 Question Id : 1017174748 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

A straight conductor of uniform area of cross-section carries a current \( I \). \( s \) is the specific charge of the electron. The total momentum of all the electrons per unit length of the conductor due to drift velocity is

\[
\frac{I}{s}
\]

\[
Is
\]

\[
\sqrt{Is}
\]

Options:

1. \( \frac{I}{s} \)
2. \( Is \)
3. \( \sqrt{Is} \)
‘n’ identical cells each of emf E and internal resistance ‘r’ are joined in series to form a row. ‘m’ such rows are joined in parallel across a load resistance R. The current in each cell is

\[ I = \frac{nE}{nr + mR} \]

Options:

1. \[ \frac{nE}{nr} + R \]
2. \[ \frac{nE}{mr + mR} \]
3. \[ \frac{mE}{mr} + R \]
4. \[ \frac{E}{nr} + R \]
Two infinite long wires each carrying a current 10 A are bend to form a right angle as shown in the figure. Then the magnetic induction at ‘O’ is \[ \mu_0 = 4\pi \times 10^{-7} \text{ Hm}^{-1} \]

Options:
1. \(1 \times 10^{-3} \text{ T}\)
2. \(1 \times 10^{-4} \text{ T}\)
3. \(3 \times 10^{-4} \text{ T}\)
4. 0

A galvanometer of resistance 10 \(\Omega\) changes its range from 1 mA to 101 mA when a resistive wire is connected in parallel. If the resistivity of the material of the wire and its area of cross-section are \(1 \times 10^{-6} \text{ \(\Omega\) m}\) and 1 mm\(^2\) respectively, then the length of the wire is

Options:
1. 10 cm
2. 1 cm
3. 20 cm
4. 15 cm
Two short bar magnets of moments 'M' and \( \sqrt{3M} \) are joined like a cross (+). This cross is suspended from its centre with its plane horizontal in the earth's magnetic field. When the cross comes to equilibrium, angle made by the weaker magnet with the earth's magnetic field \( B_H \) is

\[ \tan^{-1} \left( \frac{1}{2} \right) \]

\[ \tan^{-1} \left( \frac{4}{5} \right) \]

Options:
1. \( 30^\circ \)
2. \( 45^\circ \)
3. \( 75^\circ \)
4. \( 60^\circ \)

Question Number : 113  Question Id : 1017174753  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

A circular wheel with 10 spokes with its plane vertical along East-West is rotating about its natural axis with a uniform speed 100 revolutions per minute in the earth’s magnetic field. Radius of the wheel is 0.3 m. If the emf induced between the centre of the wheel and the rim is \( 3\pi \mu V \), angle of dip at the place is

(Vertical component of the earth's magnetic field \( B_V = 15 \mu T \))

\[ \tan^{-1} \left( \frac{1}{2} \right) \]

\[ \tan^{-1} \left( \frac{4}{5} \right) \]

Options:
1. \( 30^\circ \)
2. \( 45^\circ \)
3. \( 75^\circ \)
4. \( 60^\circ \)
A current of 4 A flows in a coil when connected to a 12 V d.c. source. If the same coil is connected to a 12 V, \( \left( \frac{25}{\pi} \right) \) Hz a.c source, a current of 2.4 A flows in the circuit. The inductance of the coil is ______.

Options:
1. 100 mH
2. 80 mH
3. 60 mH
4. 50 mH

A plane electromagnetic wave of wavelength 3.0 m travels in vacuum along the positive X-axis. The electric field of amplitude 300 Vm\(^{-1}\) oscillates parallel to the Y-axis. Then the intensity of the wave is \((\mu_0 = 4\pi \times 10^{-7} \text{ Hm}^{-1}, c = 3 \times 10^8 \text{ ms}^{-1})\)

Options:
1. 119.4 Wm\(^{-2}\)
2. 109.4 Wm\(^{-2}\)
3. 129.4 Wm\(^{-2}\)
4. 1 Wm\(^{-2}\)

Question Number : 116  Question Id : 1017174756  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The ratio of de-Broglie wavelength of molecules of hydrogen and helium which are at temperatures 27 °C and 127 °C respectively is _______

27 °C ఉమ్మడి 127 °C ఉమ్మడి యొక్క మూలం మనం విలేశించే జలాశయ డిబ్రోలీ చారిత్ర మూలం రెండు వంటి ఆఫీషాల కోసం _______

Options :
1. 2 : 3
2. \(2\sqrt{2} : \sqrt{3}\)
3. \(\sqrt{3} : 2\sqrt{2}\)
4. \(\sqrt{2} : \sqrt{3}\)

Question Number : 117  Question Id : 1017174757  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \(\Delta \lambda_L\) is the difference between shortest and longest wavelengths of Lyman series and \(\Delta \lambda_B\) is the difference between shortest and longest wavelengths of Balmer series, then

\[
\frac{\Delta \lambda_B}{\Delta \lambda_L} =
\]

యునాటియా బాల్మా రంగాల విశ్లేషణ అభయాంగం హైపర్ హైపర్ మాత్రము బాల్మా రంగాల విశ్లేషణ అభయాంగం యొక్క బాల్మా రంగాల విశ్లేషణ అభయాంగం యొక్క బాల్మా రంగాల విశ్లేషణ అభయాంగం యొక్క బాల్మా రంగాల విశ్లేషణ అభయాంగం యొక్క 

Options :
1. 2.4
2. 4.8
3. 7.2
4. 9.6

Question Number : 118  Question Id : 1017174758  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
A heavy nucleus having mass number 200 gets disintegrated into two small fragments of mass numbers 80 and 120. If binding energy per nucleon for parent atom is 6.5 MeV and for daughter nuclei is 7 MeV and 8 MeV respectively, then the energy released in the decay will be

Options:
1. 200 MeV
2. 120 MeV
3. 220 MeV
4. 180 MeV

In the following circuit, the power dissipated in the zener diode is

Options:
1. 0.12 W
2. 0.18 W
3. 0.24 W
4. 0.36 W
Match the following:

<table>
<thead>
<tr>
<th>List - I (Signal)</th>
<th>List - II (Bandwidth)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) Speech Signal</td>
<td>a) 4.2 MHz</td>
</tr>
<tr>
<td>ii) Music Signal</td>
<td>b) 6 MHz</td>
</tr>
<tr>
<td>iii) Video Signal</td>
<td>c) 20 KHz</td>
</tr>
<tr>
<td>iv) T.V. Signal</td>
<td>d) 2.8 KHz</td>
</tr>
</tbody>
</table>

The correct answer is

Options:

1. i-c, ii-d, iii-b, iv-a
2. i-a, ii-d, iii-b, iv-c
3. i-d, ii-c, iii-a, iv-b
4. i-b, ii-a, iii-d, iv-c
If the radius of electron in the excited state of He\(^+\) is 0.4232 nm, the energy of electron in that excited state is \(J\) is:

(The radius and energy of electron in the first orbit of hydrogen atom are 52.9 pm and \(-2.18 \times 10^{-18}\) J respectively)

\[
\text{He}^+ \quad \text{radius} \quad 0.4232 \text{ nm} \quad \text{energy} \quad 0^5 \text{ J}
\]

Options:
1. \(-5.45 \times 10^{-17}\)
2. \(-5.45 \times 10^{-19}\)
3. \(5.45 \times 10^{18}\)
4. \(5.45 \times 10^{-18}\)

Question Number: 122 Question Id: 1017174762 Display Question Number: Yes Single Line Question Option: No Option Orientation: Vertical

The wavelength (in m) of a particle of mass \(1.67 \times 10^{-27}\) kg moving with velocity of \(3.97 \times 10^6\) m s\(^{-1}\) is:

\[
3.97 \times 10^6 \text{ m s}^{-1} \quad \text{mass} \quad 1.67 \times 10^{-27} \text{ kg moving with velocity of} \quad 3.97 \times 10^6 \text{ m s}^{-1}
\]

Options:
1. \(1 \times 10^{-13}\)
2. \(1 \times 10^{-11}\)
3. \(2 \times 10^{-13}\)
4. \(2 \times 10^{-11}\)

Question Number: 123 Question Id: 1017174763 Display Question Number: Yes Single Line Question Option: No Option Orientation: Vertical

Which of the following statements is not correct?

Options:
First ionization enthalpy of nitrogen is greater than that of carbon

Electron gain enthalpy of oxygen is greater than that of sulphur

Ionic radius of Mg$^{2+}$ is greater than that of Al$^{3+}$

Mg$^{2+}$ उच्च क्षणिक रूपरेखा Al$^{3+}$से बड़ा है।

Electronegativity of fluorine is greater than that of oxygen

Electronegativity of fluorine is greater than that of oxygen

Match the following:

<table>
<thead>
<tr>
<th>List - I</th>
<th>List - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) sp$^3$d$^2$</td>
<td>i) PF$_5$</td>
</tr>
<tr>
<td>b) sp$^3$</td>
<td>ii) [Ni(CN)$_4$]$^{2-}$</td>
</tr>
<tr>
<td>c) sp$^3$d</td>
<td>iii) BrF$_5$</td>
</tr>
<tr>
<td>d) dsp$^2$</td>
<td>iv) C$_2$H$_6$</td>
</tr>
<tr>
<td></td>
<td>v) C$_2$H$_2$</td>
</tr>
</tbody>
</table>

The correct answer is

Options:

1. v ii i iii

2. iii iv i ii
Identify the correct statement(s) from the following:

a) Dipole moment of NH₃ is more than NF₃
b) SF₄ is square planar
c) SnCl₄ is more covalent than SnCl₂
d) In H₂SO₄ sulphur atom has expanded octet

Which one of the following statements is not correct?

Options:
The magnitude of the surface tension of a liquid depends on the attractive forces of the molecules.

The surface tension decreases as the temperature is raised.

Liquids tend to rise in the capillary because of surface tension.

On flat surface, liquid droplets are perfectly spherical.

Question Number : 127 Question Id : 1017174767 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

One litre of 0.15 M Na₂SO₃ aqueous solution is mixed with 500 mL of 0.2M K₂Cr₂O₇ aqueous solution in acid medium. What is the concentration (in mol L⁻¹) of unreacted K₂Cr₂O₇ in the resultant solution?

Options :

1/3

1/20

1/300

1/30

Question Number : 128 Question Id : 1017174768 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Which one of the following involves decrease in entropy?

Options :
1. \[ 2\text{NaHCO}_3(\text{s}) \rightarrow \text{Na}_2\text{CO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g}) \]

2. \[ 2\text{NaHCO}_3(\text{s}) \rightarrow \text{Na}_2\text{CO}_3(\text{s}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{g}) \]

3. \[ \text{CCl}_4(\text{g}) \rightarrow \text{CCl}_4(\text{l}) \]

4. \[ \text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g}) \]

5. \[ \text{Zn}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{ZnCl}_2(\text{aq}) + \text{H}_2(\text{g}) \]

6. \[ \text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s}) \]

7. \[ \text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s}) \]

Question Number : 129  Question Id : 1017174769  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( K_C \) for the equilibrium reaction \[ 2\text{ABC}(\text{g}) \rightleftharpoons 2\text{AB}(\text{g}) + \text{C}_2(\text{g}) \] is \( X \) at \( T(K) \), its \( K_P \) at the same temperature is:

\[ T(K), 2\text{ABC}(\text{g}) \rightleftharpoons 2\text{AB}(\text{g}) + \text{C}_2(\text{g}) \] K_C = X  

\[ \text{Options:} \]

1. \( X.T \)
2. \( X(RT) \)
3. \( \left( \frac{X}{T} \right)R \)
4. \( \frac{XT}{R} \)

Question Number : 130  Question Id : 1017174770  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Assertion (A): For every chemical reaction at equilibrium, standard Gibbs energy change of the reaction is zero.

Reason (R): At constant temperature and pressure chemical reactions are spontaneous in the direction of decreasing Gibbs energy.

Options:
1. Both (A) and (R) are correct and (R) is the correct explanation of (A).
2. Both (A) and (R) are correct but (R) is not the correct explanation of (A).
3. (A) is correct and (R) is not correct.
4. (A) is not correct but (R) is correct.

The reaction in which dihydrogen is acting as an oxidising agent is

Options:
1. \( \text{Pd}^{2+}_{(aq)} + \text{H}_2_{(g)} \rightarrow \text{Pd}_{(s)} + 2\text{H}^+_{(aq)} \)
2. \( \text{Pd}^{2+}_{(aq)} + \text{H}_2_{(s)} \rightarrow \text{Pd}_{(s)} + 2\text{H}^+_{(aq)} \)
3. \( \text{CuO}_{(s)} + \text{H}_2_{(g)} \rightarrow \text{Cu}_{(s)} + \text{H}_2\text{O}_{(g)} \)
4. \( \text{CuO}_{(s)} + \text{H}_2_{(s)} \rightarrow \text{Cu}_{(s)} + \text{H}_2\text{O}_{(s)} \)
5. \( 2\text{Na}_{(s)} + \text{H}_2_{(g)} \rightarrow 2\text{NaH}_{(s)} \)
6. \( 2\text{Na}_{(s)} + \text{H}_2_{(s)} \rightarrow 2\text{NaH}_{(s)} \)
Which one of the following ions participates in the production of ATP from the oxidation of glucose?

Options:
1. Na⁺
2. Co²⁺
3. Fe³⁺
4. K⁺

Which of the following is not correct regarding Orthoboric acid?

Options:
1. Orthoboric acid can be prepared by the reaction of HCl with Na₂B₄O₇
2. Orthoboric acid contains planar BO₃ units.
3. Orthoboric acid releases three H⁺ ions in water.
4. Orthoboric acid when heated above 370 K, forms HBO₂ which on further heating forms B₂O₃.
Which one of the following statements is not correct?

Options:

1. Hydrolysis of \((\text{CH}_3)_2\text{SiCl}_2\) gives product which undergoes condensation polymerisation to form long chain silicones.

2. \(\text{SiO}_2\) is soluble in HF.

3. Hydrated zeolites are used as ion exchangers to reduce the hardness of hard water.

4. Water gas contains about 40% of \(\text{CO}_2\).

---

The COD of water sample is determined using

Options:

1. 50% \(\text{H}_2\text{SO}_4\), \(\text{K}_2\text{Cr}_2\text{O}_7\)

2. 50% \(\text{NaOH}\), \(\text{K}_2\text{Cr}_2\text{O}_7\)

3. 50% \(\text{CH}_3\text{COOH}\), \(\text{KMnO}_4\)

4. 50% \(\text{H}_2\text{SO}_4\), \(\text{FeSO}_4\)
Which of the following statements are not correct?

a. The energy of resonance hybrid structure is higher than that of the possible canonical structures of the molecule.
b. When inductive effect and electromeric effect operate in opposite directions, electromeric effect predominates.
c. When the π electrons of the multiple bond are transferred to that atom to which the attacking reagent does not get attached, it is knows as +E effect.
d. The resonance structures with separation of opposite charges are more stable.

Which one among the following undergoes dehydrohalogenation most readily?

Options:
1. \((\text{H}_3\text{C})_2\text{CH} - \text{Cl}\)
2. \((\text{H}_3\text{C})_2\text{CH} - \text{I}\)
3. \((\text{H}_3\text{C})_2\text{CH} - \text{Br}\)
4. \((\text{H}_3\text{C})_3\text{C} - \text{I}\)
The trend in acidic behaviour of the following hydrocarbons is

<p>| | | | |</p>
<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
</tr>
</tbody>
</table>

Options:
1. c > d > a > b
2. d > a > b > c
3. a > d > b > c
4. b > a > d > c

An element with molar mass $2.7 \times 10^{-2}$ kg mol$^{-1}$ forms a cubic unit cell with edge length of 405 pm. If its density is $2.7 \times 10^3$ kg m$^{-3}$, the nature of cubic unit cell is:

$$N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$$

Options:
1. face centered cubic
2. simple cubic
3. body centered cubic
4. end centered

---

Question Number: 139  Question Id: 1017174779  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

2.7 $\times 10^{-2}$ kg mol$^{-1}$ ఉమ్మడి గ్రామాదాయం కే సారం, 405 pm ఎడిక రెండు కూడా అవసానం కనిపించిన కార్యంగా ఉండటం. తేది తొలి 2.7 $\times 10^3$ kg m$^{-3}$ ఏమాస్స్ సాధ్యం కూడా కార్యంగా ఉండటం ఉంది?

$$N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$$

Options:
1. face centered cubic
2. simple cubic
3. body centered cubic
4. end centered

---

Question Number: 140  Question Id: 1017174780  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical
At $T(K)$, the vapour pressures of two liquids, heptane and octane are 106 kPa and 47 kPa respectively. If 25g of heptane and 57g of octane form an ideal solution, at $T(K)$ the vapour pressure of solution in kPa is:

$T(K)$ చే, హెప్టనె, అక్టేనె యొక్క విస్తృతి సూచించడం కాలు 106 kPa, 47 kPa. 25g హెప్టనె, 57g అక్టేనె యొక్క విస్తృతి సూచించడం కాలు, $T(K)$ చే, హెప్టనె అక్టేనె యొక్క విస్తృతి సూచించడం కాలు యొక్క kPa యొక్క

Options:
1. 66.66
2. 76.5
3. 50.0
4. 60.0

Question Number : 141 Question Id : 1017174781 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

At $27^\circ C$, the osmotic pressure of a solution containing 4g of a non-electrolyte solute in 1.0 L of solution is 0.4 bar. The molar mass of the solute in g mol$^{-1}$ is:

$R = 0.083$ L bar K$^{-1}$mol$^{-1}$

$27^\circ C$ చే, 4g అనే విస్తృతి కలిగిన 1.0 L లో ఉంది అనే విస్తృతి 0.4 bar. అనే విస్తృతి సూచించడం కాలు యొక్క g mol$^{-1}$ యొక్క $R = 0.083$ L bar K$^{-1}$mol$^{-1}$

Options:
1. 24.6
2. 49.2
3. 249
4. 180

Question Number : 142 Question Id : 1017174782 Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Standard Gibbs energy change in kJ mol$^{-1}$ for a galvanic cell:

$A(s) + B^{3+} (aq) \rightarrow A^{3+} (aq) + B(s)$ that has standard emf of 0.5V is: $(F = 96500$ C mol$^{-1}$)

$0.5V$ యొక్క విస్తృతి మందము అనే $A(s) + B^{3+} (aq) \rightarrow A^{3+} (aq) + B(s)$ అనే విస్తృతి యొక్క $k$ kJ mol$^{-1}$ యొక్క $F = 96500$ C mol$^{-1}$

Options:
1. -193.50
2. -96.50
The rate equation for the decomposition of a compound ‘A’ in terms of partial pressure is given as, \( \text{rate} = k(P_A)^{\frac{3}{2}} \). If the pressure is measured in bar and time in minutes, then the units of rate constant is:

Options:
1. \( \text{min}^{-1} \)
2. \( \text{bar}^2 \text{min}^{-1} \)
3. \( \text{bar}^{-1} \text{min}^{-1} \)
4. \( \text{bar}^2 \text{min}^{-1} \)

Which one of the following is correct?

Options:
1. \( \text{As}_2\text{S}_3 \) is a positively charged sol.
2. \( \text{As}_2\text{S}_3 \) is negatively charged

The refractive indices of the dispersed phase and the dispersion medium differ greatly in magnitude to observe Tyndall effect.

Options:
1. \( \text{As}_2\text{S}_3 \) is a positively charged sol.
2. \( \text{As}_2\text{S}_3 \) is negatively charged
Ultra microscope provides information about the size and shape of colloidal particles.

Finest gold sol is green in colour.

In vapour phase refining, metal A is purified by Van Arkel method and metal B is purified by Mond’s process. A and B are respectively.

Options:
1. Zr, Ti
2. Ti, Zn
3. Ti, Ni
4. Zr, Fe

Which one of the following phosphorous halide has tetrahedral and octahedral shaped ions?

Options:
1. liquid PCl₃
2. gaseous PCl₅
3. solid PCl₅
4. gaseous PCl₅
Potassium permanganate on heating gives potassium manganate, oxygen and X. For which of the following reactions, X is used as a catalyst.

Options:
1. \(2\text{KC}l\text{O}_3 \xrightarrow{\Delta} 2\text{KCl} + 3\text{O}_2\)
2. \(2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3\)
3. \(4\text{HCl} + \text{O}_2 \rightarrow 2\text{Cl}_2 + 2\text{H}_2\text{O}\)
4. \(4\text{NH}_3 + 5\text{O}_2 \rightarrow 4\text{NO} + 6\text{H}_2\text{O}\)

Question Number: 148  Question Id: 1017174788  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

The hydrolysis products of \(\text{BrF}_5\) molecule are

Options:
1. \(\text{HBr}, \text{HOF}\)
2. \(\text{HF}, \text{HBrO}_3\)
3. \(\text{HF}, \text{HBrO}_4\)
4. \(\text{HF}, \text{HBrO}_2\)

Question Number: 149  Question Id: 1017174789  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

The magnetic moment of \([\text{CoF}_6]^{3-}\) as per spin only formula (in BM) is

Options:
1. 3.87
2. 5.92
3. 2.84
4. 4.90
The electronic configuration of a metal ion in its complex is [Ar]3d⁴. For this metal complex, \( \Delta_0 < P \) (P = energy required for electron pairing in a single orbital). The distribution of electrons in the complex.

\[ (t_{2g})^3 (e_g)^1 \]
\[ (t_{2g})^2 (e_g)^2 \]
\[ (t_{2g})^4 (e_g)^0 \]
\[ (t_{2g})^1 (e_g)^3 \]

Options:

Which of the following statements are correct?

a. Natural rubber becomes hard at high temperature
b. Neoprene is a polymer of 2-chloro -1, 3-butadiene
c. Nylon 6, 6 is a polyamide fibre
d. Buna-S is an example of a homopolymer

Options:

1. b, c
2. a, c, d
3. b, d
4. a, c
Which of the following statements are correct?

a. Deficiency of vitamin K results in increased blood clotting time.
b. The sources of vitamin B₂ are milk and liver

c. Hexapeptide has six peptide bonds

d. Improper functioning of adrenal cortex results in hypoglycemia.

Which of the following statements are correct?

a. విటామిన్ కుడి అవశేషం కావలసిన రకం కుறుకు వచ్చింది
b. మల్య మరియు శిరీశలో విటామిన్ బేరా ఉంటుంది
c. హెక్సిపెప్టిడ్ ముగ్గురు పెప్టిడ్ వాటి కలిగిన పెప్టిడ్
d. అడియోసోపొసు వస్తుంది అడియోసోపొసు మంటి వస్తాంటాను

Options:
1. b, c
2. a, c
3. b, d
4. a, b, d

Identify an artificial sweetener (A) and tranquilizer (B) from the following

ైంటి పాటు అతిపరిపాలనలు (A) నాటికి పాటుపాలనలు (B) ని కొనిపించాలి

Options:

A

B

1.
Which of the following statements are correct?

a. Aspartame is more sweeter than saccharin
b. Shaving soaps contain glycerol to prevent drying
c. Salt of sorbic acid is used as a food preservative
d. Norethindrone is an example of an antifertility drug

Which of the following statements are correct?

a. యిద్ది ప్రతిందికి మిగిలితే ఉండడాం?
b. శాడి ప్యాస్సెట్ భాగం గ్లిఫరోలు తూర్పు ఉపయోగిస్తారు
c. నీలికు ప్రతింధితం మాత్రమే ఉండాలి 

d. నరేమ్ధడు ప్రతిండికి ఉపయోగించడానికి ఉండాలి

Options:
1. a, c, d
2. b, c, d
Consider the following reaction

\[
\text{Br} \quad \text{CH}_3 - \text{CH}_2 - \text{CH} - \text{CH}_3 + \text{KOH} \quad \Delta \quad \text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CH}_2 + \text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3
\]

I

II

Which of the following statements are correct?

a. I is the major product of the reaction
b. II is the major product of the reaction
c. Formation of I is in accordance with Saytzeff’s rule
d. II is more stable because it is more substituted

Which of the following statements are correct?

a. అంతరించిని మినుతుంది
b. అంతరించిని మినుతుంది
c. I నిర్భేష్టంగా సిద్ధించబడతాయి
d. II ఆధారంగా కషించబడతాయి

Options:

1. a, c
2. c, d
3. a, d
The compound which exhibits both geometrical and optical isomerism is

Options:
1. 
2. 
3. 
4. 

What are A and B in the following reactions.

Options:

\[
\begin{align*}
\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{O} - \text{C} - \text{CH}_2 - \text{CH}_3 &\xrightarrow{\text{HI}} \text{A} + \text{B} \\
\text{CH}_3
\end{align*}
\]
Identify A, B and C in the following reactions:

\[ \text{Toluene} + A + B \xrightarrow{273-283K} C \xrightarrow{\Delta} \text{Benzaldehyde} \]

Options:

- A
- B
- C

\[\text{CrO}_3 \quad (\text{CH}_3\text{CO})_2\text{O} \quad \text{CH}(-\text{OCOCH}_3)_2\]
What are A, B and C in the following reactions?

A: $\text{K}_2\text{Cr}_2\text{O}_7$
B: $\text{SnCl}_2|\text{HCl}$
C: $\text{AlH}(\text{i-Bu})_2$

i) $\text{H}^+$
ii) $\text{H}_3\text{O}^+$
The number of resonance structures, aniline and anilinium ion can have are respectively

Options:
1. 2, 5
2. 4, 5
3. 3, 4
4. 5, 2