### Question Paper Preview

**Question Paper Name:** ENGINEERING 22nd April Shift 1  
**Subject Name:** ENGINEERING  
**Duration:** 180 minutes  

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<th>Number of Questions:</th>
<th>80</th>
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<td>80</td>
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<tr>
<td>Display Number Panel:</td>
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<td>Group All Questions:</td>
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**Question Number: 1**  
**Question Id:** 4557343681  
**Question Type:** MCQ  
**Display Question Number:** Yes  
**Single Line Question Option:** No  
**Option Orientation:** Vertical

If \( f : \mathbb{R} \to \mathbb{R} \) is defined by \( f(x) = [2x] - 2[x] \) for \( x \in \mathbb{R} \), then the range of \( f \) is

(Here \([x]\) denotes the greatest integer not exceeding \(x\))

\[
f : \mathbb{R} \to \mathbb{R} \text{ for } x \in \mathbb{R} \text{ s.t. } f(x) = [2x] - 2[x] \text{ is defined, where } f \text{ is a function of } x\]

(Here \([x]\) denotes the greatest integer not exceeding \(x\))

**Options:**

1. \(\mathbb{Z}\), the set of all integers
2. \(\mathbb{N}\), the set of all natural numbers
3. \(\mathbb{R}\), the set of all real numbers
4. \(\{0, 1\}\)

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**Question Number: 2**  
**Question Id:** 4557343682  
**Question Type:** MCQ  
**Display Question Number:** Yes  
**Single Line Question Option:** No  
**Option Orientation:** Vertical
Given that \( a, b \) and \( c \) are real numbers such that \( b^2 = 4ac \) and \( a > 0 \). The maximal possible set \( D \subseteq \mathbb{R} \) on which the function \( f : D \rightarrow \mathbb{R} \) given by

\[
f(x) = \log\left\{ ax^3 + (a+b)x^2 + (b+c)x + c \right\}
\]
is defined, is

\[ a, b, c \text{ are } b^2 = 4ac, \ a > 0 \text{ satisfying condition (1).} \text{ Define } f : D \rightarrow \mathbb{R},
\]

\[
f(x) = \log\left\{ ax^3 + (a+b)x^2 + (b+c)x + c \right\} \text{ to be continuous in some interval.}
\]

\[ \text{Following } D \subseteq \mathbb{R},
\]

Options:

1. \( \mathbb{R} - \left\{ -\frac{b}{2a} \right\} \)
2. \( \mathbb{R} - \left( \left\{ -\frac{b}{2a} \right\} \cup (-\infty, -1) \right) \)
3. \( \mathbb{R} - \left( \left\{ -\frac{b}{2a} \right\} \cup \{ x : x \geq 1 \} \right) \)
4. \( \mathbb{R} - \left( \left\{ -\frac{b}{2a} \right\} \cup (-\infty, -1] \right) \)

Question Number : 4 Question Id : 4557343684 Question Type : MCQ Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

For any natural number \( n \), \( (15 \times 5^{2n}) + (2 \times 2^{3n}) \) is divisible by

\[ 15 \times 5^{2n} + (2 \times 2^{3n}) \text{ is divisible by some number } \]

Options:

1. 7
2. 11
3. 13
4. 17
For the matrix \( A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix} \), \( A^{-1} = \) 

\[
\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}^{-1}
\]

Options:
1. \( A \)
2. \( A^2 \)
3. \( A^3 \)
4. \( A^4 \)

If \( A = \begin{bmatrix} \frac{k}{2} & 0 & 0 \\ 0 & \frac{l}{3} & 0 \\ 0 & 0 & \frac{m}{4} \end{bmatrix} \) and \( A^{-1} = \begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{1}{4} \end{bmatrix} \) then \( k + l + m = \)

Options:
1. 1
2. 9
3. 14
4. 29
Question Number : 6  Question Id : 4557343686  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If A and B are the two real values of k for which the system of equations
\[ x + 2y + z = 1, \quad x + 3y + 4z = k, \quad x + 5y + 10z = k^2 \]
is consistent, then A + B =

\[ x + 2y + z = 1, \quad x + 3y + 4z = k, \quad x + 5y + 10z = k^2 \]

Options:
1. 3
2. 4
3. 5
4. 7

Question Number : 7  Question Id : 4557343687  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Let \( z = x + iy \) and a point \( P \) represent \( z \) in the Argand plane. If the real part of \( \frac{z-1}{z+i} \) is 1, then a point that lies on the locus of \( P \) is

\[ z = x + iy \quad \text{where} \quad x, y \in \mathbb{R} \]

Options:

Question Number : 8  Question Id : 4557343688  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
If \(13e^{\tan^{-1}\frac{5}{12}} = a + ib\), then the ordered pair \((a, b)\) =

\(13e^{\tan^{-1}\frac{5}{12}} = a + ib\)  \(\approx \) (12, 5)

Options :
1. (12, 5)
2. (5, 12)
3. (24, 10)
4. (10, 24)

If \(z_1 = 1 - 2i; z_2 = 1 + i\) and \(z_3 = 3 + 4i\), then \(\left(\frac{1}{z_1} + \frac{3}{z_2}\right) \frac{z_3}{z_2} = \)

\(z_1 = 1 - 2i; z_2 = 1 + i, z_3 = 3 + 4i\)  \(\approx \) (13, 3i)

Options :
1. 13 - 6i
2. 13 - 3i
3. \(\frac{6 - 13i}{2}\)
4. \(\frac{13}{2} - 3i\)

Question Number : 10  Question Id : 4557343690  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
If $1, \omega, \omega^2$ are the cube roots of unity, then \[ \frac{1}{1+2\omega} + \frac{1}{2+\omega} - \frac{1}{1+\omega} = \]

Options:
1. 1
2. $\omega$
3. $\omega^2$
4. 0

Question Number : 11  Question Id : 4557343691  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The number of integral values of $x$ satisfying $5x - 1 < (x + 1)^2 < 7x - 3$ is

$5x - 1 < (x + 1)^2 < 7x - 3 \Rightarrow x \in \text{integral values satisfying the inequality}$

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

Question Number : 12  Question Id : 4557343692  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

For real number $x$, if the minimum value of $f(x) = x^2 + 2bx + 2c^2$ is greater than the maximum value of $g(x) = -x^2 - 2cx + b^2$, then

$x \text{ satisfies the quadratic equation, } f(x) = x^2 + 2bx + 2c^2 = 0 \text{ or } g(x) = -x^2 - 2cx + b^2 = 0 \text{ or } f(x) \text{ reaches its minimum, } g(x) \text{ reaches its maximum}$

Options:
1. $c^2 > 2b^2$
2. $c^2 < 2b^2$
3. \( b^2 = 2c^2 \)

4. \( c^2 = 2b^2 \)

Question Number : 13  Question Id : 4557343693  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If \( a, b \) and \( c \) are the roots of \( x^3 + qx + r = 0 \), then \((a - b)^2 + (b - c)^2 + (c - a)^2 =\)

\( a, b, c \) are the roots of \( x^3 + qx + r = 0 \) \( \Rightarrow \) \((a - b)^2 + (b - c)^2 + (c - a)^2 =\)

Options :
1. \(-6q\)
2. \(-4q\)
3. \(6q\)
4. \(4q\)

Question Number : 14  Question Id : 4557343694  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If the sum of two roots of the equation \( x^3 - 2px^2 + 3qx - 4r = 0 \) is zero, then the value of \( r \) is

\( x^3 - 2px^2 + 3qx - 4r = 0 \) \( \Rightarrow \) the sum of two roots is \(-2p\) \( \Rightarrow \) \( r = \frac{3pq}{2} \)

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

Question Number : 15  Question Id : 4557343695  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
The sum of the four digit even numbers that can be formed with the digits 0, 3, 5, 4 without repetition is

2. 14684
3. 43536
3. 46526
4. 52336

Question Number: 16  Question Id: 4557343696  Question Type: MCQ  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

If \( x \) is the number of ways in which six women and six men can be arranged to sit in a row such that no two women are together and if \( y \) is the number of ways they are seated around a table in the same manner, then \( x:y = \)

Options:
1. 12 : 1
2. 42 : 1
3. 16 : 1
4. 6 : 1

Question Number: 17  Question Id: 4557343697  Question Type: MCQ  Display Question Number: Yes  Single Line Question Option: No  Option Orientation: Vertical

The number of 5-letter words that can be formed by using the letters of the word SARANAM is

Options:
1. 1120
Question Number : 18  Question Id : 4557343698  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The number of rational terms in the binomial expansion of \((\sqrt[4]{5} + \sqrt[4]{4})^{100}\) is

\((\sqrt[4]{5} + \sqrt[4]{4})^{100}\) రెండిందే, ఎంపిక సాధనాలు అందరిటే మాత్రమే రాయడు.

Options :
1. 50
2. 5
3. 6
4. 51

Question Number : 19  Question Id : 4557343699  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The numerically greatest term in the binomial expansion of \((2a - 3b)^{19}\) when \(a = \frac{1}{4}\) and \(b = \frac{2}{3}\) is

\((2a - 3b)^{19}\) జాతికి ఎత్తు మార్గణం అంటే \(a = \frac{1}{4}\) మాట్లాడంటే \(b = \frac{2}{3}\) మాట్లాడంటే జాతికి ఎత్తు మార్గణం అంటే.

Options :
1. \(19C_3 \cdot 2^{11}\)
2. \(19C_3 \cdot \frac{1}{2^{11}}\)
3. \(19C_4 \cdot \frac{1}{2^{13}}\)
4. \(19C_3 \cdot 2^{13}\)
If \[
\frac{x^2 + 5x + 7}{(x-3)^3} = \frac{A}{(x-3)} + \frac{B}{(x-3)^2} + \frac{C}{(x-3)^3},
\]
then the equation of the line having slope A and passing through the point (B, C) is

\[
\frac{x^2 + 5x + 7}{(x-3)^3} = \frac{A}{(x-3)} + \frac{B}{(x-3)^2} + \frac{C}{(x-3)^3}
\]

Options:
1. \(x + y - 20 = 0\)
2. \(x - y + 20 = 0\)
3. \(x + y + 20 = 0\)
4. \(x - y - 20 = 0\)

If \(\cos\left(x - \frac{\pi}{3}\right), \cos x, \cos\left(x + \frac{\pi}{3}\right)\) are in a harmonic progression, then \(\cos x = \)

\[
\cos\left(x - \frac{\pi}{3}\right), \cos x, \cos\left(x + \frac{\pi}{3}\right)
\]

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

Question Number : 22  Question Id : 4557343702  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
\[ \cos^3 110^\circ + \cos^3 10^\circ + \cos^3 130^\circ = \]
Options :
1. \( \frac{3}{4} \)
2. \( \frac{3}{8} \)
3. \( \frac{3\sqrt{3}}{8} \)
4. \( \frac{3\sqrt{3}}{4} \)

Question Number : 23  Question Id : 4557343703  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
If the general solution of \( \sin 5x = \cos 2x \) is of the form \( a_n \cdot \frac{\pi}{2} \) for \( n = 0, \pm 1, \pm 2, \ldots \), then \( a_n = \)
\[ n = 0, \pm 1, \pm 2, \ldots \]
\[ \sin 5x = \cos 2x \text{ है, तब } a_n \cdot \frac{\pi}{2} \text{ होना होता है, } a_n = \]
Options :
1. \( \frac{2n}{5 + 2(-1)^n} \)
2. \( \frac{2n + (-1)^n}{5 + 2(-1)^n} \)
3. \( \frac{2n + 1}{5 + 2(-1)^n} \)
4. \[ \frac{2n-1}{5+2(-1)^n} \]

Question Number : 24  Question Id : 4557343704  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

let \( x, y \) be real numbers such that \( x \neq y \) and \( xy \neq 1 \). If \( ax + b \sec(\tan^{-1}x) = c \) and \( ay + b \sec(\tan^{-1}y) = c \), then \( \frac{x + y}{1 - xy} = \)

Options :
1. \( \frac{2ab}{a^2 - b^2} \)
2. \( \frac{2ac}{a^2 + c^2} \)
3. \( \frac{2ab}{a^2 + b^2} \)
4. \( \frac{2ac}{a^2 - c^2} \)

Question Number : 25  Question Id : 4557343705  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

\( \tanh^{-1} \frac{1}{2} + \coth^{-1}3 = \)

Options :
1. \( \log \sqrt{6} \)
2. \( \log 6 \)
3. \(-\log \sqrt{6}\)

4. \(-\log 6\)

Question Number : 26  Question Id : 4557343706  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If the median of a \(\Delta ABC\) through \(A\) is perpendicular to \(AC\), then \(\frac{\tan A}{\tan C'} = \)

\(\frac{\text{తెలుగు సిద్ధాంతాలు} \ ABC \ సమీకరణ చతుర్భుజానికి, \ AC \ యొక్క వేరు తోండి, \ \frac{\tan A}{\tan C'} = \)

Options :

1. \(1 + \sqrt{2}\)

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

3. \(-2\)

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

Question Number : 27  Question Id : 4557343707  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

In \(\Delta ABC\), \(\tan \frac{A}{2} + \tan \frac{B}{2} = \)

\(\Delta ABC \ సమీకరణ చతుర్భుజానికి, \ \tan \frac{A}{2} + \tan \frac{B}{2} = \)

Options :

1. \(c \cot \frac{C}{2}\)

2. \(4s\)
In a $\triangle ABC$, D, E and F respectively are the points of contact of the incircle with the sides AB, BC and CA such that $AD = \alpha$, $BE = \beta$ and $CF = \gamma$, then $\frac{\alpha \beta \gamma}{\alpha + \beta + \gamma} =$

$\triangle ABC$ లో, AB, BC మరియు CA మేందు వైపుల సేందుల కొండలు మిశ్రమి కావచ్చును కనుగొనండి $AD = \alpha$, $BE = \beta$, $CF = \gamma$ అంటే, $\frac{\alpha \beta \gamma}{\alpha + \beta + \gamma} =$

Options :
1. $R^2$
2. $2R$
3. $2r$
4. $r^2$
Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three non-coplanar vectors. The vector equation of a line which passes through the point of intersection of two lines, one joining the points $\vec{a} + 2\vec{b} - 5\vec{c}, -\vec{a} - 2\vec{b} - 3\vec{c}$ and the other joining the points $-4\vec{c}, 6\vec{a} - 4\vec{b} + 4\vec{c}$ is

$$\vec{r} = 2\vec{a} - 4\vec{b} + 3\vec{c} + \mu(\vec{a} - 6\vec{b} + 4\vec{c})$$

2. $$\vec{r} = 3\vec{a} + 6\vec{b} - \vec{c} + \mu(\vec{a} + 2\vec{b} + \vec{c})$$

3. $$\vec{r} = 2\vec{a} + 3\vec{b} - \vec{c} + \mu(\vec{a} + \vec{b} - \vec{c})$$

4. $$\vec{r} = -2\vec{b} + 3\vec{c} + \mu(\vec{a} - 4\vec{b} + 3\vec{c})$$

In $\Delta PQR$, M is the mid-point of QR and C is the mid-point of PM. If QC when extended meets PR at N then $\frac{QN}{CN} =$

$\Delta PQR$ is QR 3-4-5 triangle M is the mid-point of PM 3-4-5 triangle C. QC is 3-4-5 triangle PR is 3-4-5 triangle N is the mid-point $\frac{QN}{CN} =$

Options:
1. 1
2. 2
3. 3
4. 4
If \( \vec{a} = \vec{i} - 2\vec{j} - 3\vec{k} \), \( \vec{b} = 2\vec{i} + \vec{j} - \vec{k} \), \( \vec{c} = \vec{i} + 3\vec{j} - 2\vec{k} \).

then \[ \left[(\vec{a} \times \vec{b}) \times (\vec{b} \times \vec{c})\right] = \left[(\vec{b} \times \vec{c}) \times (\vec{c} \times \vec{a})\right] = (\vec{c} \times \vec{a}) \times (\vec{a} \times \vec{b}) \]

\[
\vec{a} = \vec{i} - 2\vec{j} - 3\vec{k}, \quad \vec{b} = 2\vec{i} + \vec{j} - \vec{k}, \quad \vec{c} = \vec{i} + 3\vec{j} - 2\vec{k}
\]

Options:
1. 160000
2. -8000
3. 400
4. -40

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If \( \vec{a} = \vec{i} + 2\vec{j} + 3\vec{k} \), \( \vec{b} = -\vec{i} + 2\vec{j} + \vec{k} \), \( \vec{c} = \vec{i} + 2\vec{j} - 2\vec{k} \). \( \vec{n} \) is perpendicular to both \( \vec{a} \) and \( \vec{b} \).

and \( \theta \) is the angle between \( \vec{c} \) and \( \vec{n} \) then \( \sin \theta = \)

\[
\vec{a} = \vec{i} + 2\vec{j} + 3\vec{k}, \quad \vec{b} = -\vec{i} + 2\vec{j} + \vec{k}, \quad \vec{c} = \vec{i} + 2\vec{j} - 2\vec{k}
\]

Options:
1. \( \sqrt{2} \)
2. \( \frac{\sqrt{2}}{3} \)
3. \( \frac{2}{3} \)
4. \( \frac{\sqrt{3}}{2} \)
5. \( \frac{\sqrt{3}}{3} \)
If \( \vec{a}, \vec{b}, \vec{c} \) are mutually perpendicular vectors of the same magnitude, then the cosine of the angle between \( \vec{a} \) and \( \vec{a} + \vec{b} + \vec{c} \) is

\[
\cos \theta = \frac{\vec{a} \cdot (\vec{a} + \vec{b} + \vec{c})}{|\vec{a}||\vec{a} + \vec{b} + \vec{c}|}
\]

Options:

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

If \( \vec{a}, \vec{b}, \vec{c} \) are non-coplanar vectors and the four points with position vectors
\( 2\vec{a} + 3\vec{b} - \vec{c}, \vec{a} - 2\vec{b} + 3\vec{c}, 3\vec{a} + 4\vec{b} - 2\vec{c} \) and \( k\vec{a} - 6\vec{b} + 6\vec{c} \) are coplanar, then \( k = \)

\[
k\vec{a} - 6\vec{b} + 6\vec{c} \text{ is coplanar with } 2\vec{a} + 3\vec{b} - \vec{c}, \vec{a} - 2\vec{b} + 3\vec{c}, 3\vec{a} + 4\vec{b} - 2\vec{c}
\]

Options:

1. 0
2. 1
3. 2
4. 3
The mean and the standard deviation of a data of 8 items are 25 and 5 respectively. If two items 15 and 25 are added to this data, then the variance of the new data is

Options:
1. 29
2. 24
3. 26
4. \(\sqrt{29}\)

The mean deviation from the median for the following distribution (corrected to two decimals) is

<table>
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<tr>
<th>(x_i)</th>
<th>6</th>
<th>9</th>
<th>3</th>
<th>12</th>
<th>15</th>
<th>13</th>
<th>21</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>(f_i)</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Options:
1. 13.42
2. 5.45
3. 4.97
4. 11.25
If a die is rolled three times, then the probability of getting a larger number on its face than the previous number each time, is

Options:
1. 15
2. 216
3. 5
4. 54

A man is known to speak the truth 2 out of 3 times. If he throws a die and reports that it is six, then the probability that it is actually five, is

Options:
1. 3
2. 8
3. 1
4. 7
If the probability function of a random variable $X$ is defined by $P(X = k) = a \left( \frac{k+1}{2^k} \right)$ for $k = 0, 1, 2, 3, 4, 5$ then the probability that $X$ takes a prime value is

Options:
1. $\frac{13}{20}$
2. $\frac{23}{60}$
3. $\frac{11}{20}$
4. $\frac{19}{60}$

If $X$ is a binomial variate with mean 6 and variance 2, then the value of $P(5 \leq X \leq 7)$ is

Options:
1. $6561$
2. $6561$
3. $5264$
4. $6561$
Question Number : 41  Question Id : 4557343721  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

Let A(2, 3), B(3, –6), C(5, –7) be three points. If P is a point satisfying the condition \( PA^2 + PB^2 = 2PC^2 \), then a point that lies on the locus of P is

\[ A(2, 3), B(3, –6), C(5, –7) \text{ are points. P satisfies } PA^2 + PB^2 = 2PC^2 \text{ implies the line is a locus.} \]

Options :
1. (2, –5)
2. (–2, 5)
3. (13, 10)
4. (–13, –10)

Question Number : 42  Question Id : 4557343722  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

If the coordinates of a point P changes to (2, –6) when the coordinate axes are rotated through an angle of 135°, then the coordinates of P in the original system are

\[ \text{If coordinates change to } (2, –6) \text{ by rotation, then original coordinates are} \]

Options :
1. (–2, 6)
2. (–6, 2)
3. \((2\sqrt{2}, 4\sqrt{2})\)
4. \((\sqrt{2}, –\sqrt{2})\)
If the portion of a line intercepted between the coordinate axes is divided by the point \( (2, -1) \) in the ratio 3:2, then the equation of that line is

\[
\text{Options:}
\begin{align*}
1. & \quad 5x - 2y - 20 = 0 \\
2. & \quad 2x - y - 5 = 0 \\
3. & \quad 3x - y - 7 = 0 \\
4. & \quad x - 3y - 5 = 0
\end{align*}
\]

The equation of the line passing through the point of intersection of the lines \( 2x + y - 4 = 0 \), \( x - 3y + 5 = 0 \) and lying at a distance of \( \sqrt{5} \) units from the origin, is

\[
\text{Options:}
\begin{align*}
1. & \quad x - 2y - 5 = 0 \\
2. & \quad x + 2y - 5 = 0 \\
3. & \quad x + 2y + 5 = 0 \\
4. & \quad x - 2y + 5 = 0
\end{align*}
\]

The equation of the line joining the centroid with the orthocentre of the triangle formed by the points \((-2, 3), (2, -1), (4, 0)\) is

\[
\text{Options:}
\]

\[
(-2, 3), (2, -1), (4, 0) \text{ త్రిభుజం శతాంబం మాత్రమే, అంటే పైపై, అంటే చిన్న శతాంబం నిష్టు వింతలు వింతలు}
\]
1. \[ x + y - 2 = 0 \]
2. \[ 11x - y - 14 = 0 \]
3. \[ x - 11y + 6 = 0 \]
4. \[ 2x - y - 2 = 0 \]

**Question Number : 46**  
**Question Id : 4557343726**  
**Question Type : MCQ**  
**Display Question Number : Yes**  
**Single Line Question : Yes**  
**Option : No**  
**Option Orientation : Vertical**

The lines represented by the equations \( 23x^2 - 48xy + 3y^2 = 0 \) and \( 2x + 3y + 4 = 0 \) form

\[ 23x^2 - 48xy + 3y^2 = 0, \quad 2x + 3y + 4 = 0 \]

**Options :**

1. an isosceles triangle
2. a right angled triangle
3. an equilateral triangle
4. a scalene triangle

**Question Number : 47**  
**Question Id : 4557343727**  
**Question Type : MCQ**  
**Display Question Number : Yes**  
**Single Line Question : Yes**  
**Option : No**  
**Option Orientation : Vertical**

If the line \( x + 2y = k \) intersects the curve \( x^2 - xy + y^2 + 3x + 3y - 2 = 0 \) at two points A and B and if O is the origin, then the condition for \( \angle AOB = 90^\circ \) is

\[ x + 2y = k, \quad x^2 - xy + y^2 + 3x + 3y - 2 = 0 \]

**Options :**

1. \( k^2 + k + 1 = 0 \)
2. \( k^2 - 2k + 1 = 0 \)
3. \( 2k^2 + 9k - 10 = 0 \)
4. \( 3k^2 + 8k - 1 = 0 \)

Question Number : 48 Question Id : 4557343728 Question Type : MCQ Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If \( 2x^2 + 3xy - 2y^2 = 0 \) represents two sides of a parallelogram and \( 3x + y + 1 = 0 \) is one of its diagonals, then the other diagonal is

\[ 2x^2 + 3xy - 2y^2 = 0 \text{ and } 3x + y + 1 = 0 \]

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

Question Number : 49 Question Id : 4557343729 Question Type : MCQ Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

If the lengths of the tangents drawn from \( P \) to the circles \( x^2 + y^2 - 2x + 4y - 20 = 0 \) and \( x^2 + y^2 - 2x - 8y + 1 = 0 \) are in the ratio 2:1, then the locus of \( P \) is

\[ x^2 + y^2 - 2x + 4y - 20 = 0 \text{ and } x^2 + y^2 - 2x - 8y + 1 = 0 \]

Options :
1. \( x^2 + y^2 + 2x + 12y + 8 = 0 \)
2. \( x^2 + y^2 - 2x + 12y + 8 = 0 \)
3. \( x^2 + y^2 + 2x - 12y + 8 = 0 \)
4. \( x^2 + y^2 - 2x - 12y + 8 = 0 \)
The equation of a circle touching the coordinate axes and the line $3x - 4y = 12$ is

Options:
1. $x^2 + y^2 + 6x + 6y + 9 = 0$
2. $x^2 + y^2 + 6x + 6y - 9 = 0$
3. $x^2 + y^2 - 6x - 6y + 9 = 0$
4. $x^2 + y^2 - 6x - 6y - 9 = 0$

The pole of the straight line $9x + y - 28 = 0$ with respect to the circle $2x^2 + 2y^2 - 3x + 5y - 7 = 0$ is

Options:
1. $(3, 1)$
2. $(3, -1)$
3. $(-3, 1)$
4. $(4, -8)$

The point of intersection of the direct common tangents drawn to the circles $(x+11)^2 + (y-2)^2 = 225$ and $(x-11)^2 + (y+2)^2 = 25$ is

Options:
In List-I, a pair of circles is given in A, B, C and in List-II, angle between those pair of circles is given. Match the items from List-I to List-II.

<table>
<thead>
<tr>
<th>List-I</th>
<th>List-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) ((x - 2)^2 + y^2 = 2) ((x - 2)^2 + (y - 1)^2 = 1)</td>
<td>I) 90°</td>
</tr>
<tr>
<td>B) (x^2 + y^2 - 6x - 6y + 9 = 0) (x^2 + y^2 - 4x + 4y - 9 = 0)</td>
<td>II) 135°</td>
</tr>
<tr>
<td>C) (x^2 + y^2 + 4x - 14y + 28 = 0) (x^2 + y^2 + 4x - 5 = 0)</td>
<td>III) 60°</td>
</tr>
</tbody>
</table>

The correct matching is

Options:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>II</td>
<td>III</td>
</tr>
</tbody>
</table>
If the radical axis of the circles \( x^2 + y^2 + 2gx + 2fy + c = 0 \) and \( 2x^2 + 2y^2 + 3x + 8y + 2c = 0 \) touches the circle \( x^2 + y^2 + 2x + 2y + 1 = 0 \), then

\[
x^2 + y^2 + 2gx + 2fy + c = 0 \quad \text{and} \quad 2x^2 + 2y^2 + 3x + 8y + 2c = 0 \quad \text{and} \quad x^2 + y^2 + 2x + 2y + 1 = 0\]

Options:

1. \( g = \frac{3}{4} \) or \( f = 2 \)
2. \( g = \frac{3}{4} \) or \( f = 2 \)
3. \( g = \frac{3}{4} \), \( f \neq 2 \)
4. \( g = \frac{2}{5} \) or \( f = 1 \)
5. \( g = \frac{2}{5} \) or \( f = 1 \)
The line \( y = 6x + 1 \) touches the parabola \( y^2 = 24x \). The coordinates of a point \( P \) on this line, from which the tangent to \( y^2 = 24x \) is perpendicular to the line \( y = 6x + 1 \), is

\[ y = 6x + 1, \text{ therefore } y^2 = 24x \text{ is tangential to } P. \text{ Hence, } y^2 = 24x \text{ is tangential to } y = 6x + 1 \text{ at point } P \text{, \( y = 6x + 1 \) is perpendicular to tangent, } P \text{ is tangential.}

Options:

1. \((-1, -5)\)
2. \((-2, -11)\)
3. \((-6, -35)\)
4. \((-7, -41)\)

---

A point on the parabola whose focus is S \((1, -1)\) and whose vertex is A \((1, 1)\) is

\[ S (1, -1), \text{ A } (1, 1) \text{ is tangential at } \text{ point } \text{ and } S \text{ is tangential.} \]

Options:

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

---

Question Number : 56  Question Id : 4557343736  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Question Number : 57  Question Id : 4557343737  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
An ellipse having the coordinate axes as its axes and its major axis along Y-axis, passes through the point \((-3, 1)\) and has eccentricity \(\sqrt{\frac{2}{5}}\). Then its equation is

\[
\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1
\]

Options:
1. \(3x^2 + 5y^2 - 15 = 0\)
2. \(5x^2 + 3y^2 - 32 = 0\)
3. \(3x^2 + 5y^2 - 32 = 0\)
4. \(5x^2 + 3y^2 - 48 = 0\)

Question Number : 58  Question Id : 4557343738  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

The product of the perpendicular distances drawn from the points \((3, 0)\) and \((-3, 0)\) to the tangent of the ellipse \(\frac{x^2}{36} + \frac{y^2}{27} = 1\) at \(\left(3, \frac{9}{2}\right)\) is

\[
\frac{x^2}{36} + \frac{y^2}{27} = 1
\]

Options:
1. 36
2. 27
3. 9
4. 63

Question Number : 59  Question Id : 4557343739  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
The equation of the hyperbola whose asymptotes are the lines $3x + 4y - 2 = 0$, $2x + y + 1 = 0$ and which passes through the point $(1, 1)$ is

$$3x + 4y - 2 = 0, \quad 2x + y + 1 = 0$$

Options:

1. $6x^2 + 11xy + 4y^2 - 30x + 2y + 7 = 0$
2. $6x^2 + 11xy + 4y^2 - x + 2y - 22 = 0$
3. $6x^2 + 11xy + 4y^2 - x + 2y + 22 = 0$
4. $6x^2 + 11xy + 4y^2 - 3x - 7y - 11 = 0$

If the orthocentre and the centroid of a triangle are $(-3, 5, 2)$ and $(3, 3, 4)$ respectively, then its circumcentre is

Options:

1. $(6, 2, 5)$
2. $(6, 2, -5)$
3. $(6, -2, 5)$
4. $(6, -2, -5)$
A Plane cuts the coordinate axes \( X, Y, Z \) respectively such that the centroid of the \( \triangle ABC \) is \((6, 6, 3)\). Then the equation of that plane is

\[ x + y + z = 6 \]

\[ x + 2y + z = 18 \]

\[ 2x + y + z = 18 \]

\[ x + y + 2z = 18 \]

**Options:**
1. \( x + y + z = 6 \)
2. \( x + 2y + z = 18 \)
3. \( 2x + y + z = 18 \)
4. \( x + y + 2z = 18 \)

**Question Number:** 62  **Question Id:** 4557343742  **Question Type:** MCQ  **Display Question Number:** Yes  **Single Line Question Option:** No  **Option Orientation:** Vertical

If the foot of the perpendicular drawn from the origin to a plane is \((1, 2, 3)\), then a point on that plane is

\[ x + 2y + 3z = 1 \]

**Options:**
1. \((3, 2, 1)\)
2. \((7, 2, 1)\)
3. \((7, 3, -1)\)
4. \((6, -3, 4)\)

**Question Number:** 63  **Question Id:** 4557343743  **Question Type:** MCQ  **Display Question Number:** Yes  **Single Line Question Option:** No  **Option Orientation:** Vertical
If \([x]\) denotes the greatest integer \(\leq x\), then

\[
\lim_{n\to\infty} \frac{1}{n^3} \left[ \left\lfloor 1^2 x \right\rfloor + \left\lfloor 2^2 x \right\rfloor + \left\lfloor 3^2 x \right\rfloor + \ldots + \left\lfloor n^2 x \right\rfloor \right] =
\]

Options:
1. \(\frac{x}{2}\)
2. \(\frac{x}{3}\)
3. \(\frac{x}{6}\)
4. 0

If a function \(f\) defined by

\[
f(x) = \begin{cases} 
\frac{1 - \sqrt{2} \sin x}{\pi - 4x}, & \text{if } x \neq \frac{\pi}{4} \\
\pi, & \text{if } x = \frac{\pi}{4}
\end{cases}
\]

is continuous at \(x = \frac{\pi}{4}\), then \(k = \)

Options:
The derivative of \( f(x) = x \tan^{-1} x \) with respect to \( g(x) = \sec^{-1} \left( \frac{1}{2x^2 - 1} \right) \) is

\[
g(x) = \sec^{-1} \left( \frac{1}{2x^2 - 1} \right)
\]

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

Options:

1. \( \frac{1}{2} \sqrt{1-x^2} \cdot x \tan^{-1} x \left[ \frac{\log x + \tan^{-1} x}{1 + x^2} + \frac{\tan^{-1} x}{x} \right] \)

2. \( -\frac{1}{2} \sqrt{1-x^2} \cdot x \tan^{-1} x \left[ \log \left( \tan^{-1} x \right) + x \left( 1 + x^2 \right) \tan^{-1} x \right] \)

3. \( -2 \tan^{-1} x \left[ \frac{\log x}{1 + x^2} + \frac{\tan^{-1} x}{x} \right] \)

4. \( \frac{1}{2} \sqrt{1-x^2} \cdot x \tan^{-1} x \left[ \frac{\log x}{1 + x^2} + \frac{\tan^{-1} x}{x} \right] \)
If \( x = 3 \cos t \) and \( y = 4 \sin t \), then \( \frac{d^2y}{dx^2} \) at the point \( (x_0, y_0) = \left( \frac{3}{2} \sqrt{2}, 2 \sqrt{2} \right) \) is:

\[
x = 3 \cos t, \quad y = 4 \sin t \quad \implies \quad (x_0, y_0) = \left( \frac{3}{2} \sqrt{2}, 2 \sqrt{2} \right)
\]

\[
\frac{d^2y}{dx^2} = \quad \text{Options:}
\]

1. \( \frac{4 \sqrt{2}}{9} \)

2. \( -\frac{4 \sqrt{2}}{9} \)

3. \( \frac{8 \sqrt{2}}{9} \)

4. \( -\frac{8 \sqrt{2}}{9} \)

If \( y = \frac{2}{\sqrt{a^2 - b^2}} \tan^{-1} \left[ \frac{a-b}{a+b} \tan \frac{x}{2} \right] \), then \( \frac{d^2y}{dx^2} \bigg|_{x=\frac{\pi}{2}} = \)

\[
y = \frac{2}{\sqrt{a^2 - b^2}} \tan^{-1} \left[ \frac{a-b}{a+b} \tan \frac{x}{2} \right] \quad \implies \quad \frac{d^2y}{dx^2} \bigg|_{x=\frac{\pi}{2}} = \quad \text{Options:}
\]

1. \( \frac{b}{2a^2} \)

2. \( \frac{b}{a^2} \)

3. \( -\frac{2b}{a} \)
Question Number : 68  Question Id : 4557343748  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
Options :

If \( f(x) = x^3 + ax^2 + bx + 5 \sin^2 x \) is an increasing function on \( \mathbb{R} \), then

\[\int \frac{d}{dx} f(x) = x^3 + ax^2 + bx + 5 \sin^2 x \text{ is an increasing function on } \mathbb{R}, \text{ if} \]

Options :
1. \( a^2 - 3b - 15 < 0 \)
2. \( a^2 - 3b + 15 > 0 \)
3. \( a^2 - 3b - 15 > 0 \)
4. \( a^2 + 3b + 15 > 0 \)

Question Number : 69  Question Id : 4557343749  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
Options :

The approximate value of \( \cos 31^\circ \) is (Take \( 1^\circ = 0.0174 \))

\[\cos 31^\circ \text{ is } (1^\circ = 0.0174 \text{ rad}) \]

Options :
1. 0.7521
2. 0.866
3. 0.7146
4. 0.8573

Question Number : 70  Question Id : 4557343750  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
Options :

If \( x \) and \( y \) are two positive numbers such that \( x + y = 32 \), then the minimum value of \( x^2 + y^2 \) is,

\[x + y = 32 \text{ and } x + y = 32 \text{ gives } x, y \text{ as both } \frac{x}{2} \text{ and } \frac{y}{2} \text{ hence } x = y = 16, x^2 + y^2 \text{ is minimum at both.} \]
The constant ‘c’ of Lagrange’s mean value theorem for the function \( f(x) = \frac{2x + 3}{4x - 1} \) defined on \([1, 2]\) is

\[ f'(c) = \frac{2}{4} \]

\[ f'(c) = \frac{1}{2} \]

\[ \frac{1}{2} = \frac{2x + 3}{4x - 1} \]

\[ 2x + 3 = \frac{2}{4x - 1} \]

\[ 2x + 3 = \frac{1}{2}x + \frac{3}{2} \]

\[ 2x = \frac{x}{2} \]

\[ x = \frac{1}{2} \]

\[ f'(c) = \frac{1}{2} \]

Options:

1. \( \frac{1}{3} \)
2. \( \frac{1}{4} \)
3. \( \frac{5}{3} \)
4. \( \frac{1}{2} \)

\[ \int \frac{\sin 2x \, dx}{\sin^4 x + \cos^4 x} = \tan^{-1}(f(x)) + c, \quad \text{then} \quad f\left(\frac{\pi}{3}\right) = \]

\[ \int \frac{\sin 2x \, dx}{\sin^4 x + \cos^4 x} = \tan^{-1}(f(x)) + c, \quad \text{also,} \quad f\left(\frac{\pi}{3}\right) = \]

Options:
1. \( \frac{1}{3} \)

2. \( \frac{3}{4} \)

3. \( \frac{1}{3} \)

4. \( \frac{1}{3} \)

Question Number : 73  Question Id : 4557343753  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

\[ \int \left( \frac{\log x - 1}{1 + (\log x)^2} \right)^2 \, dx = \]

Options :

1. \( \frac{\log x}{1 + (\log x)^2} + c \)

2. \( \frac{x}{x^2 + 1} + c \)

3. \( \frac{x}{1 + (\log x)^2} + c \)

4. \( \frac{-x}{1 + (\log x)^2} + c \)

Question Number : 74  Question Id : 4557343754  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

\[ \int \frac{dx}{x^3 + 3x^2 + 2x} = \]

Options :

1. \( \log|x| + \log \left| \frac{x+2}{x+1} \right| + c \)

2. \( \log|x| - \log|x+1| + \log|x+2| + c \)
\[ \frac{1}{2} \log |x| + \log |x+1| + \log |x+2| + c \]

\[ \frac{1}{2} \log \left( \frac{x^2 + 2x}{(x+1)^2} \right) + c \]

Question Number : 75  Question Id : 4557343755  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical

For \( n \geq 2 \), if \( I_n = \int \sec^n x \, dx \), then \( I_4 - \frac{2}{3} I_2 = \)

\[ n \geq 2 \Rightarrow I_n = \int \sec^n x \, dx \Rightarrow I_4 - \frac{2}{3} I_2 = \]

Options :
1. \( \sec^2 x \tan x + c \)
2. \( \frac{1}{3} \sec^2 x \tan x + c \)
3. \( \frac{2}{3} \sec^2 x \tan x + c \)
4. \( \frac{1}{3} \log |\sec x + \tan x| + c \)

Question Number : 76  Question Id : 4557343756  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical

\( \lim_{n \to \infty} \left( \frac{\sqrt{1} + 2\sqrt{2} + 3\sqrt{3} + \ldots + n\sqrt{n}}{\frac{5}{n^2}} \right) = \)

Options :
1. 1
2. \( \frac{5}{2} \)
\[ \int_{0}^{\alpha/3} \frac{f(x)}{f(x) + f\left(\frac{\alpha - 3x}{3}\right)} \, dx = \]

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

The area (in sq. units) of the region bounded by the X-axis and the curve \( y = 1 - x - 6x^2 \) is

\[ y = 1 - x - 6x^2 \text{   के   } X-अक्ष के संयुक्त क्षेत्र की क्षेत्रफल } \]

Options:
1. 125
2. 216
3. 125
4. 512
If \( m \) and \( n \) are respectively the order and degree of the differential equation of the family of parabolas with focus at the origin and X-axis as its axis, then \( mn - m + n = \)

\[
\frac{25}{216} \cdot \frac{25}{512}
\]

Question Number : 79  Question Id : 4557343759  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

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

Question Number : 80  Question Id : 4557343760  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

The general solution of \( \left( 1 + e^y \right) dx + e^y \left( 1 - \frac{x}{y} \right) dy = 0 \) is

\[
\left( 1 + e^y \right) dx + e^y \left( 1 - \frac{x}{y} \right) dy = 0
\]

Options :
1. \( ye^x + x = c \)
\[ \frac{y}{x} \]
\[ ye^y - x = c \]

\[ \frac{y}{x} \]
\[ ye^y + y = c \]

\[ \frac{y}{x} \]
\[ ye^y + x = c \]

---

**Physics**

- Number of Questions: 40
- Section Marks: 40
- Display Number Panel: Yes
- Group All Questions: No

**Question Number:** 81  **Question Id:** 4557343761  **Question Type:** MCQ  **Display Question Number:** Yes  **Single Line Question Option:** No  **Option Orientation:** Vertical

Two resistances 60.36 Ω and 30.09 Ω are connected in parallel. The equivalent resistance is...

Options:

1. 20 ± 0.08 Ω
2. 20 ± 0.06 Ω
3. 20 ± 0.03 Ω
4. 20 ± 0.10 Ω

**Question Number:** 82  **Question Id:** 4557343762  **Question Type:** MCQ  **Display Question Number:** Yes  **Single Line Question Option:** No  **Option Orientation:** Vertical

---

**Telugu Translated Text:**

Two resistances 60.36 Ω and 30.09 Ω are connected in parallel. The equivalent resistance is...

Options:

1. 20 ± 0.08 Ω
2. 20 ± 0.06 Ω
3. 20 ± 0.03 Ω
4. 20 ± 0.10 Ω
Assertion (A) : The velocity of a projectile at a point on its trajectory is equal to the slope at that point.

Reason (R) : The velocity vector at a point is always along the tangent to the trajectory at that point.

Options :

Both (A) and (R) are true and (R) is the correct explanation of (A)

(A), (R) ఎంపద సంభాటం నిషేదం (R), (A) ఎంపద నిషేదం

Both (A) and (R) are true but (R) is not the correct explanation of (A)

(A), (R) ఎంపద సంభాటం నిషేదం (R), (A) ఎంపద నిషేదం

(A) is true but (R) is false

(A) ఎంపద నిషేదం (R) ఎంపద

(A) is false but (R) is true

(A) ఎంపద నిషేదం (R) ఎంపద

---

A body is projected from the ground at an angle of $\tan^{-1}\left(\frac{8}{7}\right)$ with the horizontal. The ratio of the maximum height attained by it to its range is

ఒక పాత మాట్లాడబడింది స్థానం నుంచి $\tan^{-1}\left(\frac{8}{7}\right)$ సమాసంతు హోరిపాతకతో. వంటి వ్యాసాన్ని ప్రతిరోజు పొడవు వంటి వ్యాసాన్ని నుంచి పొడవు కంటే వంటి వ్యాసాన్ని పొడవు వంటి వ్యాసాన్ని నుంచి పొడవు

Options :

1. 8 : 7

2. 4 : 7
A body is projected with a speed ‘u’ at an angle ‘θ’ with the horizontal. The radius of curvature of the trajectory when it makes an angle \( \frac{\theta}{2} \) with the horizontal is \( \frac{g}{u^2 \cos^2 \theta \sec^3 \left( \frac{\theta}{2} \right)} \) (g - acceleration due to gravity).

Options:

1. \( \frac{u^2 \cos^2 \theta \sec^3 \left( \frac{\theta}{2} \right)}{\sqrt{3}g} \)
2. \( \frac{u^2 \cos^2 \theta \sec^3 \left( \frac{\theta}{2} \right)}{2g} \)
3. \( \frac{2u^2 \cos^3 \theta \sec^2 \left( \frac{\theta}{2} \right)}{g} \)
4. \( \frac{u^2 \cos^2 \theta \sec^3 \left( \frac{\theta}{2} \right)}{g} \)
Sand is to be piled up on a horizontal ground in the form of a regular cone of a fixed base of radius \( R \). Coefficient of static friction between the sand layers is \( \mu \). Maximum volume of the sand that can be piled up in the form of cone without slipping on the ground is

\[
\frac{\mu R^3}{3\pi}
\]

Options:
1. \( \frac{\mu R^3}{3\pi} \)
2. \( \frac{\mu R^3}{3} \)
3. \( \frac{\pi R^3}{3\mu} \)
4. \( \frac{\mu\pi R^3}{3} \)
A block of mass 2 kg is being pushed against a wall by a force \( F = 90 \text{ N} \) as shown in the figure. If the coefficient of friction is 0.25, then the magnitude of acceleration of the block is 

\[
(g = 10 \text{ m/s}^2) \left( \sin 37^\circ = \frac{3}{5} \right)
\]

2 kg (స్తరంలోను కలుస్తున్న 90 N కలుప్పు ఉన్న సాధనాకారానికి యొక్కుడు బోర్డు పెయించగా వచ్చింది. కానీ సంబంధం 0.25 చేతి ఉండదు అంటే చిహ్నాల ఉంటాయి)

\[
(g = 10 \text{ m/s}^2) \left( \sin 37^\circ = \frac{3}{5} \right)
\]

Options:
1. 16 ms\(^{-2}\)
2. 8 ms\(^{-2}\)
3. 38 ms\(^{-2}\)
4. 54 ms\(^{-2}\)

---

A body of mass 2 kg thrown vertically upward from the ground with a velocity of 8 ms\(^{-1}\) reaches a maximum height of 3 m. The work done by the air resistance is ______

(Acceleration due to gravity = 10 ms\(^{-2}\))

8 ms\(^{-1}\)లో ఉండి వేగం విస్తృతి నుండి పరిపాలన వేగం మీద ఉండది 2 kg నాలుగు యొక్క మార్గం మార్గం మార్గం మార్గం మార్గం 3 m. ప్రభుత్వ నిపుణుడు అంటే చిహ్నాల ఉంటాయి

(Acceleration due to gravity = 10 ms\(^{-2}\))

Options:
1. 4 J
The system of two masses 2 kg and 3 kg shown in the figure is released from rest. The work done on 3 kg block by the force of gravity during first 2 seconds of its motion is \((g = 10 \text{ ms}^{-2})\)

Options:
1. 120 J
2. 80 J
3. 40 J
4. 30 J
A rigid metallic sphere is spinning around its own axis in the absence of external torque. If the temperature is raised, its volume increases by 9%. The change in its angular speed is

Options:

1. increases by 9%
2. decreases by 9%
3. increases by 6%
4. decreases by 6%

---

Question Number : 90  Question Id : 4557343770  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Two spheres P and Q, each of mass 200 g are attached to a string of length one metre as shown in the figure. The string and the spheres are then whirled in a horizontal circle about ‘O’ at a constant angular speed. The ratio of the tension in the string between P and Q to that of between P and O is (P is at the mid point of line joining O and Q)

(200 g నిత్యంలో ఎంచుకోడం కంటే P మధ్యస్థం Q మధ్యస్థం చికక గా ఉంటుంది. పరిమాణం కంటే P మధ్యస్థం చేత కంటే ఉంటుంది ‘O’ వరుసగా దాని ద్వారా పరిమాణాను కంటే పరిమాణం కంటే ఉంటుంది P, Q మధ్యస్థం చేత పరిమాణాను కంటే పరిమాణం కంటే ఉంటుంది (O మధ్యస్థం Q మధ్యస్థం చేత పరిమాణం కంటే P మధ్యస్థం చేత)

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

The potential energy of a simple harmonic oscillator of mass 2 kg at its mean position is 5 J. If its total energy is 9 J and amplitude is 1 cm, then its time period is

(2 kg నిత్యంలో ఎంచుకోడం మధ్యస్థం చేత పరిమాణం కంటే ఉంటుంది. పరిమాణం కంటే ఉంటుంది 5 J కోసం పరిమాణం కంటే ఉంటుంది 9 J కంటే పరిమాణం కంటే ఉంటుంది 1 cm, అంతే సమయం కంటే ఉంటుంది)

Options :

Three masses $m$, $2m$ and $3m$ are arranged in two triangular configurations as shown in figure 1 and figure 2. Work done by an external agent in changing the configuration from figure 1 to figure 2 is

\[
\frac{6Gm^2}{a} \left[ 2 - \frac{6}{\sqrt{2}} \right]
\]

Options:

1. \( \frac{6Gm^2}{a} \left[ 2 - \frac{6}{\sqrt{2}} \right] \)
2. 0
3. \(- \frac{Gm^2}{a} \left[ 6 + \frac{6}{\sqrt{2}} \right] \)
4. \(-\frac{Gm^2}{a} \left[ \frac{6}{\sqrt{2}} - \frac{6}{2} \right] \)

Question Number : 93  Question Id : 4557343773  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

Two equal and opposite forces each \(F\) act on a rod of uniform cross-sectional area \(a\) as shown in the figure. Shearing stress on the section AB will be

\[
\frac{F \sin \theta \cos \theta}{a}
\]

Options :
1. \(\frac{F \sin \theta \cos \theta}{a}\)
2. \(\frac{F \sin \theta}{a}\)
3. \(\frac{F \cos \theta}{a}\)
4. \(\frac{F \sin^2 \theta}{a}\)

Question Number : 94  Question Id : 4557343774  Question Type : MCQ  Display Question Number : Yes  Single Line Question  Option : No  Option Orientation : Vertical

A body is suspended by a light string. The tensions in the string when the body is in air, when the body is totally immersed in water and when the body is totally immersed in a liquid are respectively 40.2 N, 28.4 N and 16.6 N. The density of the liquid is ________
Steam at 100 °C is passed into 1 kg of water contained in a calorimeter at 9 °C till the temperature of water and calorimeter is increased to 90 °C. The mass of the steam condensed is nearly
(Water equivalent of calorimeter = 0.1 kg
Specific heat of water = 1 calg⁻¹°C⁻¹
Latent heat of vapourisation = 540 calg⁻¹)

Options:
1. 1200 kgm⁻³
2. 1600 kgm⁻³
3. 2000 kgm⁻³
4. 2400 kgm⁻³
Three very large plates of same area are kept parallel and close to each other. They are considered as ideal black surfaces and have very high thermal conductivity. First and third plates are maintained at absolute temperatures $2T$ and $3T$ respectively. Temperature of the middle plate in steady state is

$$\left( \frac{65}{2} \right)^{\frac{1}{4}} T$$

1.

$$\left( \frac{97}{4} \right)^{\frac{1}{4}} T$$

2.

$$\left( \frac{97}{2} \right)^{\frac{1}{4}} T$$

3.

$$(97)^{\frac{1}{4}} T$$

4.

A thermally insulated vessel with nitrogen gas at $27 \degree C$ is moving with a velocity of $100 \, \text{ms}^{-1}$. If the vessel is stopped suddenly, the percentage change in the pressure of the gas is nearly

(Assume entire loss in KE of the gas is given as heat to gas and $R = 8.3 \, \text{Jmol}^{-1}\text{K}^{-1}$)

$$27 \degree C \quad \text{గుడు} \quad \text{కోసం} \quad \text{వచ్చాచు} \quad \text{ఎగు \ ఎగు} \quad \text{డిగ్రీసు} \quad 100 \, \text{మీసెకింద్రియులు} \quad \text{గుడు}$$

$$\text{ఎగు} \quad \text{కోసం} \quad \text{వచ్చాచు} \quad \text{ఎగు \ ఎగు} \quad \text{డిగ్రీసు} \quad 100 \, \text{మీసెకంటలో} \quad \text{గుడు}$$

(మూడవు అయితే కాగా కాగా ఎగు \ ఎగు \ ఎగు \ శిలీండించడానికి ఎగు \ ఎగు \ 100 \, \text{మీసెకంటలో} \quad \text{గుడు}$$

$$R = 8.3 \, \text{Jmol}^{-1}\text{K}^{-1}$$

Options:

1. 1.1
Question Number : 98  Question Id : 4557343778  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Match the following:

<table>
<thead>
<tr>
<th>List - I</th>
<th>List - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Zeroth law of Thermodynamics</td>
<td>I) Direction of flow of heat</td>
</tr>
<tr>
<td>B) First law of thermodynamics</td>
<td>II) Work done is zero</td>
</tr>
<tr>
<td>C) Free expansion of a gas</td>
<td>III) Thermal equilibrium</td>
</tr>
<tr>
<td>D) Second law of Thermodynamics</td>
<td>IV) Law of conservation of energy</td>
</tr>
</tbody>
</table>

The correct answer is

Options:

1. II IV III I
2. III IV II I
3. III I II IV
Question Number : 99  Question Id : 4557343779  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

For a molecule of an ideal gas, the number density is \( 2\sqrt{2} \times 10^8 \text{ cm}^{-3} \) and the mean free path is \( \frac{10^{-2}}{\pi} \text{ cm} \). The diameter of the gas molecule is

\[
\frac{10^{-2}}{\pi} \text{ cm}
\]

Options :
1. \( 5 \times 10^{-4} \text{ cm} \)
2. \( 0.5 \times 10^{-4} \text{ cm} \)
3. \( 2.5 \times 10^{-4} \text{ cm} \)
4. \( 4 \times 10^{-4} \text{ cm} \)

Question Number : 100  Question Id : 4557343780  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

A solid ball is suspended from the ceiling of a motor car through a light string. A transverse pulse travels at the speed 60 cm s\(^{-1}\) on the string when the car is at rest. When the car accelerates on a horizontal road, speed of the pulse is 66 cm s\(^{-1}\). The acceleration of the car is nearly (\( g = 10 \text{ ms}^{-2} \))

Options :
1. \( 4.3 \text{ ms}^{-2} \)
2. \( 2.9 \text{ ms}^{-2} \)
3. \( 6.8 \text{ ms}^{-2} \)
A reflector is moving with 20 m/s\(^{-1}\) towards a stationary source of sound. If the source is producing sound waves of 160 Hz then the wavelength of the reflected wave is (speed of sound in air is 340 m/s\(^{-1}\))

ह्रस्वात चंगूळ चंगूळ लागिरु 20 m/s\(^{-1}\) चंगूळ रङ्गतानां. ज मध्ये 160 Hz दुःखा फळसादीक चंगूळ चंगूळ लागिरु 20 m/s\(^{-1}\) चंगूळ रङ्गतानां (रूढीक ह्याल चंगूळ 340 m/s\(^{-1}\))

Options:
1. \(\frac{17}{8}\) m
2. \(\frac{17}{11}\) m
3. \(\frac{17}{9}\) m
4. \(\frac{17}{16}\) m

A light ray incidents normally on one surface of an equilateral prism. The angle of deviation of the light ray is (Refractive index of the material of the prism = \(\sqrt{2}\))

ह्याल राखणार उपरांतीच राखणार अन्तर्ग्रहण करावा काहीतरी काहीतरी राखणार अन्तर्ग्रहण करावा. 
असे कीकरी रिफ्रेक्शन कोण = \(\sqrt{2}\)

Options:
1. 60°
2. 30°
Two polaroids are placed in the path of unpolarised light beam of intensity $I_0$ such that no light is emitted from the second polaroid. If a third polaroid whose polarization axis makes an angle $\theta$ with that of the first polaroid is placed between the polaroids, then intensity of light emerging from the last polaroid is

\[
I = \frac{I_0}{8} \sin^2 2\theta
\]

Options:
1. $\left( \frac{I_0}{8} \right) \sin^2 2\theta$
2. $\left( \frac{I_0}{4} \right) \sin^2 2\theta$
3. $\left( \frac{I_0}{2} \right) \cos^2 \theta$
4. $I_0 \cos^2 \theta$
Two point charges are kept in air with a separation between them. The force between them is \( F_1 \), if half of the space between the charges is filled with a dielectric of dielectric constant 4 and the force between them is \( F_2 \), if \( \frac{1}{3} \) rd of the space between the charges is filled with dielectric of dielectric constant 9. Then \( \frac{F_1}{F_2} \) is

\[
\frac{F_1}{F_2} = \frac{4}{9} \cdot \frac{3}{2} = \frac{2}{3}
\]

Options:

1. \( \frac{27}{64} \)
2. \( \frac{16}{81} \)
3. \( \frac{81}{64} \)
4. \( \frac{100}{81} \)
A simple pendulum with a bob of mass 40 g and charge +2 μC makes 20 oscillations in 44 seconds. A vertical electric field of magnitude $4.2 \times 10^4$ NC$^{-1}$ pointing downward is applied. The time taken by the pendulum to make 15 oscillations in the electric field is (Acceleration due to gravity = 10 ms$^{-2}$)

Options:
1. 30 s
2. 60 s
3. 90 s
4. 15 s

A parallel plate capacitor has a capacity $80 \times 10^{-6}$ F when air is present between its plates. The space between the plates is filled with a dielectric slab of dielectric constant 20. The capacitor is now connected to a battery of 30 V by wires. The dielectric slab is then removed. Then the charge passing through the wire is

Options:
1. $12 \times 10^{-3}$ C
2. $25.3 \times 10^{-3}$ C
3. $120 \times 10^{-3}$ C
4. $45.6 \times 10^{-3}$ C
Three uncharged capacitors of capacities $C_1$, $C_2$ and $C_3$ are connected as shown in the figure. A, B and C are at potentials $V_1$, $V_2$ and $V_3$ respectively. The potential at ‘O’ is

\[
\frac{V_1 C_1 + V_2 C_2 + V_3 C_3}{C_1 + C_2 + C_3}
\]

Options:

1. \[
\frac{V_1 C_1 + V_2 C_2 - V_3 C_3}{C_1 + C_2 + C_3}
\]

2. \[
\frac{V_1 C_1 - V_2 C_2 - V_3 C_3}{C_1 + C_2 + C_3}
\]

3. Zero

4. ేచోడ్డి ఏలుడు
The equivalent resistance between A and B is 6 Ω. The value of \( R_1 \) is

\[
\begin{align*}
\text{A} & \quad 15\Omega \quad R_1 \quad 2\Omega \quad 3\Omega \\
\text{B} & 
\end{align*}
\]

Options:
1. 20 Ω
2. 10 Ω
3. 5 Ω
4. 25 Ω

A battery of emf 10 V is connected to a uniform wire AB of 1 m length and having a resistance of 10 Ω in series with a 10 Ω resistor as shown in the figure. Two cells of emf 2 V and 3 V having internal resistances 2 Ω and 3 Ω respectively are connected as shown in the figure. If the galvanometer shows null deflection at point J on the wire, the distance of point J from the point B is ________
1. 48 cm
2. 50 cm
3. 52 cm
4. 54 cm

Two infinitely long wires carry currents 4 A and 3 A placed along X-axis and Y-axis respectively. Magnetic field at a point P(0, 0, d) m will be _______ T.

Options:
1. \( \frac{4\mu_0}{2\pi d} \)
2. \( \frac{3\mu_0}{2\pi d} \)
3. \( \frac{7\mu_0}{2\pi d} \)
4. \( \frac{5\mu_0}{2\pi d} \)
Two moving coil galvanometers, X and Y have coils with resistances 10 \( \Omega \) and 14 \( \Omega \), cross-sectional areas \( 4.8 \times 10^{-3} \text{ m}^2 \) and \( 2.4 \times 10^{-3} \text{ m}^2 \), number of turns 30 and 45 respectively. They are placed in magnetic fields of 0.25 T and 0.50 T respectively. Then the ratio of their current sensitivities and the ratio of their voltage sensitivities are respectively.

Options :
1. 2 : 3 ; 14 : 15
2. 5 : 7 ; 2 : 1
3. 2 : 13 ; 1 : 2
4. 14 : 15 ; 2 : 9

Two short bar magnets each of magnetic moment 9 Am\(^2\) are placed such that one is at \( x = -3 \text{ cm} \) and the other at \( y = -3 \text{ cm} \). If their magnetic moments are directed along positive and negative X-directions respectively then the resultant magnetic field at the origin is

Options :
1. 100 T
2. 10 T
3. 0.1 T
4. 0.001 T
A conducting rod PQ of length 1 m is moving with a uniform speed 2 ms\(^{-1}\) in a uniform magnetic field of 4 T which is directed into the paper. A capacitor of capacity 10 \(\mu\)F is connected as shown in the figure. Then the charges on the plates of the capacitor are

\[ q_A = +80 \mu C; \quad q_B = -80 \mu C \]

\[ q_A = -80 \mu C; \quad q_B = +80 \mu C \]

\[ q_A = +1.25 \mu C; \quad q_B = -1.25 \mu C \]

\[ q_A = -1.25 \mu C; \quad q_B = +1.25 \mu C \]
For the ac circuit shown below, phase difference between emf and current is \( \frac{\pi}{4} \) radian as shown in the graph. If the impedance of the circuit is 1414 \( \Omega \) then the values of P and Q are

\[ E = E_0 \sin (100t) \]

Options:
1. 1 k\( \Omega \), 10 \( \mu \)F
2. 1 k\( \Omega \), 1 \( \mu \)F
3. 1 k\( \Omega \), 10 mH
4. 1 k\( \Omega \), 1 mH

In a plane electromagnetic wave, the electric field oscillates with a frequency \( 2 \times 10^{10} \text{ s}^{-1} \) and amplitude 40 Vm\(^{-1}\), then the energy density due to electric field is \( e_0 = 8.85 \times 10^{-12} \text{ Fm}^{-1} \)

Options:
1. 1.52 \times 10^{-9} \text{ Jm}^{-3}
2. 2.54 \times 10^{-9} \text{ Jm}^{-3}
Question Number : 116 Question Id : 4557343796 Question Type : MCQ Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Photons of frequencies equal to the frequencies of $H_{\beta}$ and $H_{\alpha}$ lines of hydrogen incident on a photosensitive plate whose threshold frequency is equal to the frequency of $H_{\alpha}$ line of hydrogen. The ratio of the maximum kinetic energies of the emitted electrons is

Options:
1. 7 : 16
2. 3 : 4
3. 8 : 27
4. 5 : 36

Question Number : 117 Question Id : 4557343797 Question Type : MCQ Display Question Number : Yes Single Line Question Option : No Option Orientation : Vertical

Hydrogen atom is in its $n^{th}$ energy state. If de-Broglie wavelength of the electron is $\lambda$, then

Options:
1. $\lambda \propto \frac{1}{n^2}$
2. $\lambda \propto \frac{1}{n}$
3. $\lambda \propto n^2$
4. λ ∝ n

Question Number : 118  Question Id : 4557343798  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If 200 MeV of energy is released in the fission of one nucleus of $^{235}_{92}$U, the number of nuclei that must undergo fission to release an energy of 1000 J is

$$\text{The number of nuclei} = \frac{1000}{200} = 5 \times 10^3$$

Options :
1. $3.125 \times 10^{13}$
2. $6.25 \times 10^{13}$
3. $12.5 \times 10^{13}$
4. $3.125 \times 10^{14}$

Question Number : 119  Question Id : 4557343799  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

If the diodes are ideal in the circuit given below, then the current through the cell is

$$\text{Current} = \frac{E}{R} = \frac{20}{20+5+3} = 1 \text{ A}$$

Options :
1. 4 A
2. 1.5 A
3. 2 A
If a message signal of frequency 10 kHz and peak voltage 12 V is used to modulate a carrier wave of frequency 1 MHz, the modulation index is 0.6. To make the modulation index 0.75, the carrier peak voltage should be

Options:
1. decreased by 25%
2. increased by 25%
3. decreased by 20%
4. increased by 20%
If the radius of electron orbit in the excited state of hydrogen atom is 476.1 pm, the energy of electron in that excited state in J is 
(Radius and energy of electron in the first orbit of hydrogen atom are 52.9 pm and \(-2.18 \times 10^{-18}\) J respectively)

Options:
1. \(-2.42 \times 10^{-18}\)
2. \(-19.62 \times 10^{-18}\)
3. \(-2.42 \times 10^{-19}\)
4. \(-6.05 \times 10^{-19}\)

A light of frequency \(1.6 \times 10^{16}\) Hz when falls on a metal plate emits electrons that have double the kinetic energy compared to the kinetic energy of emitted electrons when frequency of \(1.0 \times 10^{16}\) Hz falls on the same plate. The threshold frequency \((\nu_0)\) of the metal in Hz is

\[1.6 \times 10^{16}\text{ Hz} \overset{\text{Binding}}{\longrightarrow} 0 \text{ eV} \overset{\text{Emission}}{\longrightarrow} \text{K.E. } \overset{\text{Double}}{\longrightarrow} \text{K.E. } \overset{\text{Threshold}}{\longrightarrow} 1.0 \times 10^{16}\text{ Hz} \overset{\text{Binding}}{\longrightarrow} 0 \text{ eV}\]

Options:
1. \(1 \times 10^{15}\)
2. \(4 \times 10^{15}\)
3. \(3 \times 10^{15}\)
4. \(4 \times 10^{13}\)
To which group and period does the element belong if the electronic configuration of an element in its $-2$ oxidation state is $1s^22s^22p^63s^23p^6$?

$-2$ ఎంపికి ఎగువాడు కాంపు ఎంపికి మహిలి విభాగాన్ని ఇదిని మహిలా విభాగాన్ని $1s^22s^22p^63s^23p^6$ అనేది ఎంపికి కుంభం ఎంపికి మహిళా విభాగాన్ని?

Options:
- period 3, group 16
- period 3, group 17
- period 4, group 16
- period 4, group 17

Which set of the following molecules has only one lone pair of electrons on their respective central atoms?

అ మాత్రమే ఒక్క సామాన్యంగా తెలియిన మాత్రమే చివరు సామాన్యంగా తెలియిన చివరు భాగంలో రకాలు సామాన్యంగా తెలియిన మాత్రమే?

a) $\text{SO}_2$  b) $\text{XeF}_4$  c) $\text{PbCl}_2$  d) $\text{SF}_4$  e) $\text{ClF}_3$

Options:
- 1. a, c, d
- 2. b, c, d
- 3. a, b, e
- 4. a, c, e
XeF₄ is square planar whereas CCl₄ is tetrahedral because

XeF₄ is square planar whereas CCl₄ is tetrahedral because

Options :

1. In XeF₄, `Xe` is sp² hybridised and in CCl₄ `C` is sp³ hybridised

2. In both XeF₄ and CCl₄ the central atom is sp³ hybridised

3. In XeF₄, `Xe` is sp³d² hybridised but due to the presence of 2 lone pairs of electrons shape is square planar whereas in CCl₄ `C` is sp³ hybridised

4. Xe is a noble gas whereas C is a non-metal

Question Number : 126  Question Id : 4557343806  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

16g each of H₂, He and O₂ are present in a container exerting 10 atm. pressure at T(K). The pressure in atm exerted by 16g each of He and O₂ in the second container of same volume and temperature is

Options :

1. 1.8
2. 6.4
3. 3.6
4. 5.4
One litre of 0.15M Na₂SO₃ aqueous solution is mixed with 500 mL of 0.2M K₂Cr₂O₇ aqueous solution in acid medium. What is the number of moles of K₂Cr₂O₇ remaining in the solution after the reaction?

Options:
1. 0.1
2. 0.0125
3. 0.025
4. 0.05

From the following data:

\[
\text{CH}_3\text{OH}(l) + \frac{3}{2} \text{O}_2(g) \rightarrow \text{CO}_2(g) + 2 \text{H}_2\text{O}(l); \Delta_r H^\circ = -726 \text{ kJ mol}^{-1}
\]

\[
\text{H}_2(g) + \frac{1}{2} \text{O}_2(g) \rightarrow \text{H}_2\text{O}(l); \Delta_r H^\circ = -286 \text{ kJ mol}^{-1}
\]

\[
\text{C}(\text{graphite}) + \text{O}_2(g) \rightarrow \text{CO}_2(g); \Delta_r H^\circ = -393 \text{ kJ mol}^{-1}
\]

The standard enthalpy of formation of CH₃OH(l) in kJ mol⁻¹ is

\[
\text{CH}_3\text{OH}(s) + \frac{3}{2} \text{O}_2(s) \rightarrow \text{CO}_2(s) + 2 \text{H}_2\text{O}(s); \Delta_r H^\circ = -726 \text{ kJ mol}^{-1}
\]

\[
\text{H}_2(s) + \frac{1}{2} \text{O}_2(s) \rightarrow \text{H}_2\text{O}(s); \Delta_r H^\circ = -286 \text{ kJ mol}^{-1}
\]

\[
\text{C}(\text{graphite}) + \text{O}_2(s) \rightarrow \text{CO}_2(s); \Delta_r H^\circ = -393 \text{ kJ mol}^{-1}
\]

CH₃OH(s) ప్రత్యేక సరోపించిన మాటలు kJ mol⁻¹ ఎంత?
1. $-239$
2. $239$
3. $547$
4. $-905$

**Question Number : 129  Question Id : 4557343809  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

At 1000 K, the equilibrium constant, $K_c$ for the reaction $2 \text{NOCl}(g) \rightleftharpoons 2 \text{NO}(g) + \text{Cl}_2(g)$ is $4.0 \times 10^{-6}$ mol L$^{-1}$. The $K_P$ (in bar) at the same temperature is $(R = 0.083$ L bar K$^{-1}$ mol$^{-1}$)

\[ 1000 \text{ K} \quad 2 \text{NOCl}(g) \rightleftharpoons 2 \text{NO}(g) + \text{Cl}_2(g) \quad \text{K}_c = 4.0 \times 10^{-6} \text{ mol L}^{-1}, \quad \text{and} \quad \frac{1}{K_P} \text{bar} = (R = 0.083 \text{ L bar K}^{-1} \text{ mol}^{-1}) \]

Options :
1. $3.32 \times 10^{-6}$
2. $3.32 \times 10^{4}$
3. $3.32 \times 10^{-4}$
4. $3.32 \times 10^{-3}$

**Question Number : 130  Question Id : 4557343810  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical**

If the $pK_a$ of acetic acid and $pK_b$ of dimethylamine are 4.76 and 3.26 respectively, the pH of dimethyl ammonium acetate solution is

\[ \text{If} \quad pK_a = 4.76, \quad pK_b = 3.26 \quad \text{then} \quad \text{pH} = \frac{1}{2}(4.76 + 3.26) \]

Options :
1. 7.75
2. 6.75
3. 7.0
Question Number : 131  Question Id : 4557343811  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Which of the following statements are correct?

a) NaH(s) reacts violently with water to form NaOH and H₂
b) An example for electron rich hydride is NH₃
c) Nickel forms saline hydride

Question Number : 132  Question Id : 4557343812  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
Which of the following nitrates on heating does not give its oxide?

Options :
1. LiNO₃
2. NaNO₃
3. Ba(NO₃)₂
4. Be(NO₃)₂
BF$_3$ reacts with NaH at 450K to form NaF and X. When X reacts with LiH in diethyl ether, Y is formed. What is Y?

450K నండి, NaH అత్యంత కూడా NaF మరియు X కల్పించబడింది. X ను రాఖుకుంది అంటే
LiH వైపు ఈవరుగా Y కల్పించబడింది. Y ఎది?

Options:
1. LiBO$_2$
2. Li$_2$B$_4$O$_7$
3. LiBH$_4$
4. B$_2$H$_6$, LiH

Question Number : 134  Question Id : 4557343814  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical

Assertion (A):  [SiF$_6$]$^{2-}$ is formed but [SiCl$_6$]$^{2-}$ is not
Reason (R):  Electronegativity (EN) of F is higher than EN of Cl

రాణా (R):  F దిరిగి, ఎలక్ట్రోనిగిట్యూట్యుడు (EN), Cl ఉత్తమ, EN సాధం ఉండాలి

Options:
Both (A) and (R) are correct and (R) is the correct explanation of (A)

1. (A) తెలుగు మరియు (R) కారణ తెలుగు (R), (A) కు చెంది ఉండాలి

Both (A) and (R) are correct but (R) is not the correct explanation of (A)

2. (A) తెలుగు (R) తెలుగు కారణ తెలుగు (R), (A) తెలుగు చెంది ఉండాలి

(A) is correct but (R) is not correct

3. (A) తెలుగు తెలుగు (R) కారణ తెలుగు

(A) is not correct but (R) is correct

4. (A) తెలుగు తెలుగు (R) కారణ తెలుగు

Question Number : 135  Question Id : 4557343815  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
The environmental friendly chemical now-a-days used for bleaching the paper in the presence of a suitable catalyst is

Options:

1. Chlorine
2. Sulphur dioxide
3. Hydrogen peroxide
4. Bleaching powder

The IUPAC name of the following compound is

Options:

1. Cyanopentan-2-one
2. 2-Chloropentan-1-one
3. Oxohexanenitrile
4. Oxopentanenitrile
2 - Oxopentanenitrile
2 - అడుగా పర్ఫెంటినిట్రిల్

Question Number : 137  Question Id : 4557343817  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
Identify the correct statements from the following
a. Petrol and CNG operated automobiles cause less pollution
b. Alkanes having tertiary hydrogen can be oxidized to alcohols by KMnO₄
c. Methane can be prepared by Kolbe’s electrolytic method
d. Alkyl chloride on reduction with zinc and dilute hydrochloric acid gives alkane

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

Question Number : 138  Question Id : 4557343818  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
What are X and Y in the following reaction?

Pent-2-ene $\xrightarrow{(i)\text{O}_3}$ $\xrightarrow{(ii)\text{Zn/H}_2\text{O}}$ X + Y

Options :
1. CH$_3$CHO   CH$_3$CH$_2$CHO
2. CH$_3$CH$_2$CHO   CH$_3$CH$_2$CHO
3. CH$_3$CHO   (CH$_3$)$_2$CO
4. CH$_3$CHO   CH$_3$CHO

Question Number : 139  Question Id : 4557343819  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
The total number of body centred lattices possible among the 14 Bravais lattices is

14 ఎత్తు ఉన్ని శాస్త్ర విభాగాలు గల ఏకచర్మి సస్థానాలు

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

Question Number : 140  Question Id : 4557343820  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
The measured osmotic pressure of a solution prepared by dissolving 17.4 mg of K$_2$SO$_4$ in 2L of water at 27 °C is 3.735×10$^{-3}$ bar. The Van’t Hoff factor is
(R = 0.083 L bar K$^{-1}$ mol$^{-1}$; atomic weights K = 39; S = 32; O = 16)

27 °C కి, 17.4 mg K$_2$SO$_4$ ని 2L ప్రాంతంలో భాగం చేసే సమాగాల శిల్పప్రాముఖం రాయ యొక్క వంటిహోఫ్ పరిమితి ఉంది?
(R = 0.083 L bar K$^{-1}$ mol$^{-1}$; విభాగం అంశాలు K = 39; S = 32; O = 16)

Options:
1. 2.84
2. 3.0
3. 2.0
4. 2.32
Dissolving 120 g of a compound (mol wt = 60) in 1000 g of water gave a solution of density 1.12 g mL\(^{-1}\). The molarity of solution is

\[
\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{120 \text{ g}}{1000 \text{ g}} = 1.2 \text{ g mL}^{-1}
\]

\[\text{Molarity} = \frac{\text{Moles}}{\text{Volume in L}} = \frac{\frac{120 \text{ g}}{60 \text{ g mol}^{-1}}}{1 \text{ L}} = 2 \text{ M}
\]

Options:
1. 1.0 M
2. 2.0 M
3. 2.5 M
4. 4.0 M

When an aqueous solution of CuCl\(_2\) is electrolysed using Pt inert electrodes, the reaction at cathode and anode respectively are

\[
\text{Cathode: } \text{Cu}^2+ + 2e^- \rightarrow \text{Cu} \quad \text{Anode: } 2\text{H}_2\text{O} \rightarrow \frac{1}{2}\text{O}_2 + 4\text{H}^+ + 4e^- \\
\text{Cathode: } 2\text{Cu}^2+ + 4e^- \rightarrow 2\text{Cu} \quad \text{Anode: } 2\text{H}_2\text{O} \rightarrow \frac{1}{2}\text{O}_2 + 4\text{H}^+ + 4e^- \\
\text{Cathode: } \text{Cu}^2+ + 2e^- \rightarrow \text{Cu} \quad \text{Anode: } 2\text{Cl}^- \rightarrow \frac{1}{2}\text{Cl}_2 + 2e^- \\
\text{Cathode: } 2\text{H}_2\text{O} \rightarrow \frac{1}{2}\text{H}_2 \uparrow + 2\text{OH}^- \quad \text{Anode: } 2\text{Cl}^- \rightarrow \frac{1}{2}\text{Cl}_2 + 2e^- 
\]

Options:
1. \[4\text{H}_2\text{O} \rightarrow \frac{1}{2}\text{H}_2 + 4\text{OH}^- + 4e^- \]
2. \[2\text{Cu}^2+ \rightarrow 2\text{Cu} + 4e^- \]
3. \[\text{Cu}^2+ \rightarrow \text{Cu} + 2e^- \]
4. \[2\text{H}_2\text{O} \rightarrow \frac{1}{2}\text{H}_2 + 2\text{OH}^- \]
Thermal decomposition of HCOOH is a first order reaction and the rate constant at T(K) is $4.606 \times 10^{-3} s^{-1}$. The time required to decompose 90% of initial quantity of HCOOH at T(K) in seconds is

$$\text{HCOOH} \xrightarrow{4.606 \times 10^{-3} s^{-1}} \text{products} \quad \text{at} \quad T(K)$$

Which one of the following statements is not correct?

Options:
1. 100
2. 500
3. 1000
4. 50

Which one of the following statements is not correct?

Options:

1. A mixture of dinitrogen and dioxygen at room temperature is an example for aerosol
2. Lyophilic sols are more stable compared to lyophobic sols
3. Formation of micelles is possible only above Kraft temperature
4. An example for a soap is sodium stearate and an example for detergent is sodium lauryl sulphate
In Ellingham diagram, the plot is drawn between

Options:
1. Temperature, $\Delta H^\circ$
2. Temperature, $\Delta G^\circ$
3. Pressure, $\Delta S^\circ$
4. Temperature, $\Delta E^\circ$

Question Number : 146  Question Id : 4557343826  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Identify the reaction which does not liberate $N_2$

$N_2$ ఎందుకంటే వాయు ఆధారితంగా కలిపాలి

Options:
1. $NaN_3 \xrightarrow{\Delta} ?$
2. $(NH_4)_2 Cr_2O_7 \xrightarrow{\Delta} ?$
3. $NH_4Cl + Ca(OH)_2 \rightarrow ?$
4. $Ba(N_3)_2 \xrightarrow{\Delta} ?$

Question Number : 147  Question Id : 4557343827  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical

Identify the molecule which contains lone pair of electrons on the sulphur atom

వాయు ఎందుకంటే వాయు ఆధారితంగా కలిపాలి

Options:
Question Number : 148  Question Id : 4557343828  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
Options :

Which statement about noble gases is not correct?

1. ‘He’ forms XeF₆ under suitable conditions
2. ‘Xe’ is used in electric bulbs
3. The number of lone pair of electrons present on Xe in XeF₂ is 3.
4. ‘He’ has the highest boiling point among all the noble gases

---

Question Number : 149  Question Id : 4557343829  Question Type : MCQ  Display Question Number : Yes  Single Line Question
Option : No  Option Orientation : Vertical
Options :

Crystal field splitting energies for octahedral ($\Delta_0$) and tetrahedral ($\Delta_t$) geometries caused by the same ligands are related through the expression

$\Delta_0 = \Delta_t$

Options :
1. $\Delta_0 = \Delta_t$
In Lanthanide series, the element well known to exhibit +4 oxidation state is

.choice 1. Lu
.choice 2. Ce
.choice 3. Pm
.choice 4. Nd

In anionic polymerisation, the compound which acts as effective chain initiator is

.choice 1. BF₃
.choice 2. (CH₃CO)₂O₂
.choice 3. SnCl₂
.choice 4. R–Li
Which one of the following is the structure of lactose?

1. ![Structure 1]
2. ![Structure 2]
3. ![Structure 3]
4. ![Structure 4]
Which of the following statements are correct?

a) Drugs that mimic natural messenger by switching on the receptor are called agonists
b) Shape of the receptor does not change after attachment of chemical messenger
c) A cationic detergent is formed when stearic acid reacts with polyethylene glycol
d) Seldane is an antihistamine

Identify the major products X and Y in the following reactions

a) \[ \text{HBr} \rightarrow X \]

b) \[ \text{HBr} \text{ Peroxide} \rightarrow Y \]
Identify A and B in the following reactions.

\[ \text{A} + \text{B} \]

Options:
1. \( \text{I} \)
2. \( \text{CH}_2\text{I} \)
3. \( \text{CH}_2\text{OH} \)
4. \( \text{IH}_2\text{C-O} \)
Identify A, B and C in the following reactions

Isopropyl chloride $\xrightarrow{\text{NaOH}}$ A $\xrightarrow{\text{Cu^573K}}$ B $\xrightarrow{\text{NaOH}}$ C + Iodoform

A

B

C

Options:
1. CH₃CH₂CH₂OH
2. CH₃CH₂OH
3. CH₃–CH–CH₃
4. CH₃–CH–CH–CH₃

CH₃CH₂CH₂CHO
CH₃CHO
CH₃COCH₃
H₃C–C–C–CH₃

CH₃CH₂COONa
HCOONa
CH₃COONa
CH₃COONa
Match the following

<table>
<thead>
<tr>
<th>List - I</th>
<th>List - II</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Lucas reagent</td>
<td>I) $\text{SnCl}_2 + \text{HCl. H}_2\text{O}^+$</td>
</tr>
<tr>
<td>B) Clemmensen reagent</td>
<td>II) $[\text{Ag(NH}_3)_2]^+$</td>
</tr>
<tr>
<td>C) Tollens’ reagent</td>
<td>III) Anhydrous $\text{ZnCl}_2$</td>
</tr>
<tr>
<td>D) Stephen reaction</td>
<td>IV) Zn – Hg</td>
</tr>
<tr>
<td></td>
<td>V) $\text{C}_6\text{H}_5\text{SO}_2\text{Cl}$</td>
</tr>
</tbody>
</table>

The correct answer is

Options:

1. A B C D
   III IV II I

2. A B C D
   III IV I II

3. A B C D
   IV II III V

4. A B C D
   IV III I V
What are A, B and C in the following reactions?

Phthalic acid + NH₃ → A → B → C

Options:

A

\[
\begin{align*}
\text{H}_4\text{NOOC} & \quad \text{H}_2\text{NOC} & \quad \text{NC} \\
& \quad \text{COONH}_4 & \quad \text{COONH}_2 & \quad \text{CN}
\end{align*}
\]

B

\[
\begin{align*}
\text{CH}_2\text{COONH}_4 & \quad \text{CH}_2\text{CONH}_2 & \quad \text{CH}_2\text{CN}
\end{align*}
\]

C

\[
\begin{align*}
\text{COONH}_4 & \quad \text{CONH}_2 & \quad \text{CN} \\
\text{CH}_3 & \quad \text{CH}_3 & \quad \text{CH}_3 \\
\text{COONH}_4 & \quad \text{CONH}_2 &
\end{align*}
\]

Options:

1.  
2.  
3.  
4.  

Question Number : 159  Question Id : 4557343839  Question Type : MCQ  Display Question Number : Yes  Single Line Question Option : No  Option Orientation : Vertical
What are A and B in the following reaction sequence?

Propionitrile + A → B → propiophenone

What are A and B in the following reaction sequence?

\[ \text{Propionitrile} + A \rightarrow B \rightarrow \text{propiophenone} \]

Options:

1. \( \text{C}_2\text{H}_5\text{MgBr} \)
2. \( \text{C}_2\text{H}_5\text{MgBr} \)
3. \( \text{C}_6\text{H}_5\text{MgBr} \)
4. \( \text{C}_6\text{H}_5\text{CH}_2\text{MgBr} \)

What is ‘Z’ in the above sequence of reactions?

\[ \text{C}_2\text{H}_5\text{Cl} \xrightarrow{\text{KCN}} X \xrightarrow{\text{H}_2/\text{Catalyst}} Y \xrightarrow{\text{CHCl}_3} Z \]

What is ‘Z’ in the above sequence of reactions?

\[ \text{C}_2\text{H}_5\text{Cl} \xrightarrow{\text{KCN}} X \xrightarrow{\text{H}_2/\text{Catalyst}} Y \xrightarrow{\text{CHCl}_3} Z \]

Options:

1. \( \text{NC} \)