

Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511025
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 86435118430 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The number of distinct real roots of $\begin{vmatrix} \sin x & \cos x & \cos x \\ \cos x & \sin x & \cos x \\ \cos x & \cos x & \sin x \end{vmatrix} = 0$ in the interval $-\frac{\pi}{4} \leq x \leq \frac{\pi}{4}$ is :

Options :

86435161871. **1**

86435161872. **2**

86435161873. **3**

86435161874. **4**

Question Number : 62 Question Id : 86435118431 Question Type : MCQ Op
Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The lowest integer which is greater than $\left(1 + \frac{1}{10^{100}}\right)^{10^{100}}$ is _____.

Options :

86435161875. 1

86435161876. 2

86435161877. 3

86435161878. 4

Question Number : 63 Question Id : 86435118432 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If ${}^n P_r = {}^n P_{r+1}$ and ${}^n C_r = {}^n C_{r-1}$, then the value of r is equal to :

Options :

86435161879. 1

86435161880. 2

86435161881. 3

86435161882. 4

Question Number : 64 Question Id : 86435118433 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $[x]$ be the greatest integer less than or equal to x , then $\sum_{n=8}^{100} \left[\frac{(-1)^n n}{2} \right]$ is equal to :

Options :

86435161883. - 2

86435161884. 0

86435161885. 2

86435161886. 4

Question Number : 65 Question Id : 86435118434 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the statement "The match will be played only if the weather is good and ground is not wet". Select the correct negation from the following :

Options :

86435161887. The match will not be played or weather is good and ground is not wet.

86435161888. The match will not be played and weather is not good and ground is wet.

86435161889. If the match will not be played, then either weather is not good or ground is wet.

86435161890. The match will be played and weather is not good or ground is wet.

Question Number : 66 Question Id : 86435118435 Question Type : MCQ Op

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The sum of all those terms which are rational numbers in the expansion of $(2^{1/3} + 3^{1/4})^{12}$ is :

Options :

86435161891. 89

86435161892. 35

86435161893. 43

86435161894. 27

Question Number : 67 Question Id : 86435118436 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $y=y(x)$ be the solution of the differential equation $x dy = (y + x^3 \cos x) dx$ with $y(\pi) = 0$,

then $y\left(\frac{\pi}{2}\right)$ is equal to :

Options :

86435161895. $\frac{\pi^2}{2} + \frac{\pi}{4}$

86435161896. $\frac{\pi^2}{4} - \frac{\pi}{2}$

86435161897. $\frac{\pi^2}{2} - \frac{\pi}{4}$

86435161898. $\frac{\pi^2}{4} + \frac{\pi}{2}$

**Question Number : 68 Question Id : 86435118437 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

The first of the two samples in a group has 100 items with mean 15 and standard deviation 3. If the whole group has 250 items with mean 15.6 and standard deviation $\sqrt{13.44}$, then the standard deviation of the second sample is :

Options :

86435161899. 8

86435161900. 6

86435161901. 5

86435161902. 4

**Question Number : 69 Question Id : 86435118438 Question Type : MCQ Option Shuffling : Yes
Is Question Mandatory : No**

Correct Marks : 4 Wrong Marks : 1

The value of the integral $\int_{-1}^1 \log (x + \sqrt{x^2 + 1}) dx$ is :

Options :

86435161903. 0

86435161904. 1

86435161905. 2

86435161906. -1

Question Number : 70 Question Id : 86435118439 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let X be a random variable such that the probability function of a distribution is given by

$P(X = 0) = \frac{1}{2}, P(X = j) = \frac{1}{3^j} (j = 1, 2, 3, \dots, \infty)$ Then the mean of the distribution and

$P(X \text{ is positive and even})$ respectively are :

Options :

86435161907. $\frac{3}{4}$ and $\frac{1}{8}$

86435161908. $\frac{3}{4}$ and $\frac{1}{16}$

86435161909. $\frac{3}{8}$ and $\frac{1}{8}$

86435161910. $\frac{3}{4}$ and $\frac{1}{9}$

Question Number : 71 Question Id : 86435118440 Question Type : MCQ Op

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the greatest value of the term independent of 'x' in the expansion of $\left(x \sin \alpha + a \frac{\cos \alpha}{x}\right)^{10}$ is

$\frac{10!}{(5!)^2}$, then the value of 'a' is equal to :

Options :

86435161911. 1

86435161912. 2

86435161913. - 1

86435161914. - 2

Question Number : 72 Question Id : 86435118441 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $f(x) = \begin{cases} \int_0^x (5 + |1 - t|) dt, & x > 2 \\ 5x + 1, & x \leq 2 \end{cases}$, then

Options :

86435161915. $f(x)$ is not continuous at $x = 2$

86435161916. $f(x)$ is continuous but not differentiable at $x = 2$

86435161917. $f(x)$ is everywhere differentiable

86435161918. $f(x)$ is not differentiable at $x=1$

Question Number : 73 Question Id : 86435118442 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $\cot\frac{\pi}{24}$ is :

Options :

86435161919. $\sqrt{2} + \sqrt{3} + 2 - \sqrt{6}$

86435161920. $\sqrt{2} + \sqrt{3} + 2 + \sqrt{6}$

86435161921. $3\sqrt{2} - \sqrt{3} - \sqrt{6}$

86435161922. $\sqrt{2} - \sqrt{3} - 2 + \sqrt{6}$

Question Number : 74 Question Id : 86435118443 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The number of real solutions of the equation, $x^2 - |x| - 12 = 0$ is :

Options :

86435161923. 1

86435161924. 2

86435161925. 3

86435161926. 4

Question Number : 75 Question Id : 86435118444 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $P = \begin{bmatrix} 1 & 0 \\ 1/2 & 1 \end{bmatrix}$, then P^{50} is :

Options :

86435161927. $\begin{bmatrix} 1 & 0 \\ 50 & 1 \end{bmatrix}$

86435161928. $\begin{bmatrix} 1 & 25 \\ 0 & 1 \end{bmatrix}$

86435161929. $\begin{bmatrix} 1 & 0 \\ 25 & 1 \end{bmatrix}$

86435161930. $\begin{bmatrix} 1 & 50 \\ 0 & 1 \end{bmatrix}$

Question Number : 76 Question Id : 86435118445 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If a tangent to the ellipse $x^2 + 4y^2 = 4$ meets the tangents at the extremities of its major axis at B and C, then the circle with BC as diameter passes through the point :

Options :

86435161931.

$(\sqrt{3}, 0)$

86435161932. $(1, 1)$

86435161933. $(-1, 1)$

86435161934. $(\sqrt{2}, 0)$

Question Number : 77 Question Id : 86435118446 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let the equation of the pair of lines, $y = px$ and $y = qx$, can be written as $(y - px)(y - qx) = 0$.
Then the equation of the pair of the angle bisectors of the lines $x^2 - 4xy - 5y^2 = 0$ is :

Options :

86435161935. $x^2 - 3xy - y^2 = 0$

86435161936. $x^2 + 3xy - y^2 = 0$

86435161937. $x^2 - 3xy + y^2 = 0$

86435161938. $x^2 + 4xy - y^2 = 0$

Question Number : 78 Question Id : 86435118447 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $|\vec{a}| = 2$, $|\vec{b}| = 5$ and $|\vec{a} \times \vec{b}| = 8$, then $|\vec{a} \cdot \vec{b}|$ is equal to :

Options :

86435161939. 4

86435161940. 5

86435161941. 3

86435161942. 6

Question Number : 79 Question Id : 86435118448 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider functions $f: A \rightarrow B$ and $g: B \rightarrow C$ ($A, B, C \subseteq \mathbb{R}$) such that $(g \circ f)^{-1}$ exists, then :

Options :

86435161943. f is one-one and g is onto

86435161944. f and g both are one-one

86435161945. f is onto and g is one-one

86435161946. f and g both are onto

Question Number : 80 Question Id : 86435118449 Question Type : MCQ Option Shuffling : Yes

Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let a, b and c be distinct positive numbers. If the vectors $a\hat{i} + a\hat{j} + c\hat{k}$, $\hat{i} + \hat{k}$ and

$c\hat{i} + c\hat{j} + b\hat{k}$ are co-planar, then c is equal to :

Options :

86435161947. $\frac{a + b}{2}$

86435161948. \sqrt{ab}

86435161949. $\frac{2}{\frac{1}{a} + \frac{1}{b}}$

86435161950. $\frac{1}{a} + \frac{1}{b}$

Mathematics Section B

Section Id :	864351799
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Sub-Section Number :	1
Sub-Section Id :	8643511026

Question Shuffling Allowed :

Yes

Question Number : 81 Question Id : 86435118450 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

The equation of a circle is $\text{Re}(z^2) + 2(\text{Im}(z))^2 + 2\text{Re}(z) = 0$, where $z = x + iy$. A line which passes through the center of the given circle and the vertex of the parabola, $x^2 - 6x - y + 13 = 0$, has y -intercept equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 82 Question Id : 86435118451 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the lines $\frac{x - k}{1} = \frac{y - 2}{2} = \frac{z - 3}{3}$ and $\frac{x + 1}{3} = \frac{y + 2}{2} = \frac{z + 3}{1}$ are co-planar, then the value of k is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 83 Question Id : 86435118452 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $n \in \mathbb{N}$ and $[x]$ denote the greatest integer less than or equal to x . If the sum of $(n+1)$ terms ${}^nC_0, 3 \cdot {}^nC_1, 5 \cdot {}^nC_2, 7 \cdot {}^nC_3, \dots$ is equal to $2^{100} \cdot 101$, then $2 \left[\frac{n-1}{2} \right]$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 84 **Question Id :** 86435118453 **Question Type :** SA

Correct Marks : 4 **Wrong Marks :** 0

If $a+b+c=1$, $ab+bc+ca=2$ and $abc=3$, then the value of $a^4+b^4+c^4$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 85 **Question Id :** 86435118454 **Question Type :** SA

Correct Marks : 4 **Wrong Marks :** 0

A fair coin is tossed n -times such that the probability of getting at least one head is at least 0.9. Then the minimum value of n is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 86 Question Id : 86435118455 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let a curve $y=f(x)$ pass through the point $(2, (\log_e 2)^2)$ and have slope $\frac{2y}{x \log_e x}$ for all positive real value of x . Then the value of $f(e)$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 87 Question Id : 86435118456 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If the co-efficients of x^7 and x^8 in the expansion of $\left(2 + \frac{x}{3}\right)^n$ are equal, then the value of n is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 88 Question Id : 86435118457 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If $(\vec{a} + 3\vec{b})$ is perpendicular to $(7\vec{a} - 5\vec{b})$ and $(\vec{a} - 4\vec{b})$ is perpendicular to $(7\vec{a} - 2\vec{b})$,
then the angle between \vec{a} and \vec{b} (in degrees) is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

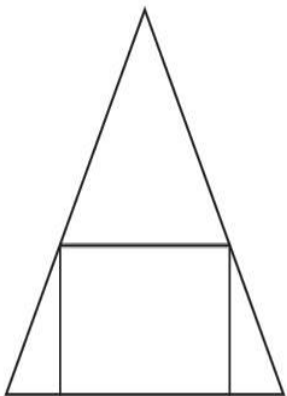
Possible Answers :

1

Question Number : 89 Question Id : 86435118458 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If a rectangle is inscribed in an equilateral triangle of side length $2\sqrt{2}$ as shown in the figure,
then the square of the largest area of such a rectangle is _____.



Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Question Number : 90 Question Id : 86435118459 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Consider the function $f(x) = \frac{P(x)}{\sin(x-2)}$, $x \neq 2$
 $= 7$, $x = 2$

where $P(x)$ is a polynomial such that $P''(x)$ is always a constant and $P(3) = 9$. If $f(x)$ is continuous at $x = 2$, then $P(5)$ is equal to _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1