Group Id :	46419939
Group Maximum Duration :	60
Group Minimum Duration :	60
Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	200

Common

Section Id :	46419947
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	15
Number of Questions to be attempted :	15
Section Marks :	75
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	464199132
Question Shuffling Allowed :	Yes

Question Number : 551 Question Id : 4641992055 Question Type : MCQ Option Shuffling : No Correct Marks : 5 Wrong Marks : 1

For $I=\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$, if $A=\begin{bmatrix}a & b\\ c & -a\end{bmatrix}$ be such that $A^2=I$, then :

(1) $1+a^2+bc=0$

(2) $1-a^2-bc=0$

(3) $1-a^2+bc=0$

(4) $1+a^2-bc=0$

Question Number : 552 Question Id : 4641992056 Question Type : MCQ Option Shuffling : No Correct Marks : 5 Wrong Marks : 1

If $x=at^4$ and $y=2at^2$, then $\frac{d^2y}{dx^2}$ is equal to :

(1) $-\frac{1}{4at^4}$

(2) $-\frac{2}{t^3}$

(3) $-\frac{1}{t}$

(4) $-\frac{1}{2at^6}$

Question Number : 553 Question Id : 4641992057 Question Type : MCQ Option Shuffling : No Correct Marks : 5 Wrong Marks : 1

A random variable X has the following probability distribution :

X	0	1	2	otherwise
P(X)	k	2k	3k	0

Then :

(A) $k = \frac{1}{6}$

(B) $P(X < 2) = \frac{1}{2}$

(C) $E(X) = \frac{3}{4}$

(D) $P(1 < X < 2) = \frac{5}{6}$

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

(1) (A) and (B) only

(2) (A), (B) and (C) only

(3) (A), (B), (C) and (D)

(4) (B), (C) and (D) only

Question Number : 554 Question Id : 4641992058 Question Type : MCQ Option Shuffling : No Correct Marks : 5 Wrong Marks : 1

If $\begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix} \begin{bmatrix} x \\ 2 \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$, then value of x is :

(1) 1

(2) 0

(3) -1

(4) 3

Question Number : 555 Question Id : 4641992059 Question Type : MCQ Option Shuffling : No Correct Marks : 5 Wrong Marks : 1

Let $f(x) = x^3 - 6x^2 + 12x - 3$, then at $x = 2$, $f(x)$ has :

(1) a maximum

(2) a minimum

(3) both a maximum and a minimum

(4) neither a maximum nor a minimum

Question Number : 556 Question Id : 4641992060 Question Type : MCQ Option Shuffling : No Correct Marks : 5 Wrong Marks : 1

The integral of the function $\frac{1}{9-4x^2}$ is :

(1) $\frac{1}{22}\log_e\left|\frac{3+x}{3-x}\right| + C$, where C is an arbitrary constant

(2) $\frac{1}{12}\log_e\left|\frac{3+2x}{3-2x}\right| + C$, where C is an arbitrary constant

(3) $\frac{1}{2}\log_e\left|\frac{7+x}{7-x}\right| + C$, where C is an arbitrary constant

(4) $\frac{1}{12}\log_e\left|\frac{3-2x}{3+2x}\right| + C$, where C is an arbitrary constant

Question Number : 557 Question Id : 4641992061 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The interval, in which the function $f(x) = \frac{3}{x} + \frac{x}{3}$ is strictly decreasing, is :

(1) $(-\infty, -3) \cup (3, \infty)$

(2) $(-3, 3)$

(3) $(-3, 0) \cup (0, 3)$

(4) $\mathbb{R} - \{0\}$

Question Number : 558 Question Id : 4641992062 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A pair of dice is rolled. If the two numbers appearing on them are different, the probability that
Match **List-I** with **List-II.**

	List-I (Event)		**List-II (Probability)**
(A)	The sum of the numbers is greater than 11	(I)	0
(B)	The sum of the numbers is 4 or less	(II)	1/15
(C)	The sum of the numbers is 4	(III)	2/15
(D)	The sum of the numbers is 7	(IV)	3/15

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

(1) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(2) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

(3) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)

(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Question Number : 559 Question Id : 4641992063 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The value of $I = \int_0^{1.5}[x^2]dx$, where [ ] denotes the greatest integer function, is :

(1) $2 - \sqrt{2}$

(2) $\sqrt{2}$

(3) $5\sqrt{2}$

(4) $3 - 2\sqrt{2}$

Question Number : 560 Question Id : 4641992064 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Consider the following LPP :

Maximise $Z = 9x + 3y$

Subject to the constraints : $x + 3y \leq 60,\ x - y \leq 0,\ x \geq 0,\ y \geq 0$

If $x = A,\ y = B$ is the optimum solution of the given LPP, then the value of $A + B$ is :

(1) 15

(2) 30

(3) 48

(4) 61

Question Number : 561 Question Id : 4641992065 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The area (in square units) of the region bounded by curves $y = x$ and $y = x^3$ is :

(1) 0

(2) 1/2

(3) 1/4

(4) 4

Question Number : 562 Question Id : 4641992066 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The solution region of the inequality $2x + 4y \leq 9$ is :

(1) open half plane containing origin

(2) closed half plane containing origin

(3) open half plane not containing origin

(4) closed half plane not containing origin

Question Number : 563 Question Id : 4641992067 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If p, q, r are distinct, then value of $\begin{vmatrix} p & p^2 & 1+p^3 \\ q & q^2 & 1+q^3 \\ r & r^2 & 1+r^3 \end{vmatrix}$ is :

(1) $(1+pqr)(q-p)(r-p)(r-q)$

(2) $(1-pqr)(q+p)(r+p)(r-q)$

(3) $(1+pqr)(q-p)(r+p)(r-q)$

(4) $(1-pqr)(q+p)(r-p)(r+q)$

Question Number : 564 Question Id : 4641992068 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The degree and order of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{4/5} = 10\frac{dy}{dx} + 2$ are :

(1) Degree 2, Order 5
(2) Degree 5, Order 1
(3) Degree 20, Order 2
(4) Degree 4, Order 2

Question Number : 565 Question Id : 4641992069 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The particular solution of the differential equation $(y - x^2y)dy = (1 - x^3)dx$ with $y(0) = 1$, is :

(1) $y^2 = x^2 + 2\log_e|1 + x| + 1$

(2) $y^2 = 1 + x^2 + 2\log_e\left|\frac{1 + x}{2}\right|$

(3) $y^2 = x^2 + 2x - 3$

(4) $y^2 = x^2 + 2x + 1$

Core Mathematics

Section Id :	46419948
Section Number :	2
Section type :	Online
Mandatory or Optional :	Optional
Number of Questions :	35
Number of Questions to be attempted :	25
Section Marks :	125
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	464199133
Question Shuffling Allowed :	Yes

Question Number : 566 Question Id : 4641992070 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Relation R on the set A = {1, 2, 3, ..., 13, 14} defined as $R = \{(x, y) : 3x - y = 0\}$ is :

(1) Reflexive, symmetric and transitive

(2) Reflexive and transitive but not symmetric

(3) Neither reflexive nor symmetric but transitive

(4) Neither reflexive nor symmetric nor transitive

Question Number : 567 Question Id : 4641992071 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $A=\begin{bmatrix}2 & 3\\ 1 & -4\end{bmatrix}$ and $B=\begin{bmatrix}1 & -2\\ -1 & 3\end{bmatrix}$, then $B^{-1}A^{-1}$ is equal to :

(1) $-\frac{1}{11}\begin{bmatrix}14 & 5\\ 5 & 1\end{bmatrix}$

(2) $\frac{1}{11}\begin{bmatrix}15 & 11\\ 1 & 0\end{bmatrix}$

(3) $\frac{1}{11}\begin{bmatrix}14 & 5\\ 5 & 1\end{bmatrix}$

(4) $-\frac{1}{11}\begin{bmatrix}15 & 11\\ 1 & 0\end{bmatrix}$

Question Number : 568 Question Id : 4641992072 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $(\cos x)^y=(\sin y)^x$ then $\frac{dy}{dx}$ is :

(1) $\frac{\log_e \sin y - y\tan x}{\log_e \cos x + x\cot y}$

(2) $\frac{\log_e \sin y + y\tan x}{\log_e \cos x + x\cos y}$

(3) $\frac{\log_e \sin y + y\tan x}{\log_e \cos x - x\cot y}$

(4) $\frac{\log_e \cos x - x\cos y}{\log_e \sin y + y\tan x}$

Question Number : 569 Question Id : 4641992073 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A particle moves along the curve $6x=y^3+2$. The points on the curve at which the x coordinate is changing 8 times as fast as y coordinate are :

(1) $(11, 4), \left(-\frac{31}{3}, 4\right)$

(2) $(-11, 4), \left(\frac{31}{3}, -4\right)$

(3) $(11, -4), \left(-\frac{31}{3}, -4\right)$

(4) $(11, 4), \left(-\frac{31}{3}, -4\right)$

Question Number : 570 Question Id : 4641992074 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Area of the parallelogram, whose adjacent sides are given by the vectors $\vec{a} = 2\hat{i} - \hat{j} + 5\hat{k}$ and $\vec{b} = 2\hat{i} + \hat{j} + 2\hat{k}$, is :

(1) $\sqrt{105}$

(2) $\sqrt{101}$

(3) $\sqrt{103}$

(4) $\sqrt{102}$

Question Number : 571 Question Id : 4641992075 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The angle between the lines $\vec{r} = 3\hat{i} - 2\hat{j} + 1\hat{k} + \mu\left(4\hat{i} + 6\hat{j} + 12\hat{k}\right)$ and $\vec{r} = 7\hat{i} - 3\hat{j} + 9\hat{k} + \lambda\left(5\hat{i} + 8\hat{j} - 4\hat{k}\right)$ is :

(1) $\cos^{-1}\frac{10}{7\sqrt{105}}$

(2) $\cos^{-1}\frac{5}{72}$

(3) $\cos^{-1}\frac{2}{35}$

(4) $\cos^{-1}\frac{7}{98}$

Question Number : 572 Question Id : 4641992076 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $P(A) = 0.4$, $P(B) = 0.8$ and $P(A \mid B) = 0.6$, then $P(A \cup B)$ is :

(1) 0.96

(2) 0.72

(3) 0.36

(4) 0.42

Question Number : 573 Question Id : 4641992077 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Let $f: \mathbb{R} \to \mathbb{R}$ be defined as $f(x) = 10 - x^2$, then :

(1) f is one-one and onto.

(2) f is one-one but not onto.

(3) f is neither one-one nor onto.

(4) f is onto but not one-one.

Question Number : 574 Question Id : 4641992078 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The domain of $f(x)=\cos^{-1}7x$ is :

(1) $\left[-\frac{1}{7},\frac{1}{7}\right]$

(2) $[-7,7]$

(3) $[0,7]$

(4) $[-1,1]$

Question Number : 575 Question Id : 4641992079 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

For a, b > 0, if $P=\begin{bmatrix}0 & -a\\ 2a & b\end{bmatrix}$ and $Q=\begin{bmatrix}b & a\\ -b & 0\end{bmatrix}$ are two matrices such that $PQ=\begin{bmatrix}2 & 0\\ 3 & 8\end{bmatrix}$, then the value of $(a+b)^{ab}$ is :

(1) 8

(2) 9

(3) 1/9

(4) $-1/27$

Question Number : 576 Question Id : 4641992080 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $A=\begin{bmatrix}2 & 4\\ x & \frac{-1}{2}\end{bmatrix}$ and A is singular, then x is equal to :

(1) $\frac{1}{4}$

(2) $-\frac{1}{4}$

(3) -7

(4) 32

Question Number : 577 Question Id : 4641992081 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $y=\frac{1}{\sqrt{1-4\sin^2 x\cos^2 x}}$, then $\frac{dy}{dx}=$

(1) $2\sec x\tan x$

(2) $\sin 2x$

(3) $2\sec 2x\tan 2x$

(4) $\cos 2x$

Question Number : 578 Question Id : 4641992082 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The value of $\int_{-1}^{1} |\tan^{-1}x|\,dx$ is :

(1) $\frac{\pi}{2} - \log_e 2$

(2) $\frac{\pi}{2} + \log_e 2$

(3) $\frac{\pi - 1 - \log_e 2}{2}$

(4) $\frac{\pi - 1 + \log_e 2}{2}$

Question Number : 579 Question Id : 4641992083 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The area (in square units) bounded by the curve $y = |x-2|$ between $x=0, y=0$ and $x=5$ is :

(1) 8

(2) 13

(3) 6.5

(4) 3.5

Question Number : 580 Question Id : 4641992084 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The area (in square units) enclosed between the curve $x^2 = 4y$ and the line $x = y$ is :

(1) 8

(2) $\frac{16}{3}$

(3) 16

(4) $\frac{8}{3}$

Question Number : 581 Question Id : 4641992085 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If the solution of differential equation $\frac{dy}{dx} = \frac{ax + 3}{2y + 5}$ represents a circle, then a is equal to :

(1) 3

(2) -2

(3) -3

(4) 5

Question Number : 582 Question Id : 4641992086 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Match **List-I** with **List-II** :

	List-I		**List-II**
(A)	$4\hat{i}-2\hat{j}-4\hat{k}$	(I)	A vector perpendicular to both $\hat{i}+2\hat{j}+\hat{k}$ and $2\hat{i}+2\hat{j}+3\hat{k}$
(B)	$-4\hat{i}-4\hat{j}+2\hat{k}$	(II)	Direction ratios are $-2, 1, 2$
(C)	$2\hat{i}-4\hat{j}+4\hat{k}$	(III)	Angle with the vector $\hat{i}-2\hat{j}-\hat{k}$ is $\cos^{-1}\left(\frac{1}{\sqrt{6}}\right)$
(D)	$4\hat{i}-\hat{j}-2\hat{k}$	(IV)	Dot product with $-2\hat{i}+\hat{j}+3\hat{k}$ is 10

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

(1) (A)-(I), (B)-(IV), (C)-(II), (D)-(III)
(2) (A)-(II), (B)-(IV), (C)-(III), (D)-(I)
(3) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)
(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Question Number : 583 Question Id : 4641992087 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A die is thrown three times. Events A and B are defined as below

A : 6 on the third throw

B : 4 on the first and 5 on the second throw

The probability of A given that B has already occurred, is :

(1) 1/6
(2) 2/3
(3) 3/4
(4) 1/2

Question Number : 584 Question Id : 4641992088 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Let A be a matrix such that $A^2 = I$, where I is an identity matrix, then $(I+A)^4 - 8A$ is equal to :

(1) 5I
(2) 8I
(3) $8(I+A)$
(4) $5(I-A)$

Question Number : 585 Question Id : 4641992089 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

For $f(x) = \int \frac{e^x}{\sqrt{4-e^{2x}}}dx$, if the point $\left(0, \frac{\pi}{2}\right)$ satisfies $y = f(x)$, then the constant of integration of the given integral is :

(1) $\frac{\pi}{2}$
(2) $\frac{\pi}{3}$
(3) $\frac{\pi}{6}$
(4) 0

Question Number : 586 Question Id : 4641992090 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The equation of line passing through origin and parallel to the line $\vec{r} = 3\hat{i} + 4\hat{j} - 5\hat{k} + t\left(2\hat{i} - \hat{j} + 7\hat{k}\right)$, where t is a parameter, is :

(A) $\frac{x}{2} = \frac{y}{-1} = \frac{z}{7}$

(B) $\vec{r} = m\left(12\hat{i} - 6\hat{j} + 42\hat{k}\right)$; where m is the parameter

(C) $\vec{r} = \left(12\hat{i} - 6\hat{j} + 42\hat{k}\right) + s\left(0\hat{i} - 0\hat{j} + 0\hat{k}\right)$; where s is the parameter

(D) $\frac{x-3}{0} = \frac{y-4}{0} = \frac{z+5}{0}$

(E) $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$

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

(1) (A) and (B) only
(2) (A), (B) and (C) only
(3) (C), (D) and (E) only
(4) (A) only

Question Number : 587 Question Id : 4641992091 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

$A = \begin{bmatrix} 0 & \alpha & \beta \\ -\alpha & 0 & \gamma \\ -\beta & -\gamma & 0 \end{bmatrix}$ is a

(A) square matrix
(B) diagonal matrix
(C) symmetric matrix
(D) skew-symmetric matrix

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

(1) (A) and (D) only
(2) (A) and (C) only
(3) (A), (B) and (D) only
(4) (A), (B) and (C) only

Question Number : 588 Question Id : 4641992092 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The integrating factor of the differential equation $(y \log_e y)\frac{dx}{dy} + x = 2\log_e y$ is :

(1) y

(2) $\frac{1}{y}$

(3) $\log_e y$

(4) $\log_e (\log_e y)$

Question Number : 589 Question Id : 4641992093 Question Type : MCQ Option Shuffling : No

Correct Marks : 5 Wrong Marks : 1

Optimise $Z = 3x + 9y$ subject to the constraints :

$x + 3y \leq 60,\ x + y \geq 10,\ x \leq y,\ x \geq 0,\ y \geq 0$, then

(1) Maximum value of Z occurs at the point (15, 15) only.

(2) Maximum value of Z occurs at the point (0, 20) only.

(3) Maximum value of Z occurs exactly at two points (15, 15) and (0, 20).

(4) Maximum value of Z occurs at all the points on the line segment joining (15, 15) and (0, 20).

Question Number : 590 Question Id : 4641992094 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Minimise $Z = -50x + 20y$

subject to the constraints : $2x - y \geq -5,\ 3x + y \geq 3,\ 2x - 3y \leq 12,\ x \geq 0,\ y \geq 0$.

Then which of the following is/are true :

(A) Feasible region is unbounded.

(B) Z has no minimum value.

(C) The minimum value of Z is 100.

(D) The minimum value of Z is -300.

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

(1) (A) and (D) only

(2) (C) and (D) only

(3) (A) and (C) only

(4) (A), (C) and (D) only

Question Number : 591 Question Id : 4641992095 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If the system of linear equations $x + y + z = 2,\ 2x + y - z = 3$ and $3x + 2y + kz = 4$ has a unique solution, then :

(1) $k = 0$

(2) $-1 < k < 1$

(3) $k \neq 0$

(4) $-3 < k < 3$

Question Number : 592 Question Id : 4641992096 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The function $f(x) = \big||x| + 1 - x\big|$ is :

(1) continuous and differentiable at $x = 0$ only

(2) continuous at $x = 0$ but nowhere differentiable

(3) continuous everywhere and differentiable at all points except at $x = 0$

(4) continuous but not differentiable at $x = 1$

Question Number : 593 Question Id : 4641992097 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Match **List-I** with **List-II.**

List-I (Function)		**List-II (Interval in which function is increasing)**	
(A)	$\frac{x}{\log_e x}$	(I)	$(-\infty, -2) \cup (2, \infty)$
(B)	$\frac{x}{2} + \frac{2}{x}, x \neq 0$	(II)	$\left(-\frac{\pi}{4}, \frac{\pi}{4}\right)$
(C)	$x^x, x > 0$	(III)	$\left(\frac{1}{e}, \infty\right)$
(D)	$\sin x - \cos x$	(IV)	(e, ∞)

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

(1) (A)-(II), (B)-(I), (C)-(III), (D)-(IV)

(2) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

(3) (A)-(IV), (B)-(I), (C)-(III), (D)-(II)

(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Question Number : 594 Question Id : 4641992098 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The value of $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1 + \tan^{18} x}$ is :

(1) $\frac{\pi}{4}$

(2) $\frac{\pi}{6}$

(3) $\frac{\pi}{9}$

(4) $\frac{\pi}{12}$

Question Number : 595 Question Id : 4641992099 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If the angle between $\vec{a} = 2y^2\hat{i} + 4y\hat{j} + \hat{k}$ and $\vec{b} = 7\hat{i} - 2\hat{j} + y\hat{k}$ is obtuse, then :

(1) $-\frac{1}{2} < y < 0$

(2) $-1 < y < -\frac{1}{2}$

(3) $\frac{1}{2} < y < 1$

(4) $0 < y < \frac{1}{2}$

Question Number : 596 Question Id : 4641992100 Question Type : MCQ Option Shuffling : No

Correct Marks : 5 Wrong Marks : 1

Two events X and Y are such that $P(X) = \frac{1}{3}$, $P(Y) = n$ and the probability of occurrence of at least one event is 0.8. If the events are independent, then the value of n is :

(1) $\frac{3}{10}$

(2) $\frac{1}{15}$

(3) $\frac{7}{10}$

(4) $\frac{11}{15}$

Question Number : 597 Question Id : 4641992101 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The shortest distance (in units) between the lines $\frac{1-x}{1} = \frac{2y-10}{2} = \frac{z+1}{1}$ and $\frac{x-3}{-1} = \frac{y-5}{1} = \frac{z-0}{1}$ is :

(1) $\frac{\sqrt{11}}{\sqrt{3}}$

(2) $\frac{11}{3}$

(3) $\frac{14}{3}$

(4) $\sqrt{\frac{14}{3}}$

Question Number : 598 Question Id : 4641992102 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The value of λ for which the lines $\frac{2-x}{3} = \frac{3-4y}{5} = \frac{z-2}{3}$ and $\frac{x-2}{-3} = \frac{2y-4}{3} = \frac{2-z}{\lambda}$ are perpendicular is :

(1) -2

(2) 2

(3) $\frac{8}{19}$

(4) $\frac{19}{8}$

Question Number : 599 Question Id : 4641992103 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Let A and B are two independent events such that $P(A) = \frac{3}{5}$ and $P(B) = \frac{4}{9}$.

Match **List-I** with **List-II**

List-I		**List-II**	
(A)	$P(A \cap B)$	(I)	$\frac{2}{5}$
(B)	$P(A \mid B)$	(II)	$\frac{4}{15}$
(C)	$P(A' \mid B)$	(III)	$\frac{3}{5}$
(D)	$P(A' \cap B')$	(IV)	$\frac{2}{9}$

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

(1) (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

(2) (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

(3) (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

(4) (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

Question Number : 600 Question Id : 4641992104 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $P = \begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$ satisfies the equation $P^2 - 3P - 7I = 0$, where I is an identity matrix of order 2, then P^{-1} is :

(1) $\frac{1}{7}\begin{bmatrix} 2 & 3 \\ -1 & -5 \end{bmatrix}$

(2) $\begin{bmatrix} 2 & 3 \\ -1 & -5 \end{bmatrix}$

(3) $\frac{1}{7}\begin{bmatrix} 2 & 3 \\ -1 & -1 \end{bmatrix}$

(4) $\frac{1}{7}\begin{bmatrix} 2 & 5 \\ -1 & -1 \end{bmatrix}$

Applied Mathematics

Section Id :	46419949
Section Number :	3
Section type :	Online
Mandatory or Optional :	Optional
Number of Questions :	35
Number of Questions to be attempted :	25
Section Marks :	125
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	464199134
Question Shuffling Allowed :	Yes

Question Number : 601 Question Id : 4641992105 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The remainder when 6^{1029} is divided by 7 is :

(1) 1

(2) 6

(3) 0

(4) 3

Question Number : 602 Question Id : 4641992106 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The minimum value of $x^2 + \frac{1}{x}$ is :

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

(2) $6 + (2)^{\frac{1}{3}}$

(3) $\left(\frac{1}{2}\right)^{\frac{1}{3}} + 5$

(4) $(4)^{\frac{2}{3}} + 2$

Question Number : 603 Question Id : 4641992107 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

For the following probability distribution :

X	3	4	5
P(X)	0.5	0.2	0.3

The mean, variance and standard deviation respectively are :

(1) 4, 3.8 and 0.87

(2) 4, 3.8 and 0.76

(3) 3.8, 4 and 0.76

(4) 3.8, 0.76 and 0.87

Question Number : 604 Question Id : 4641992108 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A delay in production for some days in a factory due to electric fault is :

(1) long term trend

(2) cyclical trend

(3) seasonal trend

(4) irregular trend

Question Number : 605 Question Id : 4641992109 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The rate of interest (per annum), at which the present value of a perpetuity of ₹ 5,000 payable at the end of every 6 months will be ₹ 40,000 is :

(1) 20%

(2) 25%

(3) 15%

(4) 30%

Question Number : 606 Question Id : 4641992110 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Sanjay takes a personal loan of ₹ 6,00,000 at the rate of 12% per annum for 'n' years, the EMI using flat rate method is ₹ 16,000. The value of n is :

(1) 5
(2) 3
(3) 6
(4) 4

Question Number : 607 Question Id : 4641992111 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Subject to constraints $2x+4y \leq 8, 3x+y \leq 6, x+y \leq 4, x, y \geq 0;$ the maximum value of $Z=3x+15y$ is :

(1) 6
(2) 22.8
(3) 30
(4) 25

Question Number : 608 Question Id : 4641992112 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The ratio in which a grocer must mix two varieties of tea worth ₹ 60 per kg and ₹ 65 per kg so that by selling the mixture at ₹ 68.20 per kg he may gain 10% is :

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

Question Number : 609 Question Id : 4641992113 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $A=\begin{bmatrix} 3 & 2 \\ -1 & 1 \end{bmatrix}$ and $B=\begin{bmatrix} -1 & 0 \\ 2 & 5 \\ 3 & 4 \end{bmatrix}$, then $(BA)^T$ is equal to :

(1) $\begin{bmatrix} 3 & 1 & 5 \\ 2 & 9 & 10 \end{bmatrix}$

(2) $\begin{bmatrix} -3 & 1 & 5 \\ -2 & 9 & 10 \end{bmatrix}$

(3) $\begin{bmatrix} -3 & -2 \\ 1 & 9 \\ 5 & 10 \end{bmatrix}$

(4) $\begin{bmatrix} 3 & 2 \\ 1 & 9 \\ 5 & 10 \end{bmatrix}$

Question Number : 610 Question Id : 4641992114 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A firm anticipates an expenditure of ₹ 10,000 for a new equipment at the end of 5 years from now. How much should the firm deposit at the end of each quarter into a sinking fund earning interest 10% per year compounded quarterly to provide for the purchase ? { Use $(1.025)^{20} = 1.7$ }

(1) ₹ 368.55
(2) ₹ 298.40
(3) ₹ 357.14
(4) ₹ 745.03

Question Number : 611 Question Id : 4641992115 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Two pipes A and B can fill a tank in 32 minutes and 48 minutes respectively. If both the pipes are opened simultaneously, after how much time B should be turned off so that the tank is full in 20 minutes ?

(1) 14 minutes
(2) 15 minutes
(3) 16 minutes
(4) 18 minutes

Question Number : 612 Question Id : 4641992116 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $A = \begin{bmatrix} K & 4 \\ 4 & K \end{bmatrix}$ and $|A^3| = 729$, then value of K^8 is

(1) 9^8
(2) 3^8
(3) 5^8
(4) $(-3)^8$

Question Number : 613 Question Id : 4641992117 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A company produces 'x' units of geometry boxes in a day. If the raw material of one geometry box costs ₹ 2 more than square of the number of boxes produced in a day, cost of transportation is half the number of boxes produced in a day, also the cost incurred on storage is ₹ 150 per day. The marginal cost (in ₹) when 70 geometry boxes are produced in a day is :

(1) 14,852.50
(2) 14,795
(3) 14,702.50
(4) 5,087.50

Question Number : 614 Question Id : 4641992118 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

For the curve $y(1+x^2)=2-x$, if $\frac{dy}{dx} = \frac{1}{A}$ at the point where the curve crosses the x-axis, then the value of A is :

(1) 5

(2) -5

(3) -1

(4) 0

Question Number : 615 Question Id : 4641992119 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

In a series of 4 trials, the probability of getting two successes is equal to the probability of getting three successes. The probability of getting at least one success is :

(1) $\frac{609}{625}$

(2) $\frac{16}{625}$

(3) $\frac{513}{625}$

(4) $\frac{112}{625}$

Question Number : 616 Question Id : 4641992120 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A furniture trader deals in tables and chairs. He has ₹ 75,000 to invest and a space to store at most 60 items. A table costs him ₹ 1,500 and a chair costs him ₹ 1,000. The trader earns a profit of ₹ 400 and ₹ 250 on a table and chair, respectively. Assuming that he can sell all the items that he can buy, then which of the following is/are true for the above problem.

(A) Let the trader buys x tables and y chairs. Let Z denote the total profit. Thus, the mathematical formulation of the given problem is
Maximize $Z=400x+250y$
subject to constraints : $x+y \leq 60$, $3x+2y \leq 150$, $x \geq 0$, $y \geq 0$

(B) The corner points of the feasible region are (0, 0), (50, 0), (30, 30) and (0, 60).

(C) Maximum profit is ₹ 19,500 when trader purchase 60 chairs only

(D) Maximum profit is ₹ 20,000 when trader purchase 50 tables only

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

(1) (A), (B) and (C) only

(2) (A), (B), and (D) only

(3) (B) and (C) only

(4) (B), (C) and (D) only

Question Number : 617 Question Id : 4641992121 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

David can row a boat in still water at the rate of 5 km/hr. He rowed in a river downstream to meet his friend. After returning back he observed that the duration of the upstream journey was three times that of the downstream journey. The speed of the stream was :

(1) 2 km/hr

(2) 2.5 km/hr

(3) 3 km/hr

(4) 3.5 km/hr

Question Number : 618 Question Id : 4641992122 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $y = e^{\frac{1}{2}\log_e t}$ and $x = \log_3\left(e^{t^2}\right)$, then $\frac{dy}{dx}$ is equal to :

(1) $\frac{1}{4t\sqrt{t}}$

(2) $\frac{e^{\frac{1}{2}\log_e t}}{2t^2}$

(3) $\frac{\log_e 3}{4t\sqrt{t}}$

(4) $\frac{2t^2}{e^{\frac{1}{2}\log_e t}}$

Question Number : 619 Question Id : 4641992123 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Match **List-I** with **List-II.**

	List-I		**List-II**
(A)	Confidence level	(I)	Percentage of all possible samples that can be expected to include the true population parameter.
(B)	Significance level	(II)	Range that could be expected to contain the population parameter of interest.
(C)	Confidence interval	(III)	The probability of making wrong decision when the null hypothesis is true.
(D)	Standard error	(IV)	The standard derivation of the sampling distribution of a statistic.

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

(1) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(2) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

(3) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)

(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Question Number : 620 Question Id : 4641992124 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The cost of a machinery is ₹ 8,00,000. Its scrap value will be one tenth of its original cost in 15 years. Using linear method of depreciation, the book value of the machine at the end of 10th year will be :

(1) ₹ 4,80,000
(2) ₹ 3,20,000
(3) ₹ 3,68,000
(4) ₹ 4,32,000

Question Number : 621 Question Id : 4641992125 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

In a 600 m race, the ratio of the speeds of two participants A and B is 4 : 5. If A has a head start of 200 m, then the distance by which A wins is :

(1) 500 m
(2) 200 m
(3) 100 m
(4) 120 m

Question Number : 622 Question Id : 4641992126 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

For predicting the straight-line trend in the sales of washing machines (in thousands) on the basis of 8 consecutive years data, the company calculates 4 year moving averages. If the sales of washing machines for respective years are a, b, c, d, e, f, g and h, then which of the following averages will be computed ?

(A) $\frac{a+b+c+d}{4}$

(B) $\frac{a+c+d+e}{4}$

(C) $\frac{c+d+f+h}{4}$

(D) $\frac{b+c+d+e}{4}$

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

(1) (A), (B) and (D) only
(2) (A) and (D) only
(3) (C) and (D) only
(4) (B), (C) and (D) only

Question Number : 623 Question Id : 4641992127 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A sample size of x is considered to be sufficient to hold Central Limit Theorem (CLT) . The value of x should be :

(1) less than 20
(2) greater than or equal to 30
(3) less than 30
(4) sample size does not effect the CLT

Question Number : 624 Question Id : 4641992128 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Vibhuti bought a car worth ₹ 10,25,000 and made a down payment of ₹ 4,00,000. The balance is to be paid in 3 years by equal monthly instalments at an interest rate of 12% p.a. The EMI that Vibhuti has to pay for the car is :

{Use $(1.01)^{-36} = 0.7$}

(1) ₹ 20,700.85

(2) ₹ 27,058.87

(3) ₹ 20,833.33

(4) ₹ 25,708.89

Question Number : 625 Question Id : 4641992129 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The correct solution of $-22 < 8x - 6 \leq 26$ is the interval :

(1) $[-2, 4]$

(2) $(-2, 4)$

(3) $(-2, 4]$

(4) $[-2, 4)$

Question Number : 626 Question Id : 4641992130 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $A = \begin{bmatrix} 5 & 1 \\ -2 & 0 \end{bmatrix}$ and $B^T = \begin{bmatrix} 1 & 10 \\ -2 & -1 \end{bmatrix}$, then the matrix AB is :

(1) $\begin{bmatrix} 1 & 10 \\ -1 & 0 \end{bmatrix}$

(2) $\begin{bmatrix} 15 & -11 \\ -2 & 4 \end{bmatrix}$

(3) $\begin{bmatrix} 3 & 49 \\ -2 & -20 \end{bmatrix}$

(4) $\begin{bmatrix} 1 & 9 \\ -2 & -20 \end{bmatrix}$

Question Number : 627 Question Id : 4641992131 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A random variable X has the following probability distribution :

X	0	1	2	3	4	5	6	7
P(X)	0	m	2m	2m	3m	m^2	$2m^2$	$7m^2+m$

The value of m is :

(1) 10

(2) $\frac{1}{10}$

(3) -1 and $\frac{1}{10}$

(4) $\frac{1}{20}$

Question Number : 628 Question Id : 4641992132 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Mohan caught 100 frogs from a garden and measured their weights. The mean weight of these frogs is a :

(1) parameter

(2) central limit

(3) statistic

(4) null hypothesis

Question Number : 629 Question Id : 4641992133 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

If $A=\begin{bmatrix}-k & 0\\ 0 & -k\end{bmatrix}$, $k\neq 0$, then the value of m in $\left(A^T\right)^4 = mA$ is :

(1) $-k$

(2) k^4

(3) $-k^3$

(4) $\frac{1}{k}$

Question Number : 630 Question Id : 4641992134 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Which of the following are true for the trials of a random experiment to be a Bernoulli's trial ?

(A) There should be finite number of trials.

(B) The trials should be dependent.

(C) Each trial should have at least two outcomes.

(D) The probability of success remains same in each trial.

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

(1) (A), (B), (C) and (D)

(2) (A), (B) and (C) only

(3) (A) and (D) only

(4) (B) and (D) only

Question Number : 631 Question Id : 4641992135 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

The probability of a boy winning a game is $\frac{2}{3}$. Let n denotes that the least number of times he must play the game so that the probability of winning the game at least once is more than 90% and X denotes that number of times he win the game. Hence n, mean, variance and standard deviation of random variable X are respectively :

(A) 3

(B) $\frac{2}{3}$

(C) 2

(D) 0.81

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

(1) (A), (B), (C), (D)

(2) (A), (C), (B), (D)

(3) (B), (A), (D), (C)

(4) (C), (A), (D), (B)

Question Number : 632 Question Id : 4641992136 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Match the following financial terms with their most suitable meaning/synonym :

	List-I		**List-II**
(A)	Perpetuity	(I)	Deposit with purpose
(B)	Sinking Fund	(II)	Asset value reduction
(C)	Bond	(III)	Forever lasting annuity
(D)	Depreciation	(IV)	Debt instrument

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

(1) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

(2) (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

(3) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)

(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Question Number : 633 Question Id : 4641992137 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

An equilateral triangle of side $4\sqrt[4]{3}$ cm formed out of a sheet is converted into a rectangle such that there is no loss of the area of the triangle. Then the least perimeter of the rectangle (in cm) will be :

(1) $2\sqrt{3}$

(2) $4\sqrt{3}$

(3) $8\sqrt{3}$

(4) 12

Question Number : 634 Question Id : 4641992138 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

Match **List-I** with **List-II** :

	List-I		**List-II**
(A)	The derivative of $\log_e x$ with respect to $\left(\frac{1}{x}\right)$ at $x=5$ is	(I)	-5
(B)	If $x^3+x^2y+xy^2=21x$, then $\frac{dy}{dx}$ at $(1, 1)$ is	(II)	-6
(C)	If $f(x)=x^3\log_e\frac{1}{x}$, then $f'(1)+f''(1)$ is	(III)	5
(D)	If $y=f(x^2)$ and $f'(x)=e^{\sqrt{x}}$, then $\frac{dy}{dx}$ at $x=0$ is	(IV)	0

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

(1) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(2) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)
(3) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)
(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Question Number : 635 Question Id : 4641992139 Question Type : MCQ Option Shuffling : No
Correct Marks : 5 Wrong Marks : 1

A coin is tossed twice. Then

Match **List-I** with **List-II** :

	List-I		**List-II**
(A)	P(exactly 2 heads)	(I)	$\frac{1}{4}$
(B)	P(at least 1 head)	(II)	1
(C)	P(at most 2 heads)	(III)	$\frac{3}{4}$
(D)	P(exactly 1 head)	(IV)	$\frac{1}{2}$

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

(1) (A)-(I), (B)-(II), (C)-(III), (D)-(IV)
(2) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)
(3) (A)-(I), (B)-(II), (C)-(IV), (D)-(III)
(4) (A)-(III), (B)-(IV), (C)-(I), (D)-(II)