Mandatory or Optional :	Mandatory
Number of Questions :	20
Number of Questions to be attempted :	20
Section Marks :	80
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	864351317
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 8643514741 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the functions are defined as $f(x) = \sqrt{x}$ and $g(x) = \sqrt{1-x}$, then what is the common domain of the following functions : $f+g$, $f-g$, f/g, g/f, $g-f$ where

$$(f \pm g)(x) = f(x) \pm g(x), (f/g)(x) = \frac{f(x)}{g(x)}$$

Options :

86435114221. $0 \leq x < 1$

86435114222. $0 < x < 1$

86435114223. $0 \leq x \leq 1$

86435114224. $0 < x \leq 1$

Question Number : 62 Question Id : 8643514742 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the equation $a|z|^2 + \overline{\bar{\alpha}z + \alpha\bar{z}} + d = 0$ represents a circle where a, d are real constants, then which of the following condition is correct ?

Options :

86435114225. $|\alpha|^2 - ad \geqslant 0$ and $a \in R$

86435114226. $|\alpha|^2 - ad > 0$ and $a \in R - \{0\}$

86435114227. $|\alpha|^2 - ad \neq 0$

86435114228. $\alpha = 0,\ a,\ d \in R^+$

Question Number : 63 Question Id : 8643514743 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $A + 2B = \begin{bmatrix} 1 & 2 & 0 \\ 6 & -3 & 3 \\ -5 & 3 & 1 \end{bmatrix}$ and $2A - B = \begin{bmatrix} 2 & -1 & 5 \\ 2 & -1 & 6 \\ 0 & 1 & 2 \end{bmatrix}$. If Tr(A) denotes the sum of all diagonal elements of the matrix A, then $Tr(A) - Tr(B)$ has value equal to :

Options :

86435114229. 1

86435114230. 2

86435114231. 3

86435114232. 0

Question Number : 64 Question Id : 8643514744 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let α, β, γ be the real roots of the equation, $x^3 + ax^2 + bx + c = 0$, (a, b, c $\in$ R and a, b $\neq$ 0). If the system of equations (in u, v, w) given by $\alpha u + \beta v + \gamma w = 0;\ \beta u + \gamma v + \alpha w = 0;$ $\gamma u + \alpha v + \beta w = 0$ has non-trivial solution, then the value of $\frac{a^2}{b}$ is :

Options :

86435114233. 0

86435114234. 1

86435114235. 3

86435114236. 5

Question Number : 65 Question Id : 8643514745 Question Type : MCQ Option Shuffli

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The sum of all the 4-digit distinct numbers that can be formed with the digits 1, 2, 2 and 3 is :

Options :

86435114237. 22264

86435114238. 26664

86435114239. 122234

86435114240. 122664

Question Number : 66 Question Id : 8643514746 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let $(1+x+2x^2)^{20} = a_0 + a_1x + a_2x^2 + ... + a_{40}x^{40}$. Then, $a_1 + a_3 + a_5 + ... + a_{37}$ is equal to :

Options :

86435114241. $2^{19}(2^{20}+21)$

86435114242. $2^{20}(2^{20}+21)$

86435114243. $2^{19}(2^{20}-21)$

86435114244. $2^{20}(2^{20}-21)$

Question Number : 67 Question Id : 8643514747 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of $3 + \cfrac{1}{4 + \cfrac{1}{3 + \cfrac{1}{4 + \cfrac{1}{3 + ... \infty}}}}$ is equal to :

Options :

86435114245. $1.5 + \sqrt{3}$

86435114246. $2+\sqrt{3}$

86435114247. $3+2\sqrt{3}$

86435114248. $4+\sqrt{3}$

Question Number : 68 Question Id : 8643514748 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

$\frac{1}{3^2-1}+\frac{1}{5^2-1}+\frac{1}{7^2-1}+\ldots\ldots+\frac{1}{(201)^2-1}$ is equal to :

Options :

86435114249. $\frac{25}{101}$

86435114250. $\frac{101}{408}$

86435114251. $\frac{99}{400}$

86435114252. $\frac{101}{404}$

Question Number : 69 Question Id : 8643514749 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If α, β are natural numbers such that $100^{\alpha}-199\beta=(100)(100)+(99)(101)+(98)(102)+\ldots\ldots+(1)(199)$, then the slope of the line passing through (α, β) and origin is :

Options :

86435114253. 510

86435114254. 530

86435114255. 540

86435114256. 550

Question Number : 70 Question Id : 8643514750 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $f(x) = \begin{cases} \frac{1}{|x|} & ; |x| \geq 1 \\ ax^2 + b & ; |x| < 1 \end{cases}$ is differentiable at every point of the domain, then the values of a and b are respectively :

Options :

86435114257. $\frac{1}{2}, \frac{1}{2}$

86435114258. $-\frac{1}{2}, \frac{3}{2}$

86435114259. $\frac{5}{2}, -\frac{3}{2}$

86435114260. $\frac{1}{2}, -\frac{3}{2}$

Question Number : 71 Question Id : 8643514751 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The real valued function $f(x) = \frac{\text{cosec}^{-1}x}{\sqrt{x - [x]}}$, where $[x]$ denotes the greatest integer less than or equal to x, is defined for all x belonging to :

Options :

86435114261. all reals except integers

86435114262. all reals except the interval $[-1, 1]$

86435114263. all non-integers except the interval $[-1, 1]$

86435114264. all integers except $0, -1, 1$

Question Number : 72 Question Id : 8643514752 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If $\lim\limits_{x\to 0}\frac{\sin^{-1}x-\tan^{-1}x}{3x^3}$ is equal to L, then the value of $(6L+1)$ is :

Options :

86435114265. $\frac{1}{6}$

86435114266. 6

86435114267. 2

86435114268. $\frac{1}{2}$

Question Number : 73 Question Id : 8643514753 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The integral $\int\frac{(2x-1)\cos\sqrt{(2x-1)^2+5}}{\sqrt{4x^2-4x+6}}dx$ is equal to :

(where c is a constant of integration)

Options :

86435114269. $\frac{1}{2}\sin\sqrt{(2x+1)^2+5}+c$

86435114270. $\frac{1}{2}\sin\sqrt{(2x-1)^2+5}+c$

86435114271. $\frac{1}{2}\cos\sqrt{(2x-1)^2+5}+c$

86435114272. $\frac{1}{2}\cos\sqrt{(2x+1)^2+5}+c$

Question Number : 74 Question Id : 8643514754 Question Type : MCQ Option Shuffli

Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The differential equation satisfied by the system of parabolas $y^2 = 4a(x + a)$ is :

Options :

86435114273. $y\left(\frac{dy}{dx}\right)^2 + 2x\left(\frac{dy}{dx}\right) - y = 0$

86435114274. $y\left(\frac{dy}{dx}\right) + 2x\left(\frac{dy}{dx}\right) - y = 0$

86435114275. $y\left(\frac{dy}{dx}\right)^2 - 2x\left(\frac{dy}{dx}\right) + y = 0$

86435114276. $y\left(\frac{dy}{dx}\right)^2 - 2x\left(\frac{dy}{dx}\right) - y = 0$

Question Number : 75 Question Id : 8643514755 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Choose the correct statement about two circles whose equations are given below :

$x^2 + y^2 - 10x - 10y + 41 = 0$

$x^2 + y^2 - 22x - 10y + 137 = 0$

Options :

86435114277. circles have two meeting points

86435114278. circles have no meeting point

86435114279. circles have only one meeting point

86435114280. circles have same centre

Question Number : 76 Question Id : 8643514756 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the four circles M, N, O and P, following four equations are given :

Circle M : $x^2+y^2=1$

Circle N : $x^2+y^2-2x=0$

Circle O : $x^2+y^2-2x-2y+1=0$

Circle P : $x^2+y^2-2y=0$

If the centre of circle M is joined with centre of the circle N, further centre of circle N is joined with centre of the circle O, centre of circle O is joined with the centre of circle P and lastly, centre of circle P is joined with centre of circle M, then these lines form the sides of a :

Options :

86435114281. Rectangle

86435114282. Rhombus

86435114283. Square

86435114284. Parallelogram

Question Number : 77 Question Id : 8643514757 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The number of integral values of m so that the abscissa of point of intersection of lines $3x+4y=9$ and $y=mx+1$ is also an integer, is :

Options :

86435114285. 0

86435114286. 1

86435114287. 2

86435114288. 3

Question Number : 78 Question Id : 8643514758 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The equation of one of the straight lines which passes through the point (1, 3) and makes an angle $\tan^{-1}(\sqrt{2})$ with the straight line, $y+1=3\sqrt{2}\,x$ is :

Options :

86435114289. $4\sqrt{2}\,x + 5y - (15 + 4\sqrt{2}) = 0$

86435114290. $4\sqrt{2}\,x - 5y - (5 + 4\sqrt{2}) = 0$

86435114291. $5\sqrt{2}\,x + 4y - (15 + 4\sqrt{2}) = 0$

86435114292. $4\sqrt{2}\,x + 5y - 4\sqrt{2} = 0$

Question Number : 79 Question Id : 8643514759 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The solutions of the equation

$$\begin{vmatrix} 1+\sin^2 x & \sin^2 x & \sin^2 x \\ \cos^2 x & 1+\cos^2 x & \cos^2 x \\ 4\sin 2x & 4\sin 2x & 1+4\sin 2x \end{vmatrix} = 0,\ (0 < x < \pi),\ \text{are :}$$

Options :

86435114293. $\frac{\pi}{6}, \frac{5\pi}{6}$

86435114294. $\frac{5\pi}{12}, \frac{7\pi}{12}$

86435114295. $\frac{7\pi}{12}, \frac{11\pi}{12}$

86435114296. $\frac{\pi}{12}, \frac{\pi}{6}$

Question Number : 80 Question Id : 8643514760 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A vector $\vec{a}$ has components 3p and 1 with respect to a rectangular cartesian system. This system is rotated through a certain angle about the origin in the counter clockwise sense. If, with respect to new system, $\vec{a}$ has components $p+1$ and $\sqrt{10}$, then a value of p is equal to :

Options :

86435114297. 1

86435114298. -1

86435114299. $\frac{4}{5}$

86435114300. $-\frac{5}{4}$

Mathematics Section B

Section Id :	864351318
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	5
Section Marks :	20
Mark As Answered Required? :	Yes
Sub-Section Number :	1
Sub-Section Id :	864351318
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 8643514761 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let z_1, z_2 be the roots of the equation $z^2+az+12=0$ and z_1, z_2 form an equilateral triangle with origin. Then, the value of $|a|$ is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText

Possible Answers :

100

Question Number : 82 Question Id : 8643514762 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

Let $f(x)$ and $g(x)$ be two functions satisfying $f(x^2)+g(4-x)=4x^3$ and $g(4-x)+g(x)=0$, then the value of $\int_{-4}^{4} f(x^2)dx$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 83 Question Id : 8643514763 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

If $f(x)=\int \frac{5x^8+7x^6}{(x^2+1+2x^7)^2}dx$, $(x \geq 0)$, $f(0)=0$ and $f(1)=\frac{1}{K}$, 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 :

100

Question Number : 84 Question Id : 8643514764 Question Type : SA

Correct Marks : 4 Wrong Marks : 0

A square ABCD has all its vertices on the curve $x^2y^2=1$. The midpoints of its sides also lie on the same curve. Then, the square of area of ABCD is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

100

Question Number : 85 Question Id : 8643514765 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let the plane $ax+by+cz+d=0$ bisect the line joining the points $(4, -3, 1)$ and $(2, 3, -5)$ at the right angles. If a, b, c, d are integers, then the minimum value of $(a^2+b^2+c^2+d^2)$ is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
100

Question Number : 86 Question Id : 8643514766 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The equation of the planes parallel to the plane $x-2y+2z-3=0$ which are at unit distance from the point (1, 2, 3) is $ax+by+cz+d=0$. If $(b-d)=K(c-a)$, then the positive value of K is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
100

Question Number : 87 Question Id : 8643514767 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The mean age of 25 teachers in a school is 40 years. A teacher retires at the age of 60 years and a new teacher is appointed in his place. If the mean age of the teachers in this school now is 39 years, then the age (in years) of the newly appointed teacher is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
100

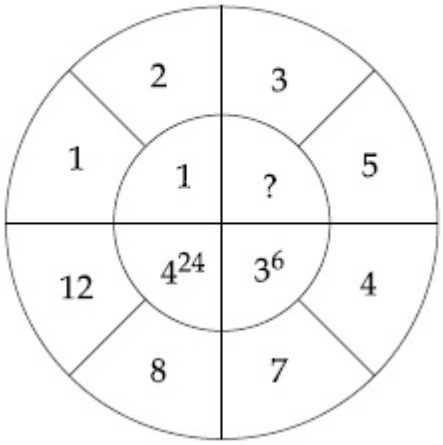
Question Number : 88 Question Id : 8643514768 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The number of times the digit 3 will be written when listing the integers from 1 to 1000 is _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
100

Question Number : 89 Question Id : 8643514769 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The missing value in the following figure is _____.



Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
100

Question Number : 90 Question Id : 8643514770 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The number of solutions of the equation $|\cot x| = \cot x + \frac{1}{\sin x}$ in the interval $[0, 2\pi]$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
100