Mathematics Section A

Section Id :	67603395
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 :	67603395
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 6760331411 Question Type : MCQ Option Shuffling : Yes Is Question Mandato
Correct Marks : 4 Wrong Marks : 1

Let $\mathbb{R}$ be the set of real numbers and '*' be a binary operation on $\mathbb{R} - \{0\}$ defined by

$$a * b = a + 2b + \frac{a}{b} .$$

Then the operation '*' is

Options :

6760334231. associative and commutative

6760334232. commutative but not associative

6760334233. associative but not commutative

6760334234. neither associative nor commutative.

Question Number : 62 Question Id : 6760331412 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If the equations $2x^2 + kx - 5 = 0$ and $x^2 - 3x - 4 = 0$ have one root in common, then a value of 'k' is

Options :

6760334235. -2

6760334236. 3

6760334237. -3

6760334238. 2

Question Number : 63 Question Id : 6760331413 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let A = (a_{ij}) be a 3×3 matrix, where $a_{ij} = 7^{\max\{i,j\}}$. Then *det* A is equal to

Options :

6760334239. 7^6

6760334240. $6 \cdot 7^6$

6760334241. $6^2 \cdot 7^6$

6760334242. $6^3 \cdot 7^6$

Question Number : 64 Question Id : 6760331414 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let A be a 3×3 matrix and | A | = –1. A matrix B is obtained from the matrix A by applying the following elementary row operations :

$R_2 \to R_2 + 3R_1$

$R_3 \to 3R_3$

$R_1 \to R_1 - 5R_3$.

Then | B | is equal to :

Options :

6760334243. -27

6760334244. -3

6760334245. 1

6760334246. 11

Question Number : 65 Question Id : 6760331415 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

For the system of linear of equations

$$(k-3)x+y+z=0$$

$$x+(k-3)y+z=0$$

$$x+y+(k-3)z=0$$

the number of distinct values of k, for which it has a non-trivial solution, is

Options :

6760334247. 3

6760334248. 2

6760334249. 1

6760334250. 0

Question Number : 66 Question Id : 6760331416 Question Type : MCQ Option Shuffling : Yes Is Question Mandato
Correct Marks : 4 Wrong Marks : 1

In the Binomial expansion of $\left(2x\sqrt{x}+3y^{\frac{1}{16}}\right)^{33}$, the number of terms, having positive integral powers of x and y is :

Options :

6760334251. 0

6760334252. 1

6760334253. 2

6760334254. 3

Question Number : 67 Question Id : 6760331417 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If 'm' is the arithmetic mean of two distinct real numbers l and n $(l, n > 1)$ and G_1, G_2 and G_3 are three geometric means between l and n, then $G_1^4 + 2G_2^4 + G_3^4$ equals

Options :

6760334255. $2l^2mn$

6760334256. $4lm^2n$

6760334257. $4lmn^2$

6760334258. $2lm^2n^2$

Question Number : 68 Question Id : 6760331418 Question Type : MCQ Option Shuffling : Yes Is Question Mandato

Correct Marks : 4 Wrong Marks : 1

$\lim\limits_{x\to 0}(1+x)^{\frac{1}{e^x-1}}$ is equal to

Options :

6760334259. 0

6760334260. 1

6760334261. e

6760334262. e^e

Question Number : 69 Question Id : 6760331419 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

If for non-zero distinct real numbers a, b and c,

$$f(x)=\begin{cases} x\alpha+\sqrt{2}a\sin x, & 0\le x<\dfrac{\pi}{4} \\ 2x\alpha\cot x-c\sin 2x, & \dfrac{\pi}{4}\le x<\dfrac{\pi}{2} \\ -8ac\cos 2x-\pi\alpha b, & \dfrac{\pi}{2}\le x\le\pi \end{cases}$$

is continuous on $[0, \pi]$, then

Options :

6760334263. a, b, c are in A.P.

6760334264. $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}$ are in A.P.

6760334265. a, b, c are in G.P.

6760334266. $\frac{1}{a}+\frac{2}{b}+\frac{1}{c}=0$

Question Number : 70 Question Id : 6760331420 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let $f : \mathbb{R} \to \mathbb{R}$ be a differentiable function such that $f(0) = 2$. If $\left|\frac{df}{dx}\right| \leq 3$, for all $x \in \mathbb{R}$, then $f(1)$ lies in the interval

Options :

6760334267. $[5, \infty)$

6760334268. $(-\infty, -1]$

6760334269. $[-1, 5]$

6760334270. $(-\infty, -1) \cup (5, \infty)$

Question Number : 71 Question Id : 6760331421 Question Type : MCQ Option Shuffling : Yes Is Question Mandato
Correct Marks : 4 Wrong Marks : 1

If the function $f:\mathbb{R}\to\mathbb{R}$ defined by $f(x)=\frac{x^3}{3}-(2a+3b)x^2+24abx+5$ has a local maxima at – 4 and a local minima at 4, then a value of $4a+3b$ is

Options :

6760334271. $\frac{1}{2}$

6760334272. 2

6760334273. 0

6760334274. 1

Question Number : 72 Question Id : 6760331422 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The integral $\int\frac{dx}{\sqrt{2x+5}-\sqrt{2x+3}}$ is equal to

(where C is a constant of integration)

Options :

6760334275. $\frac{1}{3}\left[(2x+5)^{\frac{3}{2}}+(2x+3)^{\frac{3}{2}}\right]+C$

6760334276. $\frac{1}{6}\left[(2x+5)^{\frac{2}{3}}+(2x+3)^{\frac{2}{3}}\right]+C$

6760334277. $\frac{1}{6}\left[(2x+5)^{\frac{3}{2}}+(2x+3)^{\frac{3}{2}}\right]+C$

6760334278. $\frac{1}{12}\left[(2x+5)^{\frac{2}{3}}+(2x+3)^{\frac{2}{3}}\right]+C$

Question Number : 73 Question Id : 6760331423 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A curve passes through the point (–1, 4). If the normal to it at any point (x, y) on it passes through (2, 0), then its equation is

Options :

6760334279. $(x-2)^2+y^2=25$

6760334280. $2(x-2)^2+y^2=34$

6760334281. $2y^2-(x-2)^2=23$

6760334282. $y^2-(x-2)^2=7$

Question Number : 74 Question Id : 6760331424 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If an ellipse passes through the point (4, 1) and has foci at $(\pm 3, 0)$, then its eccentricity is

Options :

6760334283. $\frac{2\sqrt{2}}{3}$

6760334284. $\frac{\sqrt{2}}{3}$

6760334285. $\frac{1}{\sqrt{2}}$

6760334286. $\frac{1}{2}$

Question Number : 75 Question Id : 6760331425 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The tangents, to the parabola $y^2 = 2 - x$ at the points of its intersection with the line $y = x - 2$, intersect at the point

Options :

6760334287. $\left(-\frac{1}{2}, 2\right)$

6760334288. $\left(2, -\frac{1}{2}\right)$

6760334289. $(2, 0)$

6760334290. $\left(2,-\frac{3}{2}\right)$

Question Number : 76 Question Id : 6760331426 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let L_1 and L_2 be two lines passing through the points $P(b-c, c-a, a-b)$ and Q $\left(\frac{1}{l}, \frac{1}{m}, \frac{1}{n}\right)$ respectively, where $\frac{1}{l}, \frac{1}{m}$ and $\frac{1}{n}$ are the a^{th}, b^{th} and c^{th} terms of an Arithmetic Progression. If L_1 and L_2 intersect at the origin, then an angle between them is

Options :

6760334291. $\frac{\pi}{3}$

6760334292. $\frac{\pi}{2}$

6760334293. $\frac{\pi}{4}$

6760334294. $\frac{\pi}{6}$

Question Number : 77 Question Id : 6760331427 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A plane intersects the yz-plane at $x=0,\ 2y-3z=5$ and it intersects the xy-plane at $z=0,\ 7x+4y=10$. Then the distance of the point $(1, -2, -1)$ from this plane is

Options :

6760334295. $\frac{1}{\sqrt{101}}$

6760334296. $\frac{3}{\sqrt{101}}$

6760334297. $\frac{5}{\sqrt{101}}$

6760334298. $\frac{7}{\sqrt{101}}$

Question Number : 78 Question Id : 6760331428 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A dice is thrown twice. If A is the event that the sum of numbers appearing on them is 7 and B is the event that number 5 appears at least once, then P(B|A) is equal to

Options :

6760334299. $\frac{1}{2}$

6760334300. $\frac{1}{3}$

6760334301. $\frac{2}{11}$

6760334302. $\frac{2}{5}$

Question Number : 79 Question Id : 6760331429 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The maximum value of $(\cos\theta_1)\cdot(\cos\theta_2)\cdot(\cos\theta_3)\cdot\ldots\cdot(\cos\theta_{10})$ under the restrictions $0 < \theta_1, \theta_2, \ldots, \theta_{10} < \frac{\pi}{2}$ and $(\cot\theta_1)\cdot(\cot\theta_2)\cdot\ldots\cdot(\cot\theta_{10}) = 1$ is

Options :

6760334303. 1

6760334304. $\frac{1}{512}$

6760334305. $\frac{1}{1024}$

6760334306. $\frac{1}{32}$

Question Number : 80 Question Id : 6760331430 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The statement $\sim(p \leftrightarrow \sim q)$ is equivalent to

Options :

6760334307. $p \leftrightarrow q$

6760334308. $p \leftrightarrow \sim q$

6760334309. $\sim q \rightarrow p$

6760334310. $\sim p \wedge q$

Mathematics Section B

Section Id :	67603396
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 :	67603396
Question Shuffling Allowed :	Yes

Question Number : 81 Question Id : 6760331431 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The number of elements in the set $\{x \in \mathbb{R} : (|x|-2)\cdot|2x+3|=1\}$ 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 : 6760331432 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
If six letter words (with or without meaning) are formed using A, B, C, D, E and F, then the number of words, in which exactly one of these alphabets is repeated three times and the other three are distinct, 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 : 6760331433 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
If the sum of all 3-digit numbers which are multiples of 9 is $41k$, then 'k' is equal to _____.
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 : 6760331434 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

If $[x]$ denotes the greatest integer $\leq x$, then the value of $\int_{-2}^{4} |[x]-x|\,dx$ is _____.

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

Question Number : 85 Question Id : 6760331435 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
If the area (in sq. units) bounded by the parabolas $5x^2 - y = 0$ and $2x^2 - y + b = 0$ ($b>0$) is $12\sqrt{3}$, then 'b' is equal to _____.

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 : 6760331436 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
The circles, $x^2 + y^2 + 2x + 4y - 4 = 0$ and $x^2 + y^2 - 4x + 4y + k = 0$ touch each other internally. If the point of contact of these circles is (a, b), then $5\left(a^2 + b^2\right)$ is equal to _____.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes

Answers Type : Equal
Text Areas : PlainText
Possible Answers :
100

Question Number : 87 Question Id : 6760331437 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

If the solution $y = y(x)$ of the differential equation $\left(y + 3x^4\right)\frac{dx}{dy} = x,\ x > 0$, satisfieds $y(1) = -1$, then the value of $\frac{d^2y}{dx^2} - \frac{dy}{dx} + y$ at $x = 2$ is _____.

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

Question Number : 88 Question Id : 6760331438 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The mean and variance of 7 observations are 7 and 18 respectively. If 5 of the observations are 2, 4, 10, 11, 13 and the remaining observations are x and y, then xy is equal to _____.

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 : 6760331439 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

A vertical pole of height $10\sqrt{3}$ meters is observed from three points, A, B and C in the same horizontal line passing through the foot 'O' of the pole. The angles of elevation of the top, 'P', of the pole from A, B and C are in A.P. If AP = $20\sqrt{3}$ meters, OC = 10 meters and BP = k meters, then k^2 is equal to _____.

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 : 6760331440 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let $\vec{a} = 2\hat{i} + \alpha\hat{j} + \hat{k}$ and $\vec{b} = \beta\hat{i} - 5\hat{j} + \gamma\hat{k}$, where α, β and γ are real numbers. If $\vec{a} \times \vec{b} = 26\hat{i} - 11\hat{j} - 19\hat{k}$, then $\alpha - \beta + \gamma$ is equal to _____.

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