Mathematics Section A

Section Id :	676033137
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 :	676033137
Question Shuffling Allowed :	Yes

Question Number : 61 Question Id : 6760332041 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The domain of the function $f(x)=\frac{\log_2(x+3)}{(x+1)(x+2)}$ is

Options :

6760336121. $\mathbb{R}-\{-1,-2\}$

6760336122. $(-2,\infty)$

6760336123. $\mathbb{R} - \{-1, -2, -3\}$

6760336124. $(-3, \infty) - \{-1, -2\}$

Question Number : 62 Question Id : 6760332042 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If A is a 3×3 matrix and $|A| = \frac{1}{36}$, then the value of $|2 \cdot adj\,(3 \cdot adj\,(6A))|$ is

Options :

6760336125. $2^7 \times 3^8$

6760336126. $2^6 \times 3^{10}$

6760336127. $2^6 \times 3^{12}$

6760336128. $2^7 \times 3^{10}$

Question Number : 63 Question Id : 6760332043 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The system of equations

$$x + 2y + pz = 4$$
$$x + qy + z = 5$$
$$2x + 4y + z = 8$$

has

Options :

6760336129. a unique solution for $p = 1$ and $q = 2$

6760336130. a unique solution for $p = 2$ and $q = 2$

6760336131. infinitely many solutions for $p = \frac{1}{2}$ and $q = 2$

6760336132. no solution for $p = 2$ and $q = 1$

Question Number : 64 Question Id : 6760332044 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If C_r $(r = 0, 1, 2,\ldots, 11)$ are the Binomial coefficients in the expansion of $(1 + x)^{11}$, then the value of

$C_0 + (C_0 + C_1) + (C_0 + C_1 + C_2) + \ldots.. + (C_0 + C_1 + \ldots. + C_{11})$ is

Options :

6760336133. 13.2^{10}

6760336134. 13.2^{11}

6760336135. 23.2^{10}

6760336136. 23.2^{11}

Question Number : 65 Question Id : 6760332045 Question Type : MCQ Option Shuffling : Yes Is Question Manc Correct Marks : 4 Wrong Marks : 1

A fair coin is tossed n times. If the probability of getting 6 heads is equal to that of getting 8 tails, then the probability of getting 2 heads, is

Options :

6760336137. $\frac{91}{2^{14}}$

6760336138. $\frac{13}{2^{14}}$

6760336139. $\frac{1}{7}$

6760336140. $\frac{51}{2^{14}}$

Question Number : 66 Question Id : 6760332046 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The value of $\lim\limits_{x\to 2}\left(2-\cos\left(2x^2-5x+2\right)\right)^{\frac{1}{\left(x^2-4x+4\right)}}$ is equal to

Options :

6760336141. $e^{\frac{9}{4}}$

6760336142. $e^{\frac{9}{2}}$

6760336143. $e^{\frac{3}{4}}$

6760336144. $e^{\frac{3}{2}}$

Question Number : 67 Question Id : 6760332047 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let $f : \mathbb{R} \to \mathbb{R}$ be twice differentiable and satisfy $f(x + y) = f(x) + f(y)$. If $f'(0) = 1$, then which of the following is true?

Options :

6760336145. $f(0) = 1$

6760336146. $f'(2) = 1$

6760336147. $f''(0) = 1$

6760336148. $f'(1) = 2$

Question Number : 68 Question Id : 6760332048 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Equation of a tangent to the curve, $y = 2\int_0^x |t|\,dt$ which is parallel to the line, $2x - y = 13$ is

Options :

6760336149. $y = 2x + 13$

6760336150. $y = 2x + 1$

6760336151. $y = 2x - 7$

6760336152. $y = 2x$

Question Number : 69 Question Id : 6760332049 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If $\int \sin^{-1}\left(\frac{2x+2}{\sqrt{4x^2+8x+13}}\right) dx = A \tan^{-1}\left(\frac{2x+2}{3}\right) + B \log_e\left(4x^2+8x+13\right) + C$ (C is a constant of integration), then the ordered pair (A, 4B) is equal to

Options :

6760336153. $\left(\frac{3}{2}(x+1), -3\right)$

6760336154. $\left(\frac{3}{2}(x+1), 3\right)$

6760336155. $(x + 1, -3)$

6760336156. $(x + 1, -6)$

Question Number : 70 Question Id : 6760332050 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The value of the integral $\int_1^6 \frac{\log_e x \, dx}{\log_e x^2 + \log_e (x^2 - 14x + 49)}$ is

Options :

6760336157. $\frac{5}{4}$

6760336158. $\frac{5}{8}$

6760336159. $\frac{7}{4}$

6760336160. $\frac{5}{2}$

Question Number : 71 Question Id : 6760332051 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If $u + v + w = 91$, and $2u = 3v = 4w$, then the value of $\int_{u-v+w}^{2u+v+4w} e^{(x-[x])} \, dx$, where $[x]$ denotes the greatest integer $\leq x$, is equal to

Options :

6760336161. $160\left(1 - \frac{1}{e}\right)$

6760336162. 161

6760336163. $161e$

6760336164. $161(e-1)$

Question Number : 72 Question Id : 6760332052 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If two distinct chords, drawn from the point (α, β) on the circle $x^2+y^2=\alpha x+\beta y$ (where $\alpha\beta \neq 0$) are bisected by the y–axis, then

Options :

6760336165. $\alpha^2 = 8\beta^2$

6760336166. $8\alpha^2 = \beta^2$

6760336167. $8\alpha^2 < \beta^2$

6760336168. $8\alpha^2 > \beta^2$

Question Number : 73 Question Id : 6760332053 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

If the area of the triangle formed by the tangent at a point in the first quadrant on the ellipse, $4x^2+3y^2=12$ and its axes is 4 sq. units, then one such point is

Options :

6760336169. $\left(1, \sqrt{\frac{8}{3}}\right)$

6760336170. $\left(\frac{3}{2}, 1\right)$

6760336171. $\left(\frac{1}{2}, \sqrt{\frac{11}{3}}\right)$

6760336172. $\left(\sqrt{\frac{3}{2}}, \sqrt{2}\right)$

Question Number : 74 Question Id : 6760332054 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Let the normal at any point of hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ intersect the coordinate axes at points P and Q. Then the locus of the mid-point of PQ is :

Options :

6760336173. $2\left(b^2x^2+a^2y^2\right)=a^2+b^2$

6760336174. $2\left(b^2x^2-a^2y^2\right)=a^2+b^2$

6760336175. $4\left(a^2x^2+b^2y^2\right)=\left(a^2+b^2\right)^2$

6760336176. $4\left(a^2x^2-b^2y^2\right)=\left(a^2+b^2\right)$

Question Number : 75 Question Id : 6760332055 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The equation of a line passing through the point (2, –1, 1) and the point of intersection of the lines $2x-y-4=0=y+2z$ and $x+3z=0=2x+5z-1$, is

Options :

6760336177. $\frac{x-2}{1}=\frac{y+1}{-3}=\frac{z-1}{2}$

6760336178. $\frac{x-2}{1}=\frac{y+1}{3}=\frac{z-1}{-2}$

6760336179. $\frac{x-2}{1}=\frac{y+1}{3}=\frac{z-1}{2}$

6760336180. $\frac{x-2}{-1}=\frac{y+1}{3}=\frac{z-1}{2}$

Question Number : 76 Question Id : 6760332056 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The distance of the point (5, 6, 9) from the plane, which passes through the line of intersection of the planes $x+y-z=1$ and $2x+3y+4z=5$, and is perpendicular to the plane $x-y+z=0$ is

Options :

6760336181. $\sqrt{31}$

6760336182. $2\sqrt{31}$

6760336183. $\sqrt{62}$

6760336184. $2\sqrt{62}$

Question Number : 77 Question Id : 6760332057 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No
Correct Marks : 4 Wrong Marks : 1

The mean and the variance of seven observations are 8 and 16 respectively. If five of the observations are 2, 4, 10, 12 and 14, then the absolute difference of the remaining two observations is

Options :

6760336185. 2

6760336186. 3

6760336187. 4

6760336188. 6

Question Number : 78 Question Id : 6760332058 Question Type : MCQ Option Shuffling : Yes Is Question Manc
Correct Marks : 4 Wrong Marks : 1

A bag contains four bulbs. Some of these bulbs are defective. Two bulbs are drawn at random and it is found that both the bulbs are defective. What is the probability that the bag contains exactly 3 defective bulbs?

Options :

6760336189. 0.5

6760336190. 0.3

6760336191. 0.6

6760336192. 0.75

Question Number : 79 Question Id : 6760332059 Question Type : MCQ Option Shuffling : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

The number of solutions of the equation $|\cos x| = \cos x - 2\sin x, -2\pi \le x \le 2\pi$, is

Options :

6760336193. 7

6760336194. 5

6760336195. 4

6760336196. 3

Question Number : 80 Question Id : 6760332060 Question Type : MCQ Option Shuffling : Yes Is Question Manc Correct Marks : 4 Wrong Marks : 1

Consider the following statements :

p : Amit plays cricket

q : Amit is out of Delhi.

r : It is Sunday

Then the statement "Amit plays cricket only if he is in Delhi and it is Sunday" can be expressed as :

Options :

6760336197. $(q \wedge r) \Rightarrow p$

6760336198. $(\sim q \wedge r) \Rightarrow p$

6760336199. $p \Rightarrow (q \wedge r)$

6760336200. $p \Rightarrow (\sim q \wedge r)$

Mathematics Section B

Section Id :	676033138
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 : 676033138
Question Shuffling Allowed : Yes

Question Number : 81 Question Id : 6760332061 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

If $z = \dfrac{\sqrt{3}-i}{2}$ and $(z^{95}+i^{95})^{94} = z^n$, then the minimum positive integral value of 'n' 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 : 6760332062 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The integral value of a, for which the equation,

$$(x^2+x+2)^2-(a-3)(x^2+x+2)(x^2+x+1)+(a-4)(x^2+x+1)^2=0$$

has real roots, 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 : 6760332063 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

If $A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$, the sum of the entries of A^{20} 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 : 6760332064 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The unit digit in the sum of $1! + 2! + 3! + \ldots + 2021!$ 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 : 6760332065 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

Let $\vec{a} = -\hat{i} + \hat{j}$ and $\vec{b} = \hat{i} + \hat{j} - \hat{k}$ be two given vectors. If a vector $\vec{c}$ satisfies $(\vec{a} \times \vec{c}) + \vec{b} = \vec{0}$ and $\vec{a}.\vec{c} = 3$, then $10 \mid \vec{c} \mid^2$ 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 : 86 Question Id : 6760332066 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
If 32, $5x$ and y are in A.P., and 2, x and y are in G.P., then the positive common difference of the A.P. 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 : 6760332067 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
If f be a twice differentiable function satisfying $f(x) = x^4 + x^2 f''(1) + f''(2)$, then the modulus of the minimum value of $f(x)$ 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 : 88 Question Id : 6760332068 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

If $\frac{dw(t)}{dt} = t\sqrt{121 - t^2}$ and $w(0) = 0$, then the value of $3w(\sqrt{21})$ 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 : 6760332069 Question Type : SA
Correct Marks : 4 Wrong Marks : 0
One side of a square lies along the line $x - 3y + 1 = 0$ and its one vertex is $(1, 4)$. If (a, b) and (c, d) are its two vertices on the line $x - 3y + 1 = 0$, then

$$|a-2|+|c-2|+|b-1|+|d-1|$$

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 : 6760332070 Question Type : SA
Correct Marks : 4 Wrong Marks : 0

The number of real solutions of the equation

$$\begin{vmatrix} x^2+\sin x\cos x & x(1+\sin x) \\ x+\cos x & x+1 \end{vmatrix} = 0$$

is _____.

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