JEE Main April 2025

Question Paper With Text Solution

02 April | Shift-2

MATHEMATICS

MATRIX

JEE Main & Advanced | XI-XII Foundation| VI-X Pre-Foundation

Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911
Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in

JEE MAIN APRIL 2025 | 02ND APRIL SHIFT-2

SECTION – A

Question ID : 603421241

1. Let $\vec{a}=2\hat{i}-3\hat{j}+\hat{k}$, $\vec{b}=3\hat{i}+2\hat{j}+5\hat{k}$ and a vector $\vec{c}$ be such that $(\vec{a}-\vec{c})\times\vec{b}=-18\hat{i}-3\hat{j}+12\hat{k}$ and $\vec{a}\cdot\vec{c}=3$. If $\vec{b}\times\vec{c}=\vec{d}$, then $|\vec{a}\cdot\vec{d}|$ is equal to :

(1) 12 (2) 18 (3) 15 (4) 9

Ans. Official answer NTA (3)

Sol.

Question ID : 603421226

2. If the domain of the function $f(x)=\frac{1}{\sqrt{10+3x-x^2}}+\frac{1}{\sqrt{x+|x|}}$ is (a, b), then $(1+a)^2+b^2$ is equal to :

(1) 26 (2) 29 (3) 30 (4) 25

Ans. Official answer NTA (1)

Sol.

Question ID : 603421240

3. The line L_1 is parallel to vector $\vec{a}=-3\hat{i}+2\hat{j}+4\hat{k}$ and passes through the point (7, 6, 2) and the line L_2 is parallel to the vector $\vec{b}=2\hat{i}+\hat{j}+3\hat{k}$ and passes trough the point (5, 3, 4). The shortest distance between the lines L_1 and L_2 is :

(1) $\frac{23}{\sqrt{38}}$ (2) $\frac{21}{\sqrt{57}}$ (3) $\frac{23}{\sqrt{57}}$ (4) $\frac{21}{\sqrt{38}}$

Ans. Official answer NTA (1)

Sol.

Question ID : 603421237

4. If the length of the minor axis of an ellipse is equal to one fourth of the distance between the foci, then the eccentricity of the ellipse is :

(1) $\frac{3}{\sqrt{19}}$ (2) $\frac{4}{\sqrt{17}}$ (3) $\frac{\sqrt{3}}{16}$ (4) $\frac{\sqrt{5}}{7}$

Ans. Official answer NTA (2)

Sol.

Question ID : 603421245

5. Let $f:[1,\infty)\to[2,\infty)$ be a differentiable function. If $10\int_1^x f(t)dt = 5xf(x) - x^5 - 9$ for all $x \geq 1$, then the value of f(3) is :

(1) 18 (2) 22 (3) 26 (4) 32

Ans. Official answer NTA (4)

Sol.

Question ID : 603421236

6. Let the point P of the focal chord PQ of the parabola $y^2 = 16x$ be (1, –4). If the focus of the parabola divides the chord PQ in the ratio m : n, gcd(m, n) = 1, then $m^2 + n^2$ is equal to :

(1) 17 (2) 26 (3) 37 (4) 10

Ans. Official answer NTA (1)

Sol.

Question ID : 603421227

7. Let A = {1, 2, 3, ..., 100} and R be a relation on A such that R = {(a, b) : a = 2b + 1}. Let $(a_1, a_2), (a_2, a_3), (a_3, a_4), \ldots\ldots, (a_k, a_{k+1})$ be a sequence of k elements of R such that the second entry of an ordered pair is equal to the first entry of the next ordered pair. Then the largest integer k , for which such a sequence exists, is equal to :

(1) 5 (2) 7 (3) 8 (4) 6

Ans. Official answer NTA (1)

Sol.

Question ID : 603421244

8. Let (a, b) be the point of intersection of the curve $x^2 = 2y$ and the straight line $y - 2x - 6 = 0$ in the second quadrant. Then the integral $I = \int_a^b \frac{9x^2}{1+5^x} dx$ is equal to :

(1) 24 (2) 18 (3) 21 (4) 27

Ans. Official answer NTA (1)

Sol.

Question ID : 603421243

9. $4\int_0^1 \left(\frac{1}{\sqrt{3+x^2}+\sqrt{1+x^2}}\right)dx - 3\log_e\left(\sqrt{3}\right)$ is equal to :

(1) $2+\sqrt{2}-\log_e\left(1+\sqrt{2}\right)$ (2) $2+\sqrt{2}+\log_e\left(1+\sqrt{2}\right)$

(3) $2-\sqrt{2}+\log_e\left(1+\sqrt{2}\right)$ (4) $2-\sqrt{2}-\log_e\left(1+\sqrt{2}\right)$

Ans. Official answer NTA (4)

Sol.

Question ID : 603421238

10. If $\theta \in \left[-\frac{7\pi}{6}, \frac{4\pi}{3}\right]$, then the number of solutions of $\sqrt{3}\,\text{cosec}^2\theta - 2\left(\sqrt{3}-1\right)\text{cosec}\,\theta - 4 = 0$, is :

(1) 8 (2) 6 (3) 7 (4) 10

Ans. Official answer NTA (2)

Sol.

Question ID : 603421235

11. Let the area of the triangle formed by a straight line $L : x + by + c = 0$ with co-ordinate axes be 48 square units. If the perpendicular drawn from the origin to the line L makes an angle of 45° with the positive x-axis, then the value of $b^2 + c^2$ is :

(1) 83 (2) 97 (3) 90 (4) 93

Ans. Official answer NTA (2)

Sol.

Question ID : 603421242

12. If $\lim\limits_{x\to 0}\frac{\cos(2x)+a\cos(4x)-b}{x^4}$ is finite, then $(a+b)$ is equal to :

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

Ans. Official answer NTA (3)

Sol.

Question ID : 603421233

13. If the mean and the variance of 6, 4, a, 8, b, 12, 10, 13 are 9 and 9.25 respectively, then $a + b + ab$ is equal to:

(1) 100 (2) 105 (3) 106 (4) 103

Ans. Official answer NTA (4)

Sol.

Question ID : 603421229

14. If the system of equations

$2x + \lambda y + 3z = 5$
$3x + 2y - z = 7$
$4x + 5y + \mu z = 9$

has infinitely many solutions, then $(\lambda^2 + \mu^2)$ is equal to :

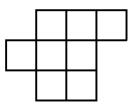
(1) 26 (2) 30 (3) 22 (4) 18

Ans. Official answer NTA (1)

Sol.

Question ID : 603421231

15. The number of ways, in which the letters A, B, C, D, E can be placed in the 8 boxes of the figure below so that no row remains empty and at most one letter can be placed in a box, is :



(1) 960 (2) 5880 (3) 5760 (4) 840

Ans. Official answer NTA (3)

Sol.

Question ID : 603421239

16. If the image of the point P(1, 0, 3) in the line joining the points A(4, 7, 1) and B(3, 5, 3) is Q(α, β, γ), then $\alpha + \beta + \gamma$ is equal to :

(1) 18 (2) 13 (3) $\frac{47}{3}$ (4) $\frac{46}{3}$

Ans. Official answer NTA (4)

Sol.

Question ID : 603421232

17. If $\sum_{r=0}^{10}\left(\frac{10^{r+1}-1}{10^r}\right)\cdot{}^{11}C_{r+1} = \frac{\alpha^{11}-11^{11}}{10^{10}}$, then α is equal to :

(1) 15 (2) 20 (3) 24 (4) 11

Ans. Official answer NTA (2)

Sol.

Question ID : 603421234

18. Given three indentical bags each containing 10 balls, whose colours are as follows :

	Red	**Blue**	**Green**
Bag I	3	2	5
Bag II	4	3	3
Bag III	5	1	4

A person chooses a bag at random and takes out a ball. If the ball is Red, the probability that it is from bag I is p and if the ball is Green, the probability that it is from bag III is q, then the value of $\left(\frac{1}{p}+\frac{1}{q}\right)$ is :

(1) 9 (2) 8 (3) 7 (4) 6

Ans. Official answer NTA (3)

Sol.

Question ID : 603421230

19. The number of terms of an A.P. is even; the sum of all the odd terms is 24 , the sum of all the even terms is 30 and the last term exceeds the first by $\frac{21}{2}$. Then the number of terms which are integers in the A.P. is :

(1) 10 (2) 4 (3) 6 (4) 8

Ans. Official answer NTA (2)

Sol.

Question ID : 603421228

20. Let A be a 3×3 real matrix such that $A^2(A - 2I) - 4(A - I) = O$, where I and O are the identity and null matrices, respectively. If $A^5 = \alpha A^2 + \beta A + \gamma I$, where α, β and γ are real constants, then $\alpha + \beta + \gamma$ is equal to:

(1) 76 (2) 20 (3) 12 (4) 4

Ans. Official answer NTA (3)

Sol.

SECTION – B

Question ID : 603421249

21. Let A(4, –2), B(1, 1) and C(9, –3) be the vertices of a triangle ABC. Then the maximum area of the parallelogram AFDE, formed with vertices D, E and F on the sides BC, CA and AB of the triangle ABC respectively, is _____.

Ans. Official answer NTA (3)

Sol.

Question ID : 603421246

22. If the set of all $a \in R - \{1\}$, for which the roots of the equation $(1 - a)x^2 + 2(a - 3)x + 9 = 0$ are positive is $(-\infty, -\alpha] \cup [\beta, \gamma)$, then $2\alpha + \beta + \gamma$ is equal to _____.

Ans. Official answer NTA (7)

Sol.

Question ID : 603421250

23. Let $y = y(x)$ be the solution of the differential equation $\frac{dy}{dx} + 2y\sec^2 x = 2\sec^2 x + 3\tan x.\sec^2 x$ such that $y(0) = \frac{5}{4}$. Then $12\left(y\left(\frac{\pi}{4}\right) - e^{-2}\right)$ is equal to _____.

Ans. Official answer NTA (21)

Sol.

Question ID : 603421248

24. If $y = \cos\left(\frac{\pi}{3} + \cos^{-1}\frac{x}{2}\right)$, then $(x-y)^2 + 3y^2$ is equal to _____.

Ans. Official answer NTA (3)

Sol.

Question ID : 603421247

25. If the sum of the first 10 terms of the series $\frac{4\cdot 1}{1+4\cdot 1^4} + \frac{4\cdot 2}{1+4\cdot 2^4} + \frac{4\cdot 3}{1+4\cdot 3^4} + \ldots$ is $\frac{m}{n}$, where $\gcd(m, n) = 1$, then $m + n$ is equal to _____.

Ans. Official answer NTA (441)

Sol.