JEE Main January 2026

Question Paper With Text Solution

23 January | Shift-1

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 JANUARY 2026 | 23TH JANUARY SHIFT-1

SECTION – A

Question ID : 8606541359

1. A rectangle is formed by the lines x = 0, y = 0, x = 3 and y = 4. Let the line L be perpendicular to $3x+y+6=0$ and divide the area of the rectangle into two equal parts. Then the distance of the point $\left(\frac{1}{2},-5\right)$ from the line L is equal to :

(1) $3\sqrt{10}$ (2) $2\sqrt{5}$ (3) $\sqrt{10}$ (4) $2\sqrt{10}$

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541363

2. Let α and β respectively be the maximum and the minimum values of the function $f(\theta)=4\left(\sin^4\left(\frac{7\pi}{2}-\theta\right)+\sin^4(11\pi+\theta)\right)-2\left(\sin^6\left(\frac{3\pi}{2}-\theta\right)+\sin^6(9\pi-\theta)\right), \theta\in R$. Then $\alpha+2\beta$ is equal to :

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

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541365

3. Let $\vec{a}=-\hat{i}+\hat{j}+2\hat{k}, \vec{b}=\hat{i}-\hat{j}-3\hat{k}, \vec{c}=\vec{a}\times\vec{b}$ and $\vec{d}=\vec{c}\times\vec{a}$. Then $(\vec{a}-\vec{b})\cdot\vec{d}$ is equal to :

(1) –2 (2) 2 (3) 4 (4) –4

Ans. Official answer NTA (1)

Sol.

Question ID : 8606541353

4. A building construction work can be completed by two masons A and B together in 22.5 days. Mason A alone can complete the construction work in 24 days less than mason B alone. Then mason A alone will complete the construction work in :

(1) 36 days (2) 42 days (3) 24 days (4) 30 days

Ans. Official answer NTA (1)

Sol.

Question ID : 8606541367

5. Let $f(x)=\begin{cases}\dfrac{ax^2+2ax+3}{4x^2+4x-3} & ,x\neq -\dfrac{3}{2},\dfrac{1}{2}\\ b & ,x=-\dfrac{3}{2},\dfrac{1}{2}\end{cases}$ be continuous at $x=-\dfrac{3}{2}$. If $fof(x)=\dfrac{7}{5}$, then x is equal to :

(1) 0 (2) 1.4 (3) 2 (4) 1

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541356

6. The sum of all possible values of $n \in N$, so that the coefficients of x, x^2 and x^3 in the expansion of $(1+x^2)^2(1+x)^n$, are in arithmetic progression is :

(1) 3 (2) 7 (3) 12 (4) 9

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541357

7. The value of $\dfrac{{}^{100}C_{50}}{51}+\dfrac{{}^{100}C_{51}}{52}+\ldots.+\dfrac{{}^{100}C_{100}}{101}$ is :

(1) $\dfrac{2^{100}}{100}$ (2) $\dfrac{2^{101}}{100}$ (3) $\dfrac{2^{101}}{101}$ (4) $\dfrac{2^{100}}{101}$

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541360

8. Let the domain of the function $f(x) = \log_3 \log_5 \log_7 \left(9x - x^2 - 13\right)$ be the interval (m, n). Let the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ have eccentricity $\frac{n}{3}$ and the length of the latus rectum $\frac{8m}{3}$. Then $b^2 - a^2$ is equal to :

(1) 9 (2) 11 (3) 5 (4) 7

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541370

9. Let y = y(x) be the solution of the differential equation $x^4\,dy + \left(4x^3y + 2\sin x\right)dx = 0, x > 0, y\left(\frac{\pi}{2}\right) = 0$.

Then $\pi^4 y\left(\frac{\pi}{3}\right)$ is equal to :

(1) 81 (2) 64 (3) 92 (4) 72

Ans. Official answer NTA (1)

Sol.

Question ID : 8606541366

10. Let the direction cosines of two lines satisfy the equations : $4l + m - n = 0$ and $2mn + 10nl + 3lm = 0$. Then the cosine of the acute angle between these lines is :

(1) $\frac{10}{\sqrt{38}}$ (2) $\frac{10}{3\sqrt{38}}$ (3) $\frac{10}{7\sqrt{38}}$ (4) $\frac{20}{3\sqrt{38}}$

Ans. Official answer NTA (2)

Sol.

Question ID : 8606541358

11. Let the mean and variance of 8 numbers –10, –7, –1, x, y, 9, 2, 16 be $\frac{7}{2}$ and $\frac{293}{4}$, respectively. Then the mean of 4 numbers x, y, x + y + 1, |x – y| is :

(1) 9 (2) 10 (3) 12 (4) 11

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541362

12. Let the line y – x = 1 intersect the ellipse $\frac{x^2}{2}+\frac{y^2}{1}=1$ at the points A and B . Then the angle made by the line segment AB at the center of the ellipse is :

(1) $\frac{\pi}{2}+2\tan^{-1}\left(\frac{1}{4}\right)$ (2) $\pi-\tan^{-1}\left(\frac{1}{4}\right)$ (3) $\frac{\pi}{2}+\tan^{-1}\left(\frac{1}{4}\right)$ (4) $\frac{\pi}{2}-\tan^{-1}\left(\frac{1}{4}\right)$

Ans. Official answer NTA (3)

Sol.

Question ID : 8606541355

13. Among the statements :

I : If $\begin{vmatrix} 1 & \cos\alpha & \cos\beta \\ \cos\alpha & 1 & \cos\gamma \\ \cos\beta & \cos\gamma & 1 \end{vmatrix} = \begin{vmatrix} 0 & \cos\alpha & \cos\beta \\ \cos\alpha & 0 & \cos\gamma \\ \cos\beta & \cos\gamma & 0 \end{vmatrix}$, then $\cos^2\alpha+\cos^2\beta+\cos^2\gamma=\frac{3}{2}$ and

II : If $\begin{vmatrix} x^2+x & x+1 & x-2 \\ 2x^2+3x-1 & 3x & 3x-3 \\ x^2+2x+3 & 2x-1 & 2x-1 \end{vmatrix} = px+q$ then $p^2 = 196\, q^2$:

(1) only I is true (2) both are true (3) only II is true (4) both are false

Ans. Official answer NTA (4)

Sol.

Question ID : 8606541368

14. Let $f(x)=\int\frac{\left(2-x^2\right)\cdot e^x}{(\sqrt{1+x})(1-x)^{3/2}}dx$. If $f(0)=0$, then $f\left(\frac{1}{2}\right)$ is equal to :

(1) $\sqrt{3e}-1$ (2) $\sqrt{2e}-1$ (3) $\sqrt{3e}+1$ (4) $\sqrt{2e}+1$

Ans. Official answer NTA (1)

Sol.

Question ID : 8606541369

15. The value of the integral $\int_{\frac{\pi}{24}}^{\frac{5\pi}{24}}\frac{dx}{1+\sqrt[3]{\tan 2x}}$ is :

(1) $\frac{\pi}{18}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{12}$ (4) $\frac{\pi}{6}$

Ans. Official answer NTA (3)

Sol.

Question ID : 8606541352

16. If α and $\beta(\alpha<\beta)$ are the roots of the equation $\left(-2+\sqrt{3}\right)\left(|\sqrt{x}-3|\right)+\left(x-6\sqrt{x}\right)+\left(9-2\sqrt{3}\right)=0, x\geq 0$, then $\sqrt{\frac{\beta}{\alpha}}+\sqrt{\alpha\beta}$ is equal to :

(1) 10 (2) 9 (3) 8 (4) 11

Ans. Official answer NTA (1)

Sol.

Question ID : 8606541364

17. The vertices B and C of a triangle ABC lie on the line $\frac{x}{1}=\frac{1-y}{-2}=\frac{z-2}{3}$. The coordinates of A and B are (1, 6, 3) and (4, 9, α) respectively and C is at a distance of 10 units from B. The area (in sq. units) of ΔABC is :

(1) $5\sqrt{13}$ (2) $20\sqrt{13}$ (3) $10\sqrt{13}$ (4) $15\sqrt{13}$

Ans. Official answer NTA (1)

Sol.

Question ID : 8606541351

18. Let A = {–2, –1, 0, 1, 2, 3, 4}. Let R be a relation on A defined by xRy if and only if $2x + y \le 2$. Let l be the number of elements in R. Let m and n be the minimum number of elements required to be added in R to make it reflexive and symmetric relations respectively. Then $l + m + n$ is equal to :

(1) 33 (2) 34 (3) 35 (4) 32

Ans. Official answer NTA (1)

Sol.

Question ID : 8606541354

19. Let $S = \{z : 3 \le |2z - 3(1+i)| \le 7\}$ be a set of complex number. Then $\underset{z \in S}{\text{Min}} \left| \left(z + \frac{1}{2}(5+3i) \right) \right|$ is equal to :

(1) $\frac{5}{2}$ (2) $\frac{3}{2}$ (3) $\frac{1}{2}$ (4) 2

Ans. Official answer NTA (2)

Sol.

Question ID : 8606541361

20. Number of solutions of $\sqrt{3}\cos 2\theta + 8\cos\theta + 3\sqrt{3} = 0, \theta \in [-3\pi, 2\pi]$ is :

(1) 5 (2) 0 (3) 3 (4) 4

Ans. Official answer NTA (1)

Sol.

SECTION – B

Question ID : 8606541372

21. The number of 4 -letter words, with or without meaning, which can be formed using the letters PQRPQRSTUVP, is _____.

Ans. Official answer NTA (1422)

Sol.

Question ID : 8606541371

22. Let $|A| = 6$, where A is a 3×3 matrix. If $\left|\text{adj}\left(3\text{adj}\left(A^2 \cdot \text{adj}(2A)\right)\right)\right| = 2^m \cdot 3^n, m, n \in N$, then $m + n$ is equal to _____.

Ans. Official answer NTA (62)

Sol.

Question ID : 8606541374

23. Let f be a twice differentiable non-negative function such that $(f(x))^2 = 25 + \int_0^x \left((f(t))^2 + \left(f'(t)\right)^2\right)dt$. Then the mean of $f\left(\log_e(1)\right), f\left(\log_e(2)\right), \ldots\ldots, f\left(\log_e(625)\right)$ is equal to _____.

Ans. Official answer NTA (1565)

Sol.

Question ID : 8606541373

24. From the first 100 natural numbers, two numbers first a and then b are selected randomly without replacement. If the probability that $a - b \geq 10$ is $\frac{m}{n}$, $\gcd(m, n) = 1$, then $m + n$ is equal to _____.

Ans. Official answer NTA (311)

Sol.

Question ID : 8606541375

25. Let the area of the region bounded by the curve $y = \max\{\sin x, \cos x\}$, lines $x = 0$, $x = \frac{3\pi}{2}$, and the x-axis be A. Then, $A + A^2$ is equal to _____.

Ans. Official answer NTA (12)

Sol.