JEE Main April 2026

Question Paper With Text Solution

04 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 2026 | 4TH APRIL SHIFT-2

SECTION – A

Question ID : 695278376

1. For the function $f : [1, \infty) \to [1, \infty)$ defined by $f(x) = (x-1)^4+1$ among the two statements:

(I) The set $S = \{x \in [1, \infty) : f(x) = f^{-1}(x)\}$ contains exactly two elements, and

(II) The set $S = \{x \in [1, \infty) : f(x) = f^{-1}(x+1)\}$ is an empty set,

(1) only (I) is TRUE (2) only (II) is TRUE

(3) both (I) and (II) are TRUE (4) neither (I) nor (II) is TRUE

Ans. (1)

Sol.

Question ID : 695278377

2. Let $S = \{z \in C\} : z^2 + 4z + 16 = 0\}$. Then $\sum_{z \in S} |z + \sqrt{3}i|^2$ is equal to :

(1) 42 (2) 23 (3) 27 (4) 38

Ans. (4)

Sol.

Question ID : 695278378

3. If the system of equations: $x + y + z = 5$ $x + 2y + 3z = 9$ $x + 3y + \lambda z = \mu$ has infinitely many solutions, then the value of $\lambda + \mu$ is :

(1) 16 (2) 18 (3) 19 (4) 21

Ans. (2)

Sol.

Question ID : 695278379

4. If $\alpha = 1$ and $\beta = 1 + i\sqrt{2}$, where $i = \sqrt{-1}$ are two roots of the equation $x^3 + ax^2 + bx + c = 0$, $a, b, c \in R$ then $\int_{-1}^{1} (x^3 + ax^2 + bx + c)dx$ is equal to :

(1) –2 (2) 4 (3) –8 (4) 10

Ans. (3)

Sol.

Question ID : 695278380

5. If the quadratic equation $(\lambda+2)x^2-3\lambda x+4\lambda=0, \lambda\neq -2$, has two positive roots, then the number of possible integral values of λ is :

(1) 1 (2) 2 (3) 3 (4) 4

Ans. (2)

Sol.

Question ID : 695278381

6. Let $A=\begin{bmatrix}1 & 2 & 7\\ 4 & -2 & 8\\ 3 & 8 & -7\end{bmatrix}$ and $\det(A-\alpha I)=0$, where a is a real number. If the largest possible value of a is p, then the circle $(x-p)^2+(y-2p)^2=320$, intersects the co-ordinate axes at :

(1) 1 point (2) 2 points (3) 3 points (4) 4 points

Ans. (3)

Sol.

Question ID : 695278382

7. Let $a=\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+...00$ and $\beta=\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+...00$. Then the value of $(0.2)^{\log_{\sqrt{5}}(a)}+(0.04)^{\log_5(\beta)}$ is equal to :

(1) 4 (2) 5 (3) 8 (4) 25

Ans. (3)

Sol.

Question ID : 695278383

8. For 10 observations $x_1, x_2,..., x_{10}$, if $\sum_{i=1}^{10}(x_i+2)^2=180$ and $\sum_{i=1}^{10}(x_i-1)^2=90$. then their standard deviation is

:

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

Ans. (4)

Sol.

Question ID : 695278384

9. In the expansion of of $\left(9x-\frac{1}{3\sqrt{x}}\right)^{18}$, $x>0$ if the term independent of x is (221)k, then k is equal to :

(1) 84 (2) 78 (3) 168 (4) 198

Ans. (1)

Sol.

Question ID : 695278385

10. Let P (3cos a, 2sin a), $\alpha \neq 0$, be a point on the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$, Q be a point on the circle $x^2+y^2-14x-14y+82=0$ and R be a point on the line $x+y=5$ such that the centroid of the triangle PQR is $\left(2+\cos\alpha, 3+\frac{2}{3}\sin\alpha\right)$. Then the sum of the ordinates of all possible points R is :

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

Ans. (4)

Sol.

Question ID : 695278386

11. Let $H: \frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ be a hyperbola such that the distance between its foci is 6 and the distance between its directrices is $\frac{8}{3}$ If the line $x=\alpha$ intersects the hyperbola H at the points A and B such that the area of the triangle AOB is $4\sqrt{15}$ where O is the origin, then α^2 equals :

(1) 12 (2) 16 (3) 24 (4) 25

Ans. (2)

Sol.

Question ID : 695278387

12. $\max_{0\le x\le\pi}\left(16\sin\left(\frac{x}{2}\right)\cos^3\left(\frac{x}{2}\right)\right)$ is equal to :

(1) $\frac{3\sqrt{3}}{2}$ (2) $3\sqrt{3}$ (3) $4\sqrt{3}$ (4) $6\sqrt{3}$

Ans. (2)

Sol.

Question ID : 695278388

13. The shortest distance between the lines $\vec{r}=\left(\frac{1}{3}\hat{i}+2\hat{j}+\frac{8}{3}\hat{k}\right)+\lambda(2\hat{i}-5\hat{j}+6\hat{k})$ and $\vec{r}=(-\frac{2}{3}\hat{i}-\frac{1}{3}\hat{k})+\mu(\hat{j}-\hat{k})$, $\lambda, \mu \in N$, i is :

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

Ans. (2)

Sol.

Question ID : 695278389

14. If $\left(2\alpha+1, \alpha^2-3\alpha, \frac{\alpha-1}{2}\right)$ is the image of $(\alpha, 2\alpha, 1)$ in the line $\frac{x-2}{3}=\frac{y-1}{2}=\frac{z}{1}$, then the possible value(s) of α is (are) :

(1) Only 3 (2) Only 3 and –1 (3) Only 3, $\frac{1}{4}$ and –1 (4) Only 3 and $\frac{1}{4}$

Ans. (1)

Sol.

Question ID : 695278390

15. Let $\hat{u}$ and $\hat{v}$ be unit vectors inclined at an acute angle such that $|\hat{u}\times\hat{v}|=\frac{\sqrt{3}}{2}$. If $\vec{A}=\lambda\hat{u}+\hat{v}+(\hat{u}\times\hat{v})$ then λ is equal to :

(1) $\frac{4}{3}(\vec{A}\cdot\hat{u})-\frac{2}{3}(\vec{A}\cdot\hat{v})$ (2) $\frac{2}{3}(\vec{A}\cdot\hat{u})-\frac{1}{3}(\vec{A}\cdot\hat{v})$

(3) $\frac{4}{3}(\vec{A}\cdot\hat{u})+\frac{2}{3}(\vec{A}\cdot\hat{v})$ (4) $(\vec{A}\cdot\hat{u})-\frac{1}{2}(\vec{A}\cdot\hat{v})$

Ans. (1)

Sol.

Question ID : 695278391

16. Let for some $\alpha \in R$, $f : R \to R$ be a function satisfying $f(x+y) = f(x) + 2y^2 + y + axy$ for all $x, y \in R$. If $f(0) = -1$ and $f(1) = 2$, then the value of $\sum_{n=1}^{5}(a+f(n))$ is :

(1) 110 (2) 140 (3) 150 (4) 170

Ans. (2)

Sol.

Question ID : 695278392

17. Let $A = \{(a, b, c) : a, b, c \text{ are non-negative integers and } a + b + 2c = 22\}$. Then $n(A)$ is equal to :

(1) 121 (2) 124 (3) 144 (4) 169

Ans. (3)

Sol.

Question ID : 695278393

18. The area of the region bounded by the curves $x + 3y^2 = 0$ and $x + 4y^2 = 1$ is equal to :

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

Ans. (3)

Sol.

Question ID : 695278394

19. Let $y = y(x)$ be the solution of the differential equation:

$\frac{dy}{dx}+\left(\frac{6x^2+(3x^2+2x^3+4)e^{-2x}}{(x^3+2)(2+e^{-2x})}\right)y=2+e^{-2x}$.

$x \in (-1, 2)$., satisfying $y(0)=\frac{3}{2}$.If $y(1)=\alpha(2+e^{-2})$. then a is equal to :

(1) $\frac{13}{8}$ (2) $\frac{6}{13}$ (3) $\frac{12}{13}$ (4) $\frac{13}{12}$

Ans. (4)

Sol.

Question ID : 695278395

20. The integral $\int_0^1 \cot^{-1}(1+x+x^2)dx$ is equal to :

(1) $2\tan^{-1}2+\frac{1}{2}\log_e\left(\frac{5}{4}\right)+\frac{\pi}{2}$ (2) $2\tan^{-1}2+\frac{1}{2}\log_e\left(\frac{5}{4}\right)-\frac{\pi}{2}$

(3) $2\tan^{-1}2-\frac{1}{2}\log_e\left(\frac{5}{4}\right)+\frac{\pi}{2}$ (4) $2\tan^{-1}2-\frac{1}{2}\log_e\left(\frac{5}{4}\right)-\frac{\pi}{2}$

Ans. (4)

Sol.

SECTION – B

Question ID : 695278396

21. From a month of 31 days, 3 different dates are selected at random. If the probability that these dates are in an increasing A.P. is equal to $\frac{a}{b}$ where a, b $\in$ N and gcd(a, b) =1, then a + b is equal to _____.

Ans. (944)

Sol.

Question ID : 695278397

22. Let $f(x)=\begin{cases} e^{x-1} & ,x<0 \\ x^2-5x+6 & ,x\geq 0 \end{cases}$ and $g(x)=f(|x|)+|f(x)|$. If the number of points where g is not continuous and is not differentiable are α and β respectively, then $\alpha+\beta$ is equal to _____.

Ans. (4)

Sol.

Question ID : 695278398

23. Let A, B be points on the two half-lines $x-\sqrt{3}|y|=a, \alpha>0$ at a distance of a from their point of intersection P. The line segment AB meets the angle bisector of the given half-lines at the point Q. If $PQ=\frac{9}{2}$ and R is the radius of the circumcircle of Δ PAB, then $\frac{\alpha^2}{R}$ is equal to _____.

Ans. (9)

Sol.

Question ID : 695278399

24. Let A, B and C be the vertices of a variable right angled triangle inscribed in the parabola $y^2=16x$. Let the vertex B containing the right angle be (4, 8) and the locus of the centroid of Δ ABC be a conic C_0 Then three times the length of latus rectum of C_0 is _____.

Ans. (16)

Sol.

Question ID : 695278400

25. Let f be a twice differentiable function such that $f(x)=\int_0^x \tan(t-x)dt-\int_0^x f(t)\tan t\,dt, x\in\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$. Then $f''\left(\frac{\pi}{6}\right)+12f'\left(-\frac{\pi}{6}\right)+f\left(\frac{\pi}{6}\right)$ is equal to _____.

Ans. (5)

Sol.