# JEE Main April 2025

## Question Paper With Text Solution

## 03 April | Shift-2

# MATHEMATICS

MATRIX

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

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# JEE MAIN APRIL 2025 | 03RD APRIL SHIFT-2

## SECTION – A

Question ID : 34757781

1. The sum $1+\frac{1+3}{2!}+\frac{1+3+5}{3!}+\frac{1+3+5+7}{4!}+\ldots$ upto $\infty$ terms, is equal to

(1) 3e (2) 6e (3) 4e (4) 2e

**Ans.** Official answer NTA (4)

**Sol.**

Question ID : 34757783

2. If the probability that the random variable X takes the value x is given by $P(X=x)=k(x+1)3^{-x}$, $x=0, 1, 2, 3, \ldots$, where k is a constant, then $P(X \geq 3)$ is equal to :

(1) $\frac{8}{27}$ (2) $\frac{4}{9}$ (3) $\frac{1}{9}$ (4) $\frac{7}{27}$

**Ans.** Official answer NTA (3)

**Sol.**

Question ID : 34757779

3. Let the equation $x(x+2)(12-k)=2$ have equal roots. Then the distance of the point $\left(k, \frac{k}{2}\right)$ from the line $3x+4y+5=0$ is :

(1) $15\sqrt{5}$ (2) $5\sqrt{3}$ (3) 15 (4) 12

**Ans.** Official answer NTA (3)

**Sol.**

Question ID : 34757782

4. Line $L_1$ of slope 2 and line $L_2$ of slope $\frac{1}{2}$ intersect at the origin O. In the first quadrant, $P_1, P_2, \ldots, P_{12}$ are 12 points on line $L_1$ and $Q_1, Q_2, \ldots, Q_9$ are 9 points on line $L_2$. Then the total number of triangles, that can be formed having vertices at three of the 22 points O, $P_1, P_2, \ldots, P_{12}, Q_1, Q_2, \ldots, Q_9$, is :

(1) 1134 (2) 1080 (3) 1026 (4) 1188

**Ans.** Official answer NTA (1)

**Sol.**

Question ID : 34757778

5. Let f be a function such that $f(x)+3f\left(\frac{24}{x}\right)=4x$, $x\neq 0$. Then f(3) + f(8) is equal to :

(1) 10 (2) 12 (3) 11 (4) 13

**Ans.** Official answer NTA (3)

**Sol.**

Question ID : 34757777

6. If the domain of the function $f(x)=\log_7(1-\log_4(x^2-9x+18))$ is $(\alpha,\beta)\cup(\gamma,\delta)$, then $\alpha+\beta+\gamma+\delta$ is equal to :

(1) 16 (2) 18 (3) 15 (4) 17

**Ans.** Official answer NTA (2)

**Sol.**

Question ID : 34757791

7. Let $f: R\to R$ be a function defined by $f(x)=||x+2|-2|x||$. If m is the number of points of local minima and n is the number of points of local maxima of f, then m + n is :

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

**Ans.** Official answer NTA (1)

**Sol.**

Question ID : 34757785

8. Consider the lines $x(3\lambda+1)+y(7\lambda+2)=17\lambda+5$, $\lambda$ being a parameter, all passing through a point P. One of these lines (say L) is farthest from the origin. If the distance of L from the point (3, 6) is d, then the value of $d^2$ is :

(1) 15 (2) 30 (3) 20 (4) 10

**Ans.** Official answer NTA (3)

**Sol.**

Question ID : 34757789

9. Each of angles $\beta$ and $\gamma$ that a given line makes the positive y- and z-axes, respectively, is half of the angle that this line makes with the positive x-axes. Then the sum of all possible values of the angle $\beta$ is :

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

**Ans.** Official answer NTA (1)

**Sol.**

Question ID : 34757786

10. If the four distinct points (4, 6), (–1, 5), (0, 0) and (k, 3k) lie on a circle of radius r, then $10k + r^2$ is equal to :

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

**Ans.** Official answer NTA (4)

**Sol.**

Question ID : 34757780

11. If $z_1, z_2, z_3 \in C$ are the vertices of an equilateral triangle, whose centroid is $z_0$, then $\sum_{k=1}^{3}(z_k - z_0)^2$ is equal to :

(1) $-i$ (2) 1 (3) 0 (4) $i$

**Ans.** Official answer NTA (3)

**Sol.**

Question ID : 34757792

12. The shortest distance between the curves $y^2 = 8x$ and $x^2 + y^2 + 12y + 35 = 0$ is :

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

**Ans.** Official answer NTA (4)

**Sol.**

Question ID : 34757784

13. Let the Mean and Variance of five observations $x_1 = 1$, $x_2 = 3$, $x_3 = a$, $x_4 = 7$ and $x_5 = b$, $a > b$, be 5 and 10 respectively. Then the Variance of the observations $n + x_n$, $n = 1, 2, ...., 5$ is :

(1) 16 (2) 17.4 (3) 17 (4) 16.4

**Ans.** Official answer NTA (1)

**Sol.**

Question ID : 34757795

14. Let $y = y(x)$ be the solution of the differential equation $\frac{dy}{dx} + 3\left(\tan^2 x\right)y + 3y = \sec^2 x$, $y(0) = \frac{1}{3} + e^3$. Then $y\left(\frac{\pi}{4}\right)$ is equal to :

(1) $\frac{2}{3} + e^3$ (2) $\frac{4}{3}$ (3) $\frac{4}{3} + e^3$ (4) $\frac{2}{3}$

**Ans.** Official answer NTA (2)

**Sol.**

Question ID : 34757790

15. The distance of the point (7, 10, 11) from the line $\frac{x-4}{1} = \frac{y-4}{0} = \frac{z-2}{3}$ along the line $\frac{x-9}{2} = \frac{y-13}{3} = \frac{z-17}{6}$ is :

(1) 18 (2) 16 (3) 12 (4) 14

**Ans.** Official answer NTA (4)

**Sol.**

Question ID : 34757788

16. The number of solutions of the equation $\left(4-\sqrt{3}\right)\sin x - 2\sqrt{3}\cos^2 x = -\frac{4}{1+\sqrt{3}}$, $x \in \left[-2\pi, \frac{5\pi}{2}\right]$ is :

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

**Ans.** Official answer NTA (2)

**Sol.**

Question ID : 34757776

17. Let A = {–2, –1, 0, 1, 2, 3}. Let R be a relation on A defined by xRy if and only if y = max{x, 1}. 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 relfexive and symmetric relations, respectively. Then $l + m + n$ is equal to :

(1) 12 (2) 14 (3) 11 (4) 13

**Ans.** Official answer NTA (1)

**Sol.**

Question ID : 34757787

18. Let C be the circle of minimum area enclosing the ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with eccentricity $\frac{1}{2}$ and foci (±2, 0). Let PQR be a variable triangle, whose vertex P is on the circle C and the side QR of length 2a is parallel to the major axis of E and contains the point of intersection of E with the negative y-axis. Then the maximum area of the triangle PQR is :

(1) $8\left(3+\sqrt{2}\right)$ (2) $8\left(2+\sqrt{3}\right)$ (3) $6\left(3+\sqrt{2}\right)$ (4) $6\left(2+\sqrt{3}\right)$

**Ans.** Official answer NTA (2)

**Sol.**

Question ID : 34757794

19. The area of the region $\left\{(x, y) : |x - y| \le y \le 4\sqrt{x}\right\}$ :

(1) $\frac{1024}{3}$ (2) 512 (3) $\frac{2048}{3}$ (4) $\frac{512}{3}$

**Ans.** Official answer NTA (1)

**Sol.**

Question ID : 34757793

20. The integral $\int_0^{\pi} \frac{8x\,dx}{4\cos^2 x + \sin^2 x}$ is equal to :

(1) $\frac{3\pi^2}{2}$ (2) $\pi^2$ (3) $4\pi^2$ (4) $2\pi^2$

**Ans.** Official answer NTA (4)

**Sol.**

## SECTION – B

Question ID : 34757797

21. Let I be the identity matrix of order $3 \times 3$ and for the matrix $A = \begin{bmatrix} \lambda & 2 & 3 \\ 4 & 5 & 6 \\ 7 & -1 & 2 \end{bmatrix}$, $|A| = -1$. Let B be the inverse of the matrix adj(A adj($A^2$)). Then $|(\lambda B + I)|$ is equal to _____.

**Ans.** Official answer NTA (38)

**Sol.**

Question ID : 34757799

22. Let $\vec{a} = \hat{i} + 2\hat{j} + \hat{k}$, $\vec{b} = 3\hat{i} - 3\hat{j} + 3\hat{k}$, $\vec{c} = 2\hat{i} - \hat{j} + 2\hat{k}$ and $\vec{d}$ be a vector such that $\vec{b} \times \vec{d} = \vec{c} \times \vec{d}$ and $\vec{a} \cdot \vec{d} = 4$. Then $\left|\left(\vec{a} \times \vec{d}\right)\right|^2$ is equal to _____.

**Ans.** Official answer NTA (128)

**Sol.**

Question ID : 347577100

23. If $\lim\limits_{x \to 0} \left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}} = p$, then $96\log_e p$ is equal to _____.

**Ans.** Official answer NTA (32)

**Sol.**

Question ID : 34757796

24. Let $(1 + x + x^2)^{10} = a_0 + a_1x + a_2x^2 + .... + a_{20}x^{20}$. If $(a_1 + a_3 + a_5 + .... + a_{19}) - 11a_2 = 121k$, then k is equal to _____.

**Ans.** Official answer NTA (239)

**Sol.**

Question ID : 34757798

25. If the equation of the hyperbola with foci (4, 2) and (8, 2) is $3x^2 - y^2 - \alpha x + \beta y + \gamma = 0$, then $\alpha + \beta + \gamma$ is equal to _____.

**Ans.** Official answer NTA (141)

**Sol.**