

JEE Main April 2025
Question Paper With Text Solution
02 April | Shift-1

MATHEMATICS



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

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**JEE MAIN APRIL 2025 | 02ND APRIL SHIFT-1****SECTION – A**

Question ID : 603421906

1. The largest $n \in \mathbb{N}$ such that 3^n divides $50!$ is :

(1) 21

(2) 23

(3) 22

(4) 20

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

Question ID : 603421911

2. If $\vec{a}$ is a nonzero vector such that its projections on the vectors $2\hat{i} - \hat{j} + 2\hat{k}$, $\hat{i} + 2\hat{j} - 2\hat{k}$ and $\hat{k}$ are equal, then a unit vector along $\vec{a}$ is :

(1) $\frac{1}{\sqrt{155}}(-7\hat{i} + 9\hat{j} + 5\hat{k})$

(2) $\frac{1}{\sqrt{155}}(7\hat{i} + 9\hat{j} + 5\hat{k})$

(3) $\frac{1}{\sqrt{155}}(-7\hat{i} + 9\hat{j} - 5\hat{k})$

(4) $\frac{1}{\sqrt{155}}(7\hat{i} + 9\hat{j} - 5\hat{k})$

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

Question ID : 603421920

3. If the system of linear equations

$$3x + y + \beta z = 3$$

$$2x + \alpha y - z = -3$$

$$x + 2y + z = 4$$

has infinitely many solutions, then the value of $22\beta - 9\alpha$ is :

(1) 31

(2) 49

(3) 43

(4) 37

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

Question ID : 603421914

4. Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a twice differentiable function such $(\sin x \cos y) (f(2x + 2y) - f(2x - 2y)) = (\cos x \sin y) (f(2x + 2y) + f(2x - 2y))$, for all $x, y \in \mathbb{R}$.

If $f'(0) = \frac{1}{2}$, then the value of $24f''\left(\frac{5\pi}{3}\right)$ is :

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

Ans. Official answer NTA (4)

Sol.

Question ID : 603421912

5. Let A be the set of all function $f: \mathbb{Z} \rightarrow \mathbb{Z}$ and R be a relation on A such that

$R = \{(f, g) : f(0) = g(1) \text{ and } f(1) = g(0)\}$. Then R is :

- (1) Reflexive but neither symmetric nor transitive
(2) Symmetric but neither reflexive nor transitive
(3) Transitive but neither reflexive nor symmetric
(4) Symmetric and transitive but not reflexive

Ans. Official answer NTA (4)

Sol.

Question ID : 603421919

6. Let $a_1, a_2, a_3, \dots$ be in an A.P. such that $\sum_{k=1}^{12} a_{2k-1} = -\frac{72}{5}a_1, a_1 \neq 0$. If $\sum_{k=1}^n a_k = 0$, then n is :

- (1) 17 (2) 11 (3) 10 (4) 18

Ans. Official answer NTA (2)

Sol.

Question ID : 603421904

7. If S and S' are the foci of the ellipse $\frac{x^2}{18} + \frac{y^2}{9} = 1$ and P be a point on the ellipse, then $\min(SP.S'P) + \max(SP.S'P)$

is equal to :

- (1) $3(6 + \sqrt{2})$ (2) $3(1 + \sqrt{2})$ (3) 9 (4) 27

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

Question ID : 603421916

8. The term independent of x in the expansion of $\left(\frac{(x+1)}{(x^{2/3} + 1 - x^{1/3})} - \frac{(x-1)}{(x - x^{1/2})} \right)^{10}$, $x > 1$, is :

- (1) 150 (2) 210 (3) 120 (4) 240

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

Question ID : 603421902

9. Let z be a complex number such that $|z| = 1$. If $\frac{2+k^2z}{k+\bar{z}} = kz$, $k \in \mathbf{R}$ then the maximum distance of $k + ik^2$ from

the circle $|z - (1 + 2i)| = 1$ is :

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

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

Question ID : 603421909

10. The number of sequences of ten terms, whose terms are either 0 or 1 or 2, that contain exactly five 1s and exactly three 2s, is equal to :

- (1) 360 (2) 45 (3) 1820 (4) 2520

Ans. Official answer NTA (4)**Sol.****MATRIX JEE ACADEMY****Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911****Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in**



Question ID : 603421910

11. Let one focus of the hyperbola $H: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be at $(\sqrt{10}, 0)$ and the corresponding directrix be $x = \frac{9}{\sqrt{10}}$.

If e and l respectively are the eccentricity and the length of the latus rectum of H , then $9(e^2 + l)$ is equal to :

- (1) 16 (2) 12 (3) 15 (4) 14

Ans. Official answer NTA(1)

Sol.

Question ID : 603421913

12. Let the vertices Q and R of the triangle PQR lie on the line $\frac{x+3}{5} = \frac{y-1}{2} = \frac{z+4}{3}$, $QR = 5$ and the coordinates of the point P be $(0, 2, 3)$. If the area of the triangle PQR is $\frac{m}{n}$:

- (1) $2m - 5\sqrt{2}n = 0$ (2) $m - 5\sqrt{2}n = 0$ (3) $5m - 2\sqrt{2}n = 0$ (4) $5m - 21\sqrt{2}n = 0$

Ans. Official answer NTA(1)

Sol.

Question ID : 603421917

13. Let $P_n = \alpha^n + \beta^n$, $n \in \mathbb{N}$. If $P_{10} = 123$, $P_9 = 76$, $P_8 = 47$ and $P_1 = 1$, then the quadratic equation having roots $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ is :

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

Ans. Official answer NTA(4)

Sol.

Question ID : 603421903

14. If $\theta \in [-2\pi, 2\pi]$, then the number of solutions of $2\sqrt{2} \cos^2 \theta + (2 - \sqrt{6}) \cos \theta - \sqrt{3} = 0$, is equal to :

- (1) 6 (2) 10 (3) 12 (4) 8

Ans. Official answer NTA(4)

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**Sol.**

Question ID : 603421908

15. If the function $f(x) = 2x^3 - 9ax^2 + 12a^2x + 1$, where $a > 0$, attains its local maximum and local minimum values at p and q , respectively, such that $p^2 = q$, then $f(3)$ is equal to :

(1) 55 (2) 10 (3) 23 (4) 37

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

Question ID : 603421901

16. Let the focal chord PQ of the parabola $y^2 = 4x$ make an angle of 60° with the positive x axis, where P lies in the first quadrant. If the circle, whose one diameter is PS , S being the focus of the parabola, touches the y -axis at the point $(0, \alpha)$, then $5\alpha^2$ is equal to :

(1) 25 (2) 15 (3) 20 (4) 30

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

Question ID : 603421905

17. Let $ABCD$ be a tetrahedron such that the edges AB , AC and AD are mutually perpendicular. Let the areas of the triangles ABC , ACD and ADB be 5, 6 and 7 square units respectively. Then the area (in square units) of the ΔBCD is equal to :

(1) $7\sqrt{3}$ (2) $\sqrt{110}$ (3) $\sqrt{340}$ (4) 12

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

Question ID : 603421915

18. Let $a \in \mathbb{R}$ and A be a matrix of order 3×3 such that $\det(A) = -4$ and $A + I = \begin{bmatrix} 1 & a & 1 \\ 2 & 1 & 0 \\ a & 1 & 2 \end{bmatrix}$, where I is the identity matrix of order 3×3 . If $\det((a+1)\text{adj}((a-1)A))$ is $2^m 3^n$, $m, n \in \{0, 1, 2, \dots, 20\}$, then $m+n$ is equal to:

- (1) 14 (2) 17 (3) 16 (4) 15

Ans. Official answer NTA(3)

Sol.

Question ID : 603421918

19. Let $A = \begin{bmatrix} \alpha & -1 \\ 6 & \beta \end{bmatrix}$, $\alpha > 0$, such that $\det(A) = 0$ and $\alpha + \beta = 1$. If I denotes 2×2 identity matrix, then the matrix $(I + A)^8$ is :

- (1) $\begin{bmatrix} 257 & -64 \\ 514 & -127 \end{bmatrix}$ (2) $\begin{bmatrix} 1025 & -511 \\ 2024 & -1024 \end{bmatrix}$ (3) $\begin{bmatrix} 4 & -1 \\ 6 & -1 \end{bmatrix}$ (4) $\begin{bmatrix} 766 & -255 \\ 1530 & -509 \end{bmatrix}$

Ans. Official answer NTA(4)

Sol.

Question ID : 603421907

20. For $\alpha, \beta, \gamma \in \mathbb{R}$, If $\lim_{x \rightarrow 0} \frac{x^2 \sin \alpha x + (\gamma - 1)e^{x^2}}{\sin 2x - \beta x} = 3$, then $\beta + \gamma - \alpha$ is equal to :

- (1) 7 (2) 6 (3) 4 (4) -1

Ans. Official answer NTA(1)

Sol.

**SECTION - B**

Question ID : 603421921

21. If the area of the region $\{(x, y) : |4 - x^2| \leq y \leq x^2, y \leq 4, x \geq 0\}$ is $\left(\frac{80\sqrt{2}}{\alpha} - \beta\right)$, $\alpha, \beta \in \mathbf{N}$, then $\alpha + \beta$ is equal to _____.

Ans. Official answer NTA (22)**Sol.**

Question ID : 603421924

22. Let $f: \mathbf{R} \rightarrow \mathbf{R}$ be a thrice differentiable odd function satisfying $f'(x) \geq 0$, $f''(x) = f(x)$, $f(0) = 0$, $f'(0) = 3$. Then $9f(\log_e 3)$ is equal to _____.

Ans. Official answer NTA (36)**Sol.**

Question ID : 603421925

23. Three distinct numbers are selected randomly from the set $\{1, 2, 3, \dots, 40\}$. If the probability, that the selected numbers are in an increasing G.P., is $\frac{m}{n}$, $\gcd(m, n) = 1$, then $m + n$ is equal to _____.

Ans. Official answer NTA (4949)**Sol.**

Question ID : 603421923

24. Let $[.]$ denote the greatest integer function. If $\int_0^{e^3} \left[\frac{1}{e^{x-1}} \right] dx = \alpha - \log_e 2$, then α^3 is equal to _____.

Ans. Official answer NTA (8)**Sol.**

Question ID : 603421922

25. The absolute difference between the squares of the radii of the two circles passing through the point $(-9, 4)$ and touching the lines $x + y = 3$ and $x - y = 3$, is equal to _____.

Ans. Official answer NTA (768)**Sol.****MATRIX JEE ACADEMY****Office : Piprali Road, Sikar (Raj.) | Ph. 01572-241911****Website : www.matrixedu.in ; Email : smd@matrixacademy.co.in**