JEE Main 2026 April 4 Shift 1 Mathematics

Question Paper with Solutions

Conducted by National Testing Agency (NTA)

General Instructions

(i) **Duration:** The total duration of the examination is 1 hours (60 minutes).

(ii) **Total Marks:** The complete Mathematics paper carries a maximum of 100 marks.

(iii) **Structure:** The paper consists of two sections:

- **Section A:** 20 Multiple Choice Questions (MCQs).
- **Section B:** 5 Numerical Value Type Questions.

(iv) **Compulsory Questions:** All 25 questions are compulsory.

(v) Each question has four options. Only **one** option is correct.

(vi) **Correct Answer:** +4 marks.

(vii) **Incorrect Answer:** −1 mark (Negative marking).

(viii) **Unanswered/Marked for Review:** 0 marks.

Mathematics Section - A

1. Let $[\cdot]$ denote the greatest integer function. If the domain of the function $f(x) = \cos^{-1}\left(\frac{4x+2[x]}{3}\right)$ is $[\alpha, \beta]$, then $12(\alpha+\beta)$ is equal to:

(A) 6

(B) 8

(C) 9

(D) 4

2. If the set of all solutions of $|x^2+x-9|=|x|+|x^2-9|$ is $[\alpha,\beta]\cup[\gamma,\infty)$, then $(\alpha^2+\beta^2+\gamma^2)$ is equal to:

(A) 9

(B) 18

(C) 36

(D) 72

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3. Let z be a complex number such that $|z+2|=|z-2|$ and $\arg\left(\frac{z+3}{z-i}\right)=\frac{\pi}{4}$. Then $|z|^2$ is equal to:

(A) 9

(B) 4

(C) 5

(D) 1

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4. The number of functions $f:\{1,2,3,4\}\to\{a,b,c\}$, which are not onto, is:

(A) 48

(B) 45

(C) 51

(D) 35

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5. Let $S=\left\{A=\begin{bmatrix}a & b\\ c & d\end{bmatrix}: a,b,c,d\in\{0,1,2,3,4\} \text{ and } A^2-4A+3I=0\right\}$ be a set of 2×2 matrices. Then the number of matrices in S, for which the sum of the diagonal elements is equal to 4, is:

(A) 20

(B) 17

(C) 21

(D) 19

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6. Let $A=\begin{bmatrix}1 & 1 & 2\\ -2 & 0 & 1\\ 1 & 3 & 5\end{bmatrix}$. Then the sum of all elements of the matrix $\text{adj}(\text{adj}(2(\text{adj}A)^{-1}))$ is equal to:

(A) 3

(B) 4

(C) -4

(D) -3

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7. The first term of an A.P. of 30 non-negative terms is $\frac{10}{3}$. If the sum of this A.P. is the cube of its last term, then its common difference is:

(A) $\frac{5}{87}$

(B) $\frac{25}{83}$

(C) $\frac{15}{29}$

(D) $\frac{5}{29}$

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8. The number of ways, of forming a queue of 4 boys and 3 girls such that all the girls are not together, is:

(A) 5040

(B) 3050

(C) 3410

(D) 4320

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9. Let the smallest value of $k \in \mathbb{N}$, for which the coefficient of x^3 in $(1+x)^3+(1+x)^4+(1+x)^5+\cdots+(1+x)^{99}+(1+kx)^{100}, x \neq 0$, is $\left(43n+\frac{101}{4}\right)\binom{100}{3}$ for some $n \in \mathbb{N}$, be p. Then the value of $p+n$ is:

(A) 10

(B) 11

(C) 12

(D) 13

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10. Suppose that the mean and median of the non-negative numbers $21, 8, 17, a, 51, 103, b, 13, 67, (a > b)$, are 40 and 21, respectively. If the mean deviation about the median is 26, then $2a$ is equal to:

(A) 109

(B) 117

(C) 161

(D) 131

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11. Let the line $L_1 : x + 3 = 0$ intersect the lines $L_2 : x - y = 0$ and $L_3 : 3x + y = 0$ at the points A and B, respectively. Let the bisector of the obtuse angle between the lines L_2 and L_3 intersect the line L_1 at the point C. Then $BC^2 : AC^2$ is equal to:

(A) 5:1

(B) 1:5

(C) 2:3

(D) 3:2

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12. Let the vertex A of a triangle ABC be $(1, 2)$, and the mid-point of the side AB be $(5, -1)$. If the centroid of this triangle is $(3, 4)$ and its circumcenter is (α, β), then $21(\alpha + \beta)$ is equal to:

(A) 309

(B) 403

(C) 497

(D) 524

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13. Suppose that two chords, drawn from the point $(1, 2)$ on the circle $x^2 + y^2 + x - 3y = 0$ are bisected by the y-axis. If the other ends of these chords are R and S, and the mid point of the line segment RS is (α, β), then $6(\alpha + \beta)$ is equal to:

(A) 1

(B) 3

(C) 4

(D) 6

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14. A line with direction ratios $1,-1,2$ intersects the lines $\frac{x}{2}=\frac{y}{3}=\frac{z+1}{3}$ and $\frac{x+1}{-1}=\frac{y-2}{1}=\frac{z}{4}$ at the points P and Q, respectively. If the length of the line segment PQ is α, then $225\alpha^2$ is equal to:

(A) 1024

(B) 1014

(C) 1104

(D) 1204

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15. The square of the distance of the point $(-2,-8,6)$ from the line $\frac{x-1}{1}=\frac{y-1}{2}=\frac{z}{-1}$ along the line $\frac{x+5}{1}=\frac{y+5}{-1}=\frac{z}{2}$ is equal to:

(A) 3

(B) 6

(C) 8

(D) 12

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16. If $y=\tan^{-1}\left(\frac{3\cos x-4\sin x}{4\cos x+3\sin x}\right)+2\tan^{-1}\left(\frac{x}{1+\sqrt{1-x^2}}\right)$, then $\frac{dy}{dx}$ at $x=\frac{\sqrt{3}}{2}$ is equal to:

(A) 3

(B) -1

(C) 1

(D) 2

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17. Let f be a real polynomial of degree n such that $f(x)=f'(x)f''(x)$, for all $x\in\mathbb{R}$. If $f(0)=0$, then $36\left(f'(2)+f''(2)+\int_0^2 f(x)dx\right)$ is equal to:

(A) 42

(B) 46

(C) 56

(D) 66

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18. The area of the region $\{(x, y) : y \leq \pi - |x|, y \leq |x \sin x|, y \geq 0\}$ is:

(A) $1 + \frac{\pi^2}{8}$

(B) $2 + \frac{\pi^2}{4}$

(C) $\frac{\pi^2}{8} - 1$

(D) $4 + \frac{\pi^2}{2}$

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19. Let $\int_{-2}^{2}(|\sin x| + [x \sin x])dx = 2(3 - \cos 2) + \beta$, where $[\cdot]$ is the greatest integer function. Then $\beta \sin\left(\frac{\beta}{2}\right)$ equals:

(A) 1

(B) 2

(C) 4

(D) 8

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20. Let $y = y(x)$ be the solution of the differential equation $\frac{dy}{dx} = (1 + x + x^2)(1 - y + y^2)$, $y(0) = \frac{1}{2}$. Then $(2y(1) - 1)$ is equal to:

(A) $\sqrt{3}\tan\left(\frac{11\sqrt{3}}{6}\right)$

(B) $\frac{\sqrt{3}}{2}\tan\left(\frac{11\sqrt{3}}{12}\right)$

(C) $\sqrt{3}\tan\left(\frac{11\sqrt{3}}{12}\right)$

(D) $\frac{\sqrt{3}}{2}\tan\left(\frac{11\sqrt{3}}{6}\right)$

Mathematics Section - B

21. A coin is tossed 8 times. If the probability that exactly 4 heads appear in the first six tosses and exactly 3 heads appear in the last five tosses is p, then $96p$ is equal to _____.

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22. Consider the parabola $P : y^2 = 4kx$ and the ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. Let the line segment joining the points of intersection of P and E, be their latus rectums. If the eccentricity of E is e, then $e^2 + 2\sqrt{2}$ is equal to _____.

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23. If $A = \frac{\sin 3^\circ}{\cos 9^\circ} + \frac{\sin 9^\circ}{\cos 27^\circ} + \frac{\sin 27^\circ}{\cos 81^\circ}$ and $B = \tan 81^\circ - \tan 3^\circ$, then $\frac{B}{A}$ is equal to _____.

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24. Let $\vec{a}_k = (\tan\theta_k)\hat{i} + \hat{j}$ and $\vec{b}_k = \hat{i} - (\cot\theta_k)\hat{j}$, where $\theta_k = \frac{2^{k-1}\pi}{2^n+1}$, for some $n \in \mathbb{N}, n > 5$. Then the value of $\frac{\sum_{k=1}^{n} |\vec{a}_k|^2}{\sum_{k=1}^{n} |\vec{b}_k|^2}$ is _____.

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25. The number of points, at which the function $f(x) = \max\{6x, 2+3x^2\} + |x-1|\cos\left|x^2 - \frac{1}{4}\right|, x \in (-\pi, \pi)$, is not differentiable, is _____.
