# JEE Main 2026 April 5 Shift 1 Mathematics

## Question Paper

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 a, b ∈ C. Let $\alpha, \beta$ be the roots of the equation $x^2 + ax + b = 0$. If $\beta - \alpha = \sqrt{11}$ and $\beta^2 - \alpha^2 = 3i\sqrt{11}$, then $(\beta^3 - \alpha^3)^2$ is equal to:**

(A) 160

(B) 176

(C) 194

(D) 187

**2. Let the sum of the first n terms of an A.P. be $3n^2 + 5n$. Then the sum of squares of the first 10 terms of the A.P. is:**

(A) 10220

(B) 12860

(C) 15220

(D) 19780

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**3. Let A be a 3 x 3 matrix such that**

$$A^T\begin{pmatrix}1\\0\\1\end{pmatrix}=\begin{pmatrix}5\\2\\2\end{pmatrix}, A\begin{pmatrix}0\\0\\1\end{pmatrix}=\begin{pmatrix}3\\1\\1\end{pmatrix}, A\begin{pmatrix}1\\0\\1\end{pmatrix}=\begin{pmatrix}3\\4\\4\end{pmatrix} \text{ and } A\begin{pmatrix}0\\0\\1\end{pmatrix}=\begin{pmatrix}1\\3\\1\end{pmatrix}$$

**If det(A) = 1, then det(adj($A^2$ + A)) is equal to:**

(A) 16

(B) 25

(C) 49

(D) 64

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**4. Consider the system of linear equations in x, y, z:**

**x+2y+tz = 0,**

**6x + y + 5t z = 0,**

**3x + y + f(t) z = 0,**

**where f: R→ R is a differentiable function. If this system has infinitely many solutions for all t ∈ R, then f**

(A) is a constant function

(B) is strictly increasing on R

(C) is strictly decreasing on R

(D) has two critical points

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**5. The sum $\sum_{n=1}^{10} \frac{528}{n(n+1)(n+2)}$ is equal to:**

(A) 65

(B) 130

(C) 220

(D) 440

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**6. Let tan A, tan B, where A, B $\in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, be the roots of the quadratic equation $x^2 - 2x - 5 = 0$. Then $20\sin^2\left(\frac{A+B}{2}\right)$ is equal to:**

(A) $10 + \sqrt{10}$

(B) $10 - 2\sqrt{10}$

(C) $10 - 3\sqrt{10}$

(D) $10 - \sqrt{10}$

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**7. A letter is known to have arrived by post either from KANPUR or from ANANTPUR. On the envelope just two consecutive letters AN are visible. The probability, that the letter came from ANANTPUR, is:**

(A) $\frac{7}{10}$

(B) $\frac{10}{17}$

(C) $\frac{12}{19}$

(D) $\frac{7}{19}$

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**8. The mean deviation about the mean for the data**

| $x_i$ | 5 | 7 | 9 | 10 | 12 | 15 |
|---|---|---|---|---|---|---|
| $f_i$ | 8 | 6 | 2 | 2 | 2 | 6 |

**is equal to:**

(A) $\frac{40}{13}$

(B) $\frac{42}{13}$

(C) $\frac{44}{13}$

(D) $\frac{46}{13}$

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**9. Let a focus of the ellipse E: $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ be S(4, 0) and its eccentricity be $\frac{4}{5}$. If the point P(3, $\alpha$) lies on E and O is the origin, then the area of △POS is equal to:**

(A) 12/5

(B) 14/5

(C) 24/5

(D) 48/5

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**10. Let P be a moving point on the circle $x^2 + y^2 - 6x - 8y + 21 = 0$. Then, the maximum distance of P from the vertex of the parabola $x^2 + 6x + y + 13 = 0$ is equal to:**

(A) 8

(B) 10

(C) 12

(D) 9

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**11. In an equilateral triangle PQR, let the vertex P be at (3, 5) and the side QR be along the line x + y = 4. If the orthocentre of the triangle PQR is $(\alpha, \beta)$, then $9(\alpha + \beta)$ is equal to:**

(A) 16

(B) 27

(C) 36

(D) 48

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**12. The sum of all the integral values of p such that the equation $3\sin^2 x + 12\cos x - 3 = p, x \in \mathbb{R}$, has at least one solution, is:**

(A) -54

(B) -60

(C) -75

(D) -84

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**13. The square of the distance of the point P(5, 6, 7) from the line $\frac{x-2}{2} = \frac{y-5}{3} = \frac{z-2}{4}$ is equal to:**

(A) 3

(B) 5

(C) 6

(D) 8

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**14. Let $\vec{a} = \sqrt{7}\hat{i} + \hat{j} - \hat{k}$ and $\vec{b} = \hat{j} + 2\hat{k}$. If $\vec{r}$ is a vector such that $\vec{r} \times \vec{a} + \vec{a} \times \vec{b} = \vec{0}$ and $\vec{r} \cdot \vec{a} = 0$, then $|3\vec{r}|^2$ is equal to:**

(A) 44

(B) 54

(C) 86

(D) 132

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**15. The square of the distance of the point of intersection of the lines $\vec{r} = (\hat{i} + \hat{j} - \hat{k}) + \lambda(a\hat{i} - \hat{j})$,**

$a \neq 0$ **and** $\vec{r} = (4\hat{i} - \hat{k}) + \mu(2\hat{i} + a\hat{k})$ **from the origin is:**

(A) 5

(B) 10

(C) 17

(D) 26

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**16. The area of the region R = { (x, y): xy $\leq$ 27, 1 $\leq$ y $\leq$ $x^2$} is equal to:**

(A) $78\log_e 3 - \frac{52}{3}$

(B) $54\log_e 3 - \frac{52}{3}$

(C) $54\log_e 3 - \frac{26}{3}$

(D) $54\log_e 3 + \frac{26}{3}$

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**17. The product of all possible values of $\alpha$, for which** $\lim_{x\to 0} \frac{1-\cos(\alpha x)\cos((\alpha+1)x)\cos((\alpha+2)x)}{\sin^2((\alpha+1)x)} = 2$**, is:**

(A) -2

(B) 1

(C) -1

(D) $\frac{5}{4}$

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**18. The value of the integral** $\int_0^\infty \frac{\log_e(x)}{x^2+4} dx$ **is:**

(A) $\frac{\pi \log_e(2)}{2}$

(B) $\frac{\pi \log_e(2)}{4}$

(C) $1 + \pi \log_e(2)$

(D) $2 + \pi \log_e(2)$

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**19. Let $f:\mathbb{R}\to\mathbb{R}$ be a differentiable function such that $f\left(\frac{x+y}{3}\right)=\frac{f(x)+f(y)}{3}$ for all $x,y\in\mathbb{R}$, and $f'(0)=3$. Then the minimum value of the function $g(x)=3+e^x f(x)$, is:**

(A) $3\left(\frac{e+1}{e}\right)$

(B) $3\left(\frac{e-1}{e}\right)$

(C) $3-e$

(D) $3e$

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**20. The value of the integral $\int_{\pi/6}^{\pi/3}\left(\frac{4-\csc^2 x}{\cos^4 x}\right)dx$ is:**

(A) $\frac{11}{\sqrt{3}}$

(B) $\frac{16}{\sqrt{3}}$

(C) $\frac{32}{3\sqrt{3}}$

(D) $\frac{64}{3\sqrt{3}}$

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## Mathematics Section - B

**21. Let $A=\{1,2,3,4,5,6\}$. The number of one-one functions $f:A\to A$ such that $f(1)\geq 3, f(3)\leq 4$ and $f(2)+f(3)=5$, is ________.**

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**22. Two players A and B play a series of games of badminton. The player who wins 5 games first, wins the series. Assuming that no game ends in a draw, the number of ways in which player A wins the series is ________.**

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**23. If the sum of the coefficients of $x^7$ and $x^{14}$ in the expansion of $\left(\frac{1}{x^3}-x^4\right)^n, x\neq 0$, is zero, then the value of $n$ is ________.**

**24. If** $\frac{\pi}{4} + \sum_{p=1}^{11} \tan^{-1}\left(\frac{2^{p-1}}{1+2^{2p-1}}\right) = \alpha$**, then** $\tan\alpha$ **is equal to** ________**.**

**25. Let** $y = y(x)$ **be the solution of the differential equation** $x\sin\left(\frac{y}{x}\right)dy = \left(y\sin\left(\frac{y}{x}\right) - x\right)dx, y(1) = \frac{\pi}{2}$ **and let** $\alpha = \cos\left(\frac{y(e^{12})}{e^{12}}\right)$**. Then the number of integral values of** $p$**, for which the equation** $x^2 + y^2 - 2px + 2py + \alpha + 2 = 0$ **represents a circle of radius** $r \leq 6$**, is** ________**.**