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JEE (MAIN) 2026

MEMORY BASED QUESTIONS & TEXT SOLUTION

SHIFT-2

DATE & DAY: 21st January 2026 & Wednesday

PAPER-1

Duration: 3 Hrs.

Time: 03:00 PM – 06:00 PM

SUBJECT: MATHEMATICS

Selections in JEE (Advanced)/
IIT-JEE Since 2002

52979

Classroom: 35901 | Distance: 17078

Selections in JEE (Main)/
AIEEE Since 2009

262693

Classroom: 194471 | Distance: 68222

Selections in NEET (UG)/
AIPMT/AIIMS Since 2012

22733

Classroom: 15409 | Distance: 7324

Admission Open for 2026-27

Target: JEE (Advanced) | JEE (Main) | NEET (UG) | PCCP (Class V to X)

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MATHEMATICS

1. If three vectors are given as shown.

If angle between vector $\vec{p}$ and $\vec{q}$ is θ where $\cos \theta = \frac{1}{\sqrt{3}}$ and $|\vec{p}| = 2\sqrt{3}$, $|\vec{q}| = 2$. Then the value of $|\vec{p} \times (\vec{q} - 3\vec{r})|^2 - 3|\vec{r}|^2$ is :

- (1) 104 (2) 102 (3) 108 (4) 106

Ans. (1)

2. Let one end of a focal chord of the parabola $y^2 = 16x$ be $(16, 16)$. If $P(\alpha, \beta)$ divides this focal chord internally in the ratio 5: 2; then the minimum value of $\alpha + \beta$ is equal to:

- (1) 7 (2) 22 (3) 5 (4) 16

Ans. (2)

3. The largest $n \in \mathbb{N}$, for which 7^n divides $101!$ is

- (1) 16 (2) 18 (3) 19 (4) 15

Ans. (1)

4. Let $f(x) = x^3 + x^2 f'(1) + 2x f''(2) + f'''(3)$, $x \in \mathbb{R}$. Then the value of $f'(5)$ is

- (1) $\frac{117}{5}$ (2) $\frac{62}{5}$ (3) $\frac{657}{5}$ (4) $\frac{2}{5}$

Ans. (1)

5. If the line $\alpha x + 2y - 4 = 0$ is the tangent to the ellipse $3x^2 + 4y^2 = 1$ then α

- (1) $3\sqrt{5}$ (2) $2\sqrt{5}$ (3) $5\sqrt{5}$ (4) $8\sqrt{5}$

Ans. (1)

6. Let O be the vertex of the parabola $y^2 = 16x$.

The locus of centroid of $\triangle OPA$ when P lies on parabola, and A lies on x -axis and $\angle OPA = 90^\circ$

- (1) $y^2 = 8(3x - 16)$ (2) $9y^2 = 8(3x - 16)$
(3) $y^2 = 8(3x + 16)$ (4) $9y^2 = 8(3x + 16)$

Ans. (2)

7. Let the line L pass through the point $(-3, 5, 2)$ and make equal angle with the positive coordinate axes.

If the distance of L from the point $(-2, r, 1)$ is $\sqrt{\frac{14}{3}}$, then the sum of all possible values of r is

- (1) 16 (2) 10 (3) 12 (4) 6

Ans. (2)

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8. If the product $\left(\frac{1}{15C_0} + \frac{1}{15C_1}\right)\left(\frac{1}{15C_1} + \frac{1}{15C_2}\right) \dots \left(\frac{1}{15C_{12}} + \frac{1}{15C_{13}}\right) = \frac{\alpha^{13}}{14C_0 \cdot 14C_1 \cdot 14C_2 \dots 14C_{12}}$, then 30α is equal to
- (1) 16 (2) 32 (3) 15 (4) 28

Ans. (2)

9. Let Z be the complex number satisfying $|z - 5| \leq 3$ and having maximum positive argument, then $34 \left| \frac{5z-12}{5z+16} \right|^2$ is equal to
- (1) 16 (2) 26 (3) 12 (4) 20

Ans. (4)

10. Let $a_1, \frac{a_2}{2}, \frac{a_3}{2^2}, \dots, \frac{a_{10}}{2^9}$ be a G.P of common ratio $\frac{1}{\sqrt{2}}$. If $a_1 + a_2 + \dots + a_{10} = 62$, then a_1 is equal to
- (1) $\sqrt{2} - 1$ (2) $2(2 - \sqrt{2})$ (3) $2(\sqrt{2} - 1)$ (4) $2 - \sqrt{2}$

Ans. (3)

11. Lines L_1 & L_2 are $\frac{x-1}{2} = \frac{y}{1} = \frac{z+1}{2}$ & $\frac{x}{2} = \frac{y}{-1} = \frac{z+1}{1}$ respectively, if a line L with direction ratios $(1,1,1)$ intersects L_1 & L_2 at A & B respectively, then Find $(AB)^2$:
- (1) 27 (2) 26 (3) 18 (4) 9

Ans. (1)

12. If $x \in \left[-\frac{\sqrt{3}}{2}, \frac{1}{\sqrt{2}}\right]$, then maximum value of the expression $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$ is $\frac{n\pi^2}{n+7}$ (where $n \in \mathbb{N}$) then n is equal to:

Ans. (29)

13. If probability distribution is given by,

x	0	1	2	3
$p(x)$	$\frac{8a-1}{30}$	$\frac{4a-1}{30}$	$\frac{2a+1}{30}$	b

If it is given that $\sigma^2 + \mu^2 = 2$, where σ is standard deviation and μ is mean of distribution then $\frac{a}{b}$ is

- (1) $\frac{22}{71}$ (2) $\frac{110}{71}$ (3) $\frac{220}{71}$ (4) $\frac{1110}{71}$

Ans. (4)

14. $\int_0^1 \cot^{-1}(x^2 + x + 1) dx$ is equal to
- (1) $\int_0^1 \tan^{-1}(x+1) dx - \int_0^1 \tan^{-1} x dx$ (2) $\int_0^1 (\tan^{-1}(x+1) + \tan^{-1} x) dx$
- (3) $\int_0^1 4 \tan^{-1} x dx$ (4) $3 \int_0^1 \tan^{-1}(x+1) dx$

Ans. (1)

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15. The maximum value of $(\sin^{-1} x)^2 + (\cos^{-1} x)^2$ in $x \in \left[-\frac{\sqrt{3}}{2}, \frac{1}{\sqrt{2}}\right]$ is $\frac{a\pi^2}{b}$, then $a + b$ is

Ans. (65)

16. Let α and β be the roots of the equation $x^2 + 2ax + (3a + 10) = 0$ such that $\alpha < 1 < \beta$. Then the set of all possible values of a is

- (1) $\left(-\infty, -\frac{11}{5}\right) \cup (5, \infty)$ (2) $(-\infty, -3)$ (3) $(-\infty, -8) \cup (5, \infty)$ (4) $\left(-\infty, -\frac{11}{5}\right)$

Ans. (4)

17. For Matrices $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} -29 & 49 \\ -13 & 18 \end{bmatrix}$, if $(A^{15} + B) \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$, then among the following which one is correct

- (1) $x = 11, y = 2$ (2) $x = 5, y = 7$
(3) $x = 18, y = 11$ (4) $x = 16, y = 3$

Ans. (1)

18. If the area of the region $\{(x, y) : 1 - 2x \leq y \leq 4 - x^2, x \geq 0, y \geq 0\}$ is $\frac{\alpha}{\beta}$, $\alpha, \beta \in \mathbb{N}$, $\gcd(\alpha, \beta) = 1$, then the value of $(\alpha + \beta)$ is

- (1) 67 (2) 73 (3) 91 (4) 85

Ans. (2)

19. Let $A = \{2, 3, 4, 5, 9\}$ and relation $R = \{(x, y) : 2x \leq 3y, x, y \in A\}$. If m is the number of elements in R and n is the number of elements to be added in R to make it symmetric, then $m + n$ is equal to

- (1) 20 (2) 28 (3) 35 (4) 25

Ans. (4)

20. Let $f(x) = \lim_{n \rightarrow \infty} \left(\frac{1}{n^3} \sum_{k=1}^n \left[\frac{k^2}{3x} \right] \right)$, where $[.]$ denotes the greatest integer function, then $12 \sum_{j=1}^{\infty} f(j)$ is equal to

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

Ans. (3)

21. If $(\sec x) \frac{dy}{dx} - 2y = 2 + 3 \sin x$ and $y(0) = -\frac{7}{4}$ then $y\left(\frac{\pi}{6}\right)$ is

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

Ans. (4)

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