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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: 09:00 – 12:00 IST

SUBJECT: MATHEMATICS

REGISTERED & CORPORATE OFFICE (CIN: U80302RJ2007PLC024029):
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MATHEMATICS

1. If three vectors are given as shown.
If angle between vector $\vec{p}$ and $\vec{q}$ is q 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 $\in N$, for which 7^n divides 101 ! is

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

Ans. **(1)**

4. Let $f(x) = x^3 + x^2 f'(1) + 2x f''(2) + f'''(3), x \in R$. 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 $\angle OPA = 90°$

(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)**

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

(1) 16 (2) 32 (3) 15 (4) 28

Ans. **(2)**

9. Let **Z** be the compelx number satisfing $|z-5|\leqslant 3$ and having maximum positive arguement, then $34\left|\frac{5z-12}{5iz+16}\right|^2$ is equal to

(1) 16 (2) 26 (3) 12 (4) 20

Ans. **(4)**

10. Let $a_1,\frac{a_2}{2},\frac{a_3}{2^2},\ldots\frac{a_{10}}{2^9}$ be a G.P of common ratio $\frac{1}{\sqrt{2}}$. If $a_1+a_2+\cdots+a_{10}=62$, 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 $n\in N$) 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) $\int_0^1\tan^{-1}(x+1)dx-\int_0^1\tan^{-1}xdx$ (2) $\int_0^1(\tan^{-1}(x+1)+\tan^{-1}x)dx$

(3) $\int_0^1 4\tan^{-1}xdx$ (4) $3\int_0^1\tan^{-1}(x+1)dx$

Ans. **(1)**

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 $\{(x,y): 1 - 2x \le y \le 4 - x^2, x \ge 0, y \ge 0\}$ is $\frac{\alpha}{\beta}, \alpha, \beta, \in N, \gcd(\alpha, \beta) = 1$, 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 $R = \{(x,y): 2x \leqslant 3y, x, y \in A\}$. 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 $m + \mathrm{n}$ is equal to

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

Ans. **(4)**

20. Let $f(x) = \lim\limits_{n\to\infty} \left(\frac{1}{n^3}\sum_{k=1}^{n} \left[\frac{k^2}{3^x}\right]\right)$, 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)**