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JEE (MAIN) 2026

MEMORY BASED QUESTIONS & TEXT SOLUTION

SHIFT-1

DATE & DAY: 24 January 2026 & Saturday

PAPER-1

Duration: 3 Hrs.
Time: 09:00 – 12:00 IST

SUBJECT: MATHEMATICS

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MATHEMATICS

1. The value of $\dfrac{\sqrt{3}\,cosec\,20°-\sec 20°}{\cos 20°\cos 40°\cos 60°\cos 80°}$ is

(1) 12 　　　　　　(2) 16 　　　　　　(3) 64 　　　　　　(4) 32

Ans. **(3)**

2. The number of solution for $x \in R, x|x-4| + |x-1| - 2 = 0$

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

Ans. **(1)**

3. If $\cot x = \dfrac{5}{12}$ for some $x \in \left(\pi, \dfrac{3\pi}{2}\right)$ then $\sin 7x\left(\cos\dfrac{13x}{2} + \sin\dfrac{13x}{2}\right) + \cos 7x\left(\cos\dfrac{13x}{2} - \sin\dfrac{13x}{2}\right)$ is equal to

Ans. $\left(\dfrac{1}{\sqrt{13}}\right)$

4. Consider 10 data such that their mean is 10 and variance is 2. If one of the data α is removed and new data entry β is inserted. Now new mean is 10.1 and new variance is 1.99 then $(\alpha + \beta)$ is equal to

(1) 10 　　　　　　(2) 20 　　　　　　(3) 1 　　　　　　(4) 2

Ans. **(2)**

5. Consider an A.P $a_1, a_2 \cdots a_n; a_1 > 0, a_2 - a_1 = \dfrac{-3}{4}, a_n = \dfrac{1}{4}a_1$ and $\sum_{i=1}^{n} a_i = \dfrac{525}{2}$ then $\sum_{i=1}^{17} a_i$ is equal to

(1) 276 　　　　　　(2) 238 　　　　　　(3) 189 　　　　　　(4) 258

Ans. **(2)**

6. If $F(t) = \int \dfrac{1-\sin(\ln t)}{1-\cos(\ln t)}\,dt$ and $F\left(e^{\pi/2}\right) = -e^{\pi/2}$ then $F\left(e^{\pi/4}\right)$ is

(1) $(-1-\sqrt{2})e^{\frac{\pi}{4}}$ 　　(2) $(1-\sqrt{2})e^{\frac{\pi}{4}}$ 　　(3) $(1+\sqrt{2})e^{\frac{\pi}{4}}$ 　　(4) $(-2-\sqrt{2})e^{\frac{\pi}{4}}$

Ans. **(1)**

7. Consider a sequence 729,81,9,1, ___

Let P_n = product of first n terms of the given sequence and $\sum_{n=1}^{40} (P_n)^{\frac{1}{n}} = \dfrac{3^\alpha - 1}{2\times 3^\beta}$. Then the value of　$\alpha + \beta$ is

(1) 73 　　　　　　(2) 75 　　　　　　(3) 76 　　　　　　(4) 81

Ans. **(1)**

8. Number of matrices A of order 3×2 such that all of its elements are from the set $\{-2,-1,0,1,2\}$ such that trace of AA^T is 5, is equal to

(1) 120 　　　　　　(2) 312 　　　　　　(3) 192 　　　　　　(4) 126

Ans. **(2)**

9. Let a circle passes through points $A(-\sqrt{2}\alpha, 0), B(0, \sqrt{3}\beta)$ and $O(0,0)$ such that its radius is 4. Then the radius of locus of centroid of triangle OAB is

(1) $\dfrac{2}{3}$ 　　　　(2) $\dfrac{8}{3}$ 　　　　(3) $\dfrac{4}{3}$ 　　　　(4) $\dfrac{11}{3}$

Ans. **(2)**

10. A line passing through point $P(1,1,1)$, which is perpendicular to $\frac{x-17}{1} = \frac{y-71}{1} = \frac{z}{0}$ and $\frac{x-4}{4} = \frac{y-1}{1} = \frac{z-1}{1}$. Let the line intersect the $y-z$ plane at point Q. Another line parallel to L and passing through $s(1, 0, -1)$ intersect another plane at point R. Then the square of area of parallelogram $PQRS$ is

(1) 11 (2) 12 (3) 6 (4) 8

Ans. **(3)**

11. Let $\left|\frac{z-6i}{z-2i}\right| = 1$, $\left|\frac{z-8+2i}{z+2i}\right| = \frac{3}{5}$ then if ω satisfy both equation then find $\sum|\omega^2|$.

(1) 398 (2) 385 (3) 413 (4) 433

Ans. **(2)**

12. If $S = \frac{1}{25!} + \frac{1}{23!3!} + \frac{1}{21!5!} + \cdots$. upto 13 terms. Then $13S = \frac{2^\alpha}{\beta!}$, then $\alpha + \beta$ is

Ans. **(49)**

13. Let A_1 be the area enclosed by $y = x^2 + 2$, y-axis and $x + y = 8$ and
Let A_2 be the area enclosed by $y = x^2 + 2$, $y^2 = x$, $x = 2$ and y-axis, then the value of $A_1 - A_2$ is

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

Ans. **(2)**

14. If $f(x) = \frac{e^x(\tan x - x) + \ln(\sec x + \tan x) - x}{\tan x - x}$, $x \neq 0$. If $f(x)$ is continuous at $x = 0$, then $f(0)$ is equal to

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

Ans. **(1)**

15. $E_1 : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
$E_2 : \frac{x^2}{A^2} + \frac{y^2}{B^2} = 1$

Let eccentricity of both $E_1 \& E_2$ be $\frac{4}{5}$, $2l_1^2 = 9l_2$ where l_1 and l_2 are the length of latus rectum of $E_1 \& E_2$ respectively. Distance between the foci of E_1 be 8 then distance between foci of ellipse E_2 is

(1) $\frac{32}{5}$ (2) $\frac{16}{5}$ (3) $\frac{8}{5}$ (4) $\frac{4}{5}$

Ans. **(1)**

16. Out of 100 bulbs, 10 are defective and 90 are non-defective. If the probability of finding 7 defective bulbs out of 8 draws, with replacement, is $\frac{K}{10^8}$, then the value of K is

(1) 69 (2) 72 (3) 75 (4) 96

Ans. **(2)**