MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 23

Mathematics

1. Two intersecting lines lying in plane P_1 have equations $\frac{x-1}{1}=\frac{y-3}{2}=\frac{z-4}{3}$ and $\frac{x-1}{2}=\frac{y-3}{3}=\frac{z-4}{1}$. If the equation of plane P_2 is $7x-5y+z-6=0$, then the distance between planes P_1 and P_2 is

A. $\frac{11}{5\sqrt{3}}$

B. $\frac{2}{\sqrt{3}}$

C. $\frac{1}{\sqrt{3}}$

D. $\frac{7}{5\sqrt{3}}$

Answer: B

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2. If t is real and $\lambda = \frac{t^2 - 3t + 4}{t^2 + 3t + 4}$ then find number of the solution of the systems of equation $3x - y + 4z = 0, x + 2y - 3z = -2.6x + 5y + \lambda z = -3$ for a particular value of λ.

A. a unique solution

B. infinite solutions

C. no solution

D. 2 solutions

Answer: A

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3. The solution of the differential equation $2ydx + xdy = 2x\sqrt{y}dx$ is (where, C is an arbitrary constant)

A. $x\sqrt{y} = x + C$

B. $x\sqrt{y} = \frac{x^2}{2} + C$

C. $\frac{x}{\sqrt{y}} = x + C$

D. $xy = C$

Answer: B

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4. The mean and variance of 10 observation are found to be 10 and 4 respectively. On rechecking it was found that an observation 8 was incorrect. If it is replaced by 18, then the correct variance is

A. 7

B. 8

C. 9

D. $\frac{55}{6}$

Answer: C

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5. The sum of the series

$3 + 8 + 16 + 27 + 41$..... upto 20 terms is equal to

A. 4230

B. 4430

C. 4330

D. 4500

Answer: B

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6. The greatest integer less than or equal to $\left(\sqrt{2}+1\right)^6$ is

A. 196

B. 197

C. 198

D. 199

Answer: B

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7. If $\cos x - \sin x = -\frac{5}{4}$, where $\frac{\pi}{2} < x < \frac{3\pi}{4}$, then $\cot\left(\frac{x}{2}\right)$ is equal to

A. $\frac{4-\sqrt{7}}{9}$

B. 8

C. -8

D. $\frac{4+\sqrt{7}}{9}$

Answer: D

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8. In ΔPQR, the equation of the internal angle bisector of angle Q is y = x and the equation of side PR is $3x - y = 2$. If coordinates of P are (3, 2) and $2PQ = RQ$, then the coordinates of Q are

A. (3, 3)

B. (7, 7)

C. $(-2, -2)$

D. (5, 5)

Answer: B

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9. Let the lines l_1 and l_2 be normals to $y^2 = 4x$ and tangents to $x^2 = -12y$ (where l_1 and l_2 are not x - axis). The absolute value of the difference of slopes of l_1 and l_2 is

A. 3

B. 2

C. 1

D. $\frac{1}{2}$

Answer: C

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10. The value of $\lim_{x \to \infty} \frac{(\ln x)^2}{2 + 3x^2}$ is equal to

A. $\frac{1}{3}$

B. $\frac{2}{3}$

C. 1

D. 0

Answer: D

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11. The value of $\lim_{n \to \infty} \Sigma_{r=1}^{n} \left(\frac{2r}{n^2} \right) e^{\frac{r^2}{n^2}}$ is equal to

A. e

B. 2e

C. $e - 2$

D. $e - 1$

Answer: D

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12. The direction cosines l, m and n of two lines are connected by the relations $l + m + n = 0$ and $lm = 0$, then the angle between the lines is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{4}$

C. $\frac{\pi}{2}$

D. 0

Answer: A

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13. The function $f(x) = x^3 - ax$ has a local minimum at $x = k$, where $k \geq 2$, then a possible value of a is

A. 9

B. 11

C. 13

D. 8

Answer: C

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14. Let two circles having radii r_1 and r_2 are orthogonal to each other. If the length of their common chord is k times the square root of harmonic mean between the squares of their radii, then k^4 is equal to

A. 13

B. 7

C. 4

D. 2

Answer: C

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15. The value of $\int_0^{\frac{\pi}{2}} \left(\cos 2x \cos 2^2 x \cos 2^3 x \cos 2^4 x\right) dx$ is equal to

A. 0

B. $\frac{1}{2}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{4}$

Answer: A

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16. Let A be a matrix of order 3×3 such that $|A| = 3$. Let $B = 3A^{-1}$ and $C = \frac{adjA}{2}$, then the value of $\left|A^2 B^3 C^4\right|$ is

A. $\frac{3^{16}}{2^{12}}$

B. $\left(\frac{3}{2}\right)^{12}$

C. $\frac{3^{10}}{2^8}$

D. $\frac{3^{12}}{2^{14}}$

Answer: A

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17. Let

$\left(\hat{p} \times \overrightarrow{q}\right) \times \hat{p} + \left(\hat{p}.\ \overrightarrow{q}\right)\overrightarrow{q} = \left(x^2 + y^2\right)\overrightarrow{q} + (14 - 4x - 6y)\hat{p}$

where $\hat{p}$ and $\overrightarrow{q}$ are non - collinear vectors $\hat{p}$ is a unit vector)

and x, y are scalars, then the value of $x^2 + y^2$ is equal to

A. 10

B. 11

C. 12

D. 13

Answer: D

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18. If p and q are two statements, then which of the following statement is a tautology

A. $p \Rightarrow (p \vee \sim q)$

B. $(p \vee q) \Rightarrow p$

C. $p \Rightarrow (p \wedge q)$

D. $p \Leftrightarrow (p \Rightarrow q)$

Answer: A

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19. In an equilateral triangle ABC, equation of the sides BC is $x + y - 2 = 0$ and the centroid of ΔABC is (0, 0). If points A, B and C are in anticlockwise order, then the equation of side AC is

A. $(y + 2) = \left(2 - \sqrt{3}\right)(x + 2)$

B. $(y + 2) = \left(2 + \sqrt{3}\right)(x + 2)$

C. $(y + 1) = \left(2 + \sqrt{3}\right)(x + 1)$

D. $x + 2 = 0$

Answer: B

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20. The minimum distance between the curves $y = \tan x, \forall x \in \left(-\frac{\pi}{2}, \frac{\pi}{2} \right)$ and $\left(x - 2 - \frac{\pi}{4} \right)^2 + y^2 = 1$ is

A. $\sqrt{2} - 1$

B. $\sqrt{5} - 1$

C. $\sqrt{5} + 1$

D. 2

Answer: B

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21. A fair die is thrown n number of times. If the probability of always getting a number greater than the previous number is $\frac{5}{54}$, then the value of n is equal to $(n \leq 6)$.

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22. How many 4 letter words can be formed from the word "MATHEMATICS" ?

A. 2500

B. 2454

C. 2400

D. 2254

Answer: B

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23. If $f(x) = \begin{cases} (1+|\sin x|)^{\frac{p}{|\sin x|}} & , \quad -\frac{\pi}{6} < x < 0 \\ q & : \quad x = 0 \\ e^{\tan 3x \,.\, \cot 5x} & : \quad 0 < x < \frac{\pi}{6} \end{cases}$ is continuous at x = 0, then the value of $2p + 10 \ln q$ is equal to

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24. If $f(x) = \sin x, g(x) = \cos x$ and $h(x) = \cos(\cos x)$, then the integral $I = \int f(g(x)).\, f(x).\, h(x) dx$ simplifies to $-\lambda \sin^2(\cos x) + C$ (where, C is the constant of integration). The value of λ is equal to

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25. If numerically greatest term in the expansion of $(3-5x)^{11}$, where $x=\frac{1}{5}$, is 729λ, then the value of $\frac{\lambda}{150}$ is

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