MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 38

Mathematics

1. If m_1, m_2 be the roots of the equation $x^2 + (\sqrt{3}+2)x + \sqrt{3} - 1 = 0$, then the area of the triangle formed by the lines $y = m_1 x$, $y = m_2 x$ and $y = 2$ is

A. $\sqrt{33} + \sqrt{11}$

B. $\sqrt{33} - \sqrt{11}$

C. $2\sqrt{33}$

D. $2\sqrt{11}$

Answer: A

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2. If

$$\begin{vmatrix} \alpha^{2n} & \alpha^{2n+2} & \alpha^{2n+4} \\ \beta^{2n} & \beta^{2n+2} & \beta^{2n+4} \\ \gamma^{2n} & \gamma^{2n+2} & \gamma^{2n+4} \end{vmatrix} = \left(\frac{1}{\beta^2} - \frac{1}{\alpha^2}\right)\left(\frac{1}{\gamma^2} - \frac{1}{\beta^2}\right)\left(\frac{1}{\alpha^2} - \frac{1}{\gamma^2}\right)$$

{where α^2, β^2 and γ^2 are al distinct}, then the value of n is equal to

A. 4

B. -4

C. 3

D. -2

Answer: D

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3. An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march ?

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4. The line $2x + y = 3$ intersects the ellipse $4x^2 + y^2 = 5$ at two points. The point of intersection of the tangents to the ellipse at these point is

A. $\left(\frac{5}{6}, \frac{5}{6}\right)$

B. $\left(\frac{5}{3}, \frac{5}{6}\right)$

C. $\left(\frac{5}{6}, \frac{5}{3}\right)$

D. $\left(\frac{5}{3}, \frac{5}{3}\right)$

Answer: C

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5. The fourth term of the arithmetic - geometric progression 6, 8, 8, ... Is

A. 8

B. 12

C. $\frac{32}{3}$

D. $\frac{64}{9}$

Answer: D

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6. If $0 < A < B < \pi, \sin A - \sin B = \frac{1}{\sqrt{2}}$ and $\cos A - \cos B = \sqrt{\frac{3}{2}}$, then the value of $A + B$ is equal to

A. $\frac{2\pi}{3}$

B. $\frac{5\pi}{6}$

C. π

D. $\frac{4\pi}{3}$

Answer: D

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7. Consider the function $f(x) = \begin{cases} \sin(x-4).\tan^{-1}\left(\frac{1}{x-4}\right) & x \neq 4 \\ 0 & x = 4 \end{cases}$, then

A. f(x) is contunuous and differentiable at $x = 4$

B. $f(x)$ is continuous but non differentiable at x= 4

C. $f(x)$ is discontinuous but differentiable at $x = 4$

D. f(x) is dicountinuous and non differentiable at x = 4

Answer: B

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8. The solution of the differential equation $xdy = \left(\tan y + \frac{e^1/x^2}{x}\sec y\right)dx$ is (where C is the constant of integration)

A. $\sin y = e^{\frac{1}{x^2}} + c$

B. $\frac{2\sin y}{x} + e^{\frac{1}{x^2}} = C$

C. $\frac{\sin y}{x} - e^{\frac{1}{x^2}} = C$

D. $\sin y - xe^{\frac{1}{x^2}} = C$

Answer: B

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9. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three vectors such that $\vec{a} \neq 0, \left|\vec{a}\right| = \left|\vec{c}\right| = 1, \left|\vec{b}\right| = 4$ and $\left|\vec{b} \times \vec{c}\right| = \sqrt{15}$. If $\vec{b} - 2\vec{c} = \lambda \vec{a}$ then find the value of λ.

A. ± 2

B. ± 1

C. $\pm 2\sqrt{2}$

D. ± 4

Answer: C

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10. If two distinct numbers a and be are selected from the set $\{5^1, 5^2, 5^3 \ldots\ldots\ldots 5^9\}$, then the probability that $\log_a b$ is an integer is

A. $\frac{7}{18}$

B. $\frac{5}{9}$

C. $\frac{7}{36}$

D. $\frac{3}{16}$

Answer: A

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11. If z and w are two non - zero complex numbers such that $|zw| = 1$ and $arg(z) - arg(w) = \frac{\pi}{2}$, then the value of $5i\bar{z}w$ is equal to

A. -5

B. 5i

C. 5

D. $-5i$

Answer: C

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12. Let $f: R \to B$ be a functio defined by $f(x) = \tan^{-1}. \frac{2x}{1+x^2}$, then f is both one - one and onto when B is in the interval

A. $\left(0, \frac{\pi}{4}\right)$

B. $\left[0, \frac{\pi}{3}\right]$

C. $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

D. $\left(-\frac{\pi}{4}, \frac{\pi}{4}\right)$

Answer: C

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13. The value of $\lim_{x \to 0} \frac{\sec x - (\sec x)^{\sec x}}{1 - \sec x + \ln(\sec x)}$ is equal to

A. 0

B. 1

C. 2

D. -1

Answer: C

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14. $\operatorname{cosec}^2\theta\left(\cos^2\theta - 3\cos\theta + 2\right) \geq 1$, If θ belongs to

A. $\left(0, \frac{\pi}{3}\right)$

B. $\left(\frac{\pi}{2}, \pi\right)$

C. $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$

D. $\left(0, \frac{\pi}{4}\right)$

Answer: C

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15. The coefficient of x^2 in the expansion of $(1-x+2x^2)\left(x+\frac{1}{x}\right)^{10}$ is

A. 210

B. 714

C. 504

D. 240

Answer: B

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16. The value of the integral $I=\int e^x(\sin x+\cos x)dx$ is equal to $e^x.\, f(x)+C, C$ being the constant of integration. Then the maximum value of $y=f\left(x^2\right),\ \forall x\in R$ is equal to

A. 0

B. `-1

C. 1

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

Answer: C

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17. The number of local minima/maximum for the function $y = x^2 - 2\sin x,\ \forall x \in \left(0, \frac{\pi}{2}\right)$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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18. Consider $A = \int_0^1 \frac{dx}{1+x^3}$, then A satisfies

A. $A > \frac{\pi}{4}$

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

C. $A = \frac{\pi}{4}$

D. $A = \frac{\pi}{6}$

Answer: A

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19. If $B_0 = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$, $B_n = adj(B_{n-1}, \forall n \in N$ and I is an identity matrix of order 3, then $B_1 + B_3 + B_5 + B_7 + B_9$ is equal to

A. B_0

B. $5B_0$

C. $25B_0$

D. $5I$

Answer: B

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20. A plane passes through the point $(-2, -2, 2)$ and contains the line joining the points $(1, -1, 2)$ and $(1, 1, 1)$.

Then the image of $(-7, 2, 3)$ in the plane is

A. $(1, -1, 5)$

B. $(-5, -4, -2)$

C. $(-6, -1, -3)$

D. $\left(\frac{13}{23}, \frac{7}{23}, \frac{6}{23}\right)$

Answer: C

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21. If the number of integral solutions (x, y, z) of the equation xyz = 18 is t, then the value of $\frac{t}{8}$ is

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22. The ratio of the variance of first n positive integral multiples of 4 to the variance of first n positive odd number is

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23. If $f: R \to R$ is a function satisfying the equation $f(3x+1)+f(3x+10)=10, Aax \in R$, then the period of f(x) is

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24. Let (α, β) be an ordered pair of real numbers satisfying the equation $x^2-4x+4y^2+3=0$. If the maximum and minimum value of $\sqrt{\alpha^2+\beta^2}$ are l and s respectively, then the value of $\frac{l-s}{l+s}$ is

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25. The sum of the real roots of the equation $x^5 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0$ is

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