MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 12

Mathemetic Single Choice

1. $f(x) = \max\left\{\frac{x}{n}, |\sin \pi x|\right\}, n \in N.$ has maximum points of non-differentiability for $x \in (0, 4)$, Then n cannot be (A) 4 (B) 2 (C) 5 (D) 6

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2. The value of the expression

$$\frac{2(\sin 1^\circ + \sin 2^\circ + \sin 3^\circ + \ldots\ldots + \sin 89^\circ)}{2(\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \ldots\ldots . + \cos 44^\circ) + 1}$$

is equal to

A. $\sqrt{2}$

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

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

D. 0

Answer: A

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3. The sum of all real values of x satisfying the equation $\left(x^2 - 5x + 5\right)^{x^2+4x-60} = 1$ is:

A. 6

B. 5

C. 3

D. -4

Answer: C

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4. If $C_0, C_1, C_2, \ldots\ldots, C_n$ are binomial coefficients, (where $C_r = .^n C_r$), then the value of $C_0 - C_1 + C_2 - C_3 + \ldots\ldots + (-1)^n C_n$ is equal to

A. 2^{n-1}

B. 2^n

C. 0

D. 1

Answer: C

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5. If $f(x) = \cos x \cos 2x \cos 4x \cos(8x).\cos 16x$ then find $f'\left(\frac{\pi}{4}\right)$

A. $\sqrt{2}$

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

C. 1

D. none of these

Answer: A

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6. $(p \to q) \wedge (q \to \ -p)$ is equivalent to

A. p

B. q

C. $\sim p$

D. $\sim q$

Answer: C

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7. z is a complex number such that $|Re(z)| + |Im(z)| = 4$ then $|z|$ can't be

A. $\sqrt{\frac{17}{2}}$

B. $\sqrt{10}$

C. $\sqrt{7}$

D. $\sqrt{8}$

Answer: C

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8. $\int \frac{\ln\left(\frac{x-1}{x+1}\right)}{x^2-1} dx$ is equal to

A. $\frac{1}{2}\left(\ln\left(\frac{x-1}{x+1}\right)\right)^2 + C$

B. $\frac{1}{2}\left(\ln\left(\frac{x+1}{x-1}\right)\right)^2 + C$

C. $\frac{1}{4}\left(\ln\left(\frac{x-1}{x+1}\right)\right)^2 + C$

D. $\frac{1}{4}\left(\ln\left(\frac{x+1}{x-1}\right)\right)^2 + C$

Answer: C

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9. A circle of radius 2 units is touching both the axes and a circle with centre at (6,5). The distance between their centres is

A. 8 units

B. 5 units

C. 7 units

D. none of these

Answer: B

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10. The value of the expression $\cot^{-1}\left(\frac{1}{2}\right) + \cot^{-1}\left(\frac{9}{2}\right) + \cot^{-1}\left(\frac{25}{2}\right) + \cot^{-1}\left(\frac{49}{2}\right)$ upto + ...n terms is

A. $\tan^{-1} 2n$

B. $\tan^{-1}(2n-1)$

C. $\tan^{-1} n$

D. $\tan^{-1} 2n - \tan^{-1} 1$

Answer: A

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11. If $\begin{vmatrix} x-4 & 2x & 2x \\ 2x & x-4 & 2x \\ 2x & 2x & x-4 \end{vmatrix} = (A+Bx)(x-A)^2$

then the ordered pair (A,B) is equal to

A. $(4, 5)$

B. $(-4, -5)$

C. $(-4, 3)$

D. $(-4, 5)$

Answer: D

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12. A rectangle with sides of lengths $(2n-1)$ and $(2m-1)$ units is divided into squares of unit length. The number of rectangles which can be formed with sides of odd length, is

A. m^2n^2

B. $mn(m+1)(n+1)$

C. $4(m+n)-1$

D. none of these

Answer: A

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13. For a group of 50 male workers, the mean and the standard deviation of their daily wages are Rs. 630 and Rs. 90 respectively and for a group of 40 female workers these are Rs. 540, and Rs . 60 respectively. Then, the standard deviation of all these 90 workers is

A. 60

B. 70

C. 80

D. 90

Answer: D

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14. If $\lim_{x \to 0} \frac{\{(a-n)nx - \tan x\}\sin nx}{x^2} = 0$, where n is non-zero real number, then a is equal to

A. 0

B. $\frac{n+1}{n}$

C. n

D. $n + \frac{1}{n}$

Answer: D

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15. Find the point at which the slope of the tangent of the function $f(x) = e^x \cos x$ attains minima, when

$x \in [0, 2\pi]$.

A. $x = \pi$

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

C. $x = \frac{3\pi}{4}$

D. $x = \frac{3\pi}{2}$

Answer: A

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16. There are 5 machines. Probability of a machine being faulted is $\frac{1}{4}$. Probability of atmost two machines is faulted, is $\left(\frac{3}{4}\right)^3 k$, then value of k is

A. $\frac{17}{8}$

B. $\frac{17}{4}$

C. $\frac{17}{2}$

D. 4

Answer: A

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17. The point of intersection of the lines

$\vec{r} = 7\hat{i} + 10\hat{j} + 13\hat{k} + \vec{s}\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$ and

$\vec{r} = 3\hat{i} + 5\hat{j} + 7\hat{k} + t\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$ is

A. $\hat{i} + \hat{j} - \hat{k}$

B. $2\hat{i} - \hat{j} + 4\hat{k}$

C. $\hat{i} - \hat{j} + \hat{k}$

D. $\hat{i} + \hat{j} + \hat{k}$

Answer: D

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18. The solution of the differential equation $\frac{dy}{dx} + x(2x + y) = x^3(2x + y)^3 - 2$ is (C being an arbitrary constant)

A. $\frac{1}{2x + xy} = x^2 + 1 + Ce^x$

B. $\frac{1}{(2x + y)^2} = x^2 + 1 + Ce^{x^2}$

C. $\frac{1}{2x+y} = x^2 + 1 + Ce^{-x^2}$

D. $\frac{1}{(2x+y)^2} = x^2 + 1 + Ce$

Answer: B

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19. If $\vec{a}, \vec{b}, \vec{c}$ are mutually perpendicular vectors having magnitudes 1,2,3 respectively, then $\left[\vec{a}+\vec{b}+\vec{c} \quad \vec{b}-\vec{a}\,\vec{c}\right] =$

A. 0

B. 6

C. 12

D. 18

Answer: C

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20. The length of the chord of the parabola $x^2 = 4y$ having equations $x - \sqrt{2}y + 4\sqrt{2} = 0$ is

A. $6\sqrt{3}$ units

B. $8\sqrt{2}$ units

C. $2\sqrt{11}$ units

D. $3\sqrt{2}$ units

Answer: A

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Mathemetic Subjective Numerical

1. The area bounded by the curves y=lnx, y=ln|x|, y=|lnx| and y=|ln||x| is

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2. The number of elements in the set $\{(a, b): a^2 + b^2 = 50, a, b \in Z\}$ where Z is the set of all integers, is

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3. The value of the integral $\int_0^{\frac{1}{2}} \frac{1+\sqrt{3}}{\left((x+1)^2(1-x)^6\right)^{\frac{1}{4}}} dx$ is _____.

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4. If $\sum_{k=1}^{\infty} \frac{1}{(k+2)\sqrt{k}+k\sqrt{k+2}} = \frac{\sqrt{a}+\sqrt{b}}{\sqrt{c}}$, where $a, b, c \in N$ and $a, b, c \in [1, 15]$, then a + b + c is equal to

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5. Consider the equation

$\log_{\sqrt{2}\sin x}(1+\cos x)=2, x \in \left[-\frac{\pi}{2}, \frac{3\pi}{2}\right]$.If the sum of the roots is $\frac{p\pi}{q}$, where G.C.D (p,q) = 1 then the value of $p^2+q^2$is

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