MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 4

Mathemetic Single Choice

1. The relation less than in the set of natural numbers is

A. only symmetric

B. only transitive

C. only reflexive

D. an equivalence relation

Answer: B

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2. If $I_1 = \int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$, $I_2 = \int_0^{\pi} x \sin^4 x dx$ then, $I_1 : I_2$ is equal to

A. $3:4$

B. $1:2$

C. $4:3$

D. $2:3$

Answer: C

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3. The roots of the equation $x^2 - 2\sqrt{3}x + 2 = 0$ represent two sides of a triangle. If the angle between them is $\frac{\pi}{3}$. , then the perimeter of the triangle is

A. $2\sqrt{3}$ units

B. $\sqrt{6}$ units

C. $2\sqrt{3} + \sqrt{6}$ units

D. $2\left(\sqrt{3} + \sqrt{6}\right)$ units

Answer: C

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4. At an election a voter may vote for any number of candidates, not greater than the number to be elected. There are 10

candidates and 4 are to be elected. If a voter for atleast one candidates, then the number of ways in which he can vote is

A. 6210

B. 385

C. 1110

D. 5040

Answer: B

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5. For any natural number m, evaulate,

$$\int \left(x^{3m}+x^{2m}+x^{m}\right)\left(2x^{2m}+3x^{m}+6\right)^{\frac{1}{m}}dx,\ x>0$$

A. $\frac{1}{6(m+1)}\left\{2x^{3m}+3x^{2m}+6x^{m}\right\}^{(1/m)+1}+C$

B. $\frac{1}{6m}\left\{2x^{3m}+3x^{2m}+6x^{m}\right\}^{(1/m)+1}+C$

C. $\frac{1}{6m}\left\{2x^{3m}+3x^{2m}+6x^{m}\right\}^{1/m}+C$

D. None of the above

Answer: A

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6. If $2(y-a)$ is the $H.M.$ between $y-x$ and $y-z$ then $x-a, y-a, z-a$ are in

A. arithmetic progression

B. geometri progression

C. harmonic progression

D. none of these

Answer: B

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7. Find the number of quadratic equations, which are unchanged by squaring their roots.

A. 2

B. 4

C. 6

D. 8

Answer: B

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8. If $\frac{1+3p}{3}, \frac{1-p}{4}, \frac{1-2p}{2}$ are the probabilities of 3 mutually exclusive events then find the set of all values of p.

A. $\frac{1}{3} \leq p \leq \frac{1}{2}$

B. $\frac{1}{4} \leq p \leq \frac{1}{2}$

C. $\frac{1}{3} \leq p \leq \frac{2}{3}$

D. $\frac{1}{3} \leq p \leq \frac{2}{5}$

Answer: A

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9. The function $f(x) = \sec\left[\log\left(x + \sqrt{1+x^2}\right)\right]$ is

A. an odd function

B. an even function

C. neither an odd nor an even function

D. a constant function

Answer: B

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10. The equation of the bisectors of the angles between the lines represented by the equation

$2(x+2)^2+3(x+2)(y-2)-2(y-2)^2=0$ is

A. $3x^2-8xy-3y^2-28x+4y+32=0$

B. $3x^2+8xy-3y^2+28x-4y+32=0$

C. $3x^2-8xy-3y^2+28x-4y+32=0$

D. $3x^2-8xy-3y^2+28x-4y-32=0$

Answer: C

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11. Let $\phi(x)$ be the inverse of the function $f(x)$ and $f' = \frac{1}{1+x^5}$, then $\frac{d}{dx}\phi(x)$ is

A. $\frac{1}{1+[\phi(x)]^5}$

B. $\frac{1}{1+[f(x)]^5}$

C. $1+[\phi(x)]^5$

D. $1+f(x)$

Answer: C

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12. The possible values of scalar k such that the matrix $A^{-1} - kI$ is singular where $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 1 & 0 & 0 \end{bmatrix}$, are

A. $\frac{-1}{2}, 2$

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

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

D. $-1, 1$

Answer: B

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13. The negation of $p \wedge (q \rightarrow \sim r)$ is

A. $p \wedge (q \wedge r)$

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

C. $p \vee (q \wedge r)$

D. $\sim p \vee (q \wedge r)$

Answer: D

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14. If

$1 + \sin\theta + \sin^2\theta + \sin^3\theta + \ldots \infty = 4 + 2\sqrt{3}, 0 < \theta < \pi, \theta \neq \frac{\pi}{2}$

then

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

B. $\theta = \frac{\pi}{6}$

C. $\theta = \frac{\pi}{3}$ or $\frac{\pi}{6}$

D. $\theta = \frac{\pi}{3}$ or $\frac{2\pi}{3}$

Answer: D

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15. The function $f(x) = \frac{1 - \sin x + \cos x}{1 + \sin x + \cos x}$ is not defined at $x = \pi$. The value of $f(\pi)$, so that f(x) is continuous at $x = \pi$, is

A. $-\frac{1}{2}$

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

C. -1

D. 1

Answer: C

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16. If $f(x) = 3x^4 + 4x^3 - 12x^2 + 12$, then f(x) is

A. increasing in $(-\infty, -2) \cup (0, 1)$

B. increasing in $(-2, 0) \cup (1, \infty)$

C. decreasing in $(-2, 0) \cup (0, 1)$

D. decreasing in $(-\infty, -2) \cup (1, \infty)$

Answer: B

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17. The complete solution set of the inequality $\cos^{-1}(\cos 4) > 3x^2 - 4x$ is

A. $\left(0, \frac{2 + \sqrt{6\pi - 8}}{3}\right)$

B. $\left(\frac{2-\sqrt{6\pi-8}}{3}, 0\right)$

C. $(-2, 2)$

D. $\left(\frac{2-\sqrt{6\pi-8}}{3}, \frac{2+\sqrt{6\pi-8}}{3}\right)$

Answer: D

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18. A ladder 5 m long leans against a vertical wall. The bottom of the ladder is 3m from the wall. If the bottom of the ladder is pulled 1 m farther from the wall, how much does the top of the ladder slide down the wall

A. 1 m

B. 4 m

C. 2 m

D. 3 m

Answer: A

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19. The area bounded by the curve $y = \frac{1}{2}x^2$, the X-axis and the lines x = 2 is

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

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

C. 1 sq unit

D. $\frac{4}{3}$ sq unit

Answer: D

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20. If $\left(1+x-2x^2\right)^6 = 1 + a_1x + a_2x^{12} + \ldots\ldots + a_{12}x^{12}$, then find the value of $a_2 + a_4 + a_6 + \ldots . + a_{12}$.

A. 31

B. 32

C. 64

D. 1024

Answer: A

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Mathemetic Subjective Numerical

1. Evaluate $\lim_{x \to 2} \frac{3^x + 3^{3-x} - 12}{3^{\frac{-x}{2}} - 3^{1-x}}$

A. 6

B. 18

C. 24

D. 36

Answer: D

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2. Consider a family of circles passing through two fixed points $S(3, 7)$ and $B(6, 5)$. If the common chords of the circle $x^2 + y^2 - 4x - 6y - 3 = 0$ and the members of the family of

circles pass through a fixed point (a,b), then find the values of a & b.

A. $a = 2, b = \frac{22}{3}$

B. $a = 3, b = \frac{22}{3}$

C. $a = 2, b = \frac{25}{3}$

D. $a = 1, b = \frac{17}{3}$

Answer: A

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3. P is a point on the parabola whose ordinate equals its abscissa. A normal is drawn to the parabola at P to meet it again at Q. If S is the focus of the parabola, then the product of the slopes of SP and SQ is

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4. If $z = \frac{1}{2}(\sqrt{3} - i)$ and the least positive integral value of n such that $\left(z^{101} + i^{109}\right)^{106} = z^n$ is k, then the value of $\frac{2}{5}k$ is equal to

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5. Find the angle between the pair of tangents from the point (1,2) to the ellipse $3x^2 + 2y^2 = 5$ from the point $(1, 2)$ is $\left|\tan^{-1}\left(\frac{12}{\sqrt{\lambda}}\right)\right|$, then the value of λ is

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