MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 110

Mathematics

1. If $|x| < 1$ then the value of $(1-7x)^{\frac{1}{3}}(1+2x)^{-\frac{3}{4}}$ is

A. $1+\frac{23}{6}x$

B. $1-\frac{23}{6}x$

C. $1-\frac{25}{6}x$

D. $1 + \frac{25}{6}x$

Answer: B

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2. Axis of a parabola is y = x and vertex and focus are at a distance $\sqrt{2}$ and $2\sqrt{2}$ respectively from the origin. Then equation of the parabola is

A. $(x - y)^2 = 8(x + y - 2)$

B. $(x + y)^2 = 2(x + y - 2)$

C. $(x - y)^2 = 4(x + y - 2)$

D. $(x + y)^2 = 2(x - y + 2)$

Answer: A

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3. The negation of the compound statement ~p V (p V (~q)) is

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

B. $(\sim p \wedge q) \vee p$

C. $(\sim p \wedge q) V \sim p$

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

Answer: A

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4. The determinant

$$\begin{vmatrix} xp+y & x & y \\ yp+z & y & z \\ 0 & xp+y & yp+z \end{vmatrix}$$ =0 if

A. x, y, z are in A. P

B. x, y, z are in G. P.

C. x, y, z are in H.P.

D. xy, yz, zx are in A. P

Answer: B

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5. The number of integral value(s) of x which satisfying the equation

$$\left|\log_4\left(2x^2-x\right)+\log_2\left(2-x^2\right)+x^2+2x+2\right|$$

$$=x^2+2x+2$$

$$+\left|\log_4\left(2x^2-x\right)\right|+\left|\log_2\left(2-x^2\right)\right|$$

A. 0

B. 1

C. 2

D. 4

Answer: C

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6. A = { x : x I $\neq$ x} represents

A. {O}

B. {}

C. {1}

D. {x}

Answer: B

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7. The coordinates of the foci for the hyperbola $9x^2 - 16y^2 = 144$ are

A. (5.0) and(-5,0)

B. (2,0)and(-2,0)

C. (4,0) and (-4, 0)

D. (1,0) and (-1,0)

Answer: A

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8. If the sum of first n terms of a G. P. is α and the sum of its first 2n terms is 5α :, then the sum of its first 3n

terms is

A. 10α

B. 15α

C. 21α

D. 25α

Answer: C

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9. If f (x) $> 0 \forall x \in$ R , f (3) = 0 and g(x) =f $\left(\tan^2 x - 2\right.$ tan x +4) , 0 $<$ x then $< \frac{\pi}{2}$ g(x) is increasing in the interval

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

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

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

D. $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

Answer: D

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10. Consider $\vec{r}, \vec{a}, \vec{b}$ and $\vec{c}$ are non-zero vectors such that $\vec{r}.Veca = 0\left|\vec{r} \times \vec{b}\right|$ then $= \left|\vec{r}\right|\left|\vec{b}\right|\left|\vec{r} \times \vec{c}\right| = \left|\vec{r}\right|\left|\vec{c}\right|\left[\vec{a}\,\vec{b}\,\vec{c}\right]$ is equal to

A. 2

B. 3

C. 4

D. 0

Answer: D

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11. For a positive integer m, if

$$\lim_{x \to \infty} \left(x^3 \mathrm{In} \left(\frac{x+1}{x} \right) + \frac{x}{2} - x^2 \right) = \frac{1}{m}$$. Then the value of m is

A. 1

B. 2

C. 3

D. 4

Answer: C

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12. Let f(X) = cos x , g(x) = $\begin{cases} \min. \{f(t) : 0 \leq t \leq x\}, & x \in [0,\pi] \\ \sin x - 1, & x > \pi \end{cases}$ then

A. g (x) is discontinuous at x = π

B. g (x) is continuous for x $\in (0, \infty)$

C. g (x) is differentiable at x = π

D. g (x) is differentiable for $x \geq 0$

Answer: B

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13. The value of the definite integral,

$\int_{\theta_1}^{\theta_2} \frac{d\theta}{1+\tan\theta} = \frac{501\pi}{K}$ where $\theta_2 = \frac{1003\pi}{2008}$ and $\theta_1 = \frac{\pi}{2008}$. Then value of K equals

A. 2007

B. 2006

C. 2009

D. 2008

Answer: D

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14. If equation of a circle is given by $r^2 - Br\left(\sqrt{3}\cos\theta + \sin\theta\right) + 15 = 0$ (where x = r cos θ , y = r sin θ), then the radius of the circle is

A. 8

B. 7

C. 6

D. 5

Answer: B

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15. The value of $\tan\frac{\pi}{18} + 2\tan\frac{7\pi}{18}$ is equal to

A. $\tan 80^\circ$

B. $\tan 60^\circ$

C. $\tan 50^\circ$

D. $\tan 30^\circ$

Answer: A

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16. The number of real values of the θ for equation $\cos^7\theta + \sin^4 = 1$ in $\theta \in [-\pi, \pi]$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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17. If $\cos\left(\cot^{-1}\left(\frac{1}{2}\right)\right)\cot\left(\cos^{-1}x\right)$ then a value of x is

A. $\frac{1}{\sqrt{6}}$

B. $\frac{-1}{\sqrt{12}}$

C. $\frac{2}{\sqrt{6}}$

D. $\frac{-2}{\sqrt{6}}$

Answer: A

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18. The average weight of three boys A, B & C is 54 $\frac{1}{3}$ kg, while the average weight of three boys B, D & E is 53 kg. Then the average weight of A, B, C, D & E is

A. 52.4 kg

B. 53.2 kg

C. 53.8 kg

D. Data inadequate

Answer: D

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19. The solution of the differential equation: $2\left(x^2\frac{dy}{dx}-xy\right)=1+\cos\frac{y}{x}$ is given by: (where c is arbitrary constant)

A. $\tan\frac{y}{2x}+\frac{1}{4x^2}=C$

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

C. $\tan\frac{y}{2x}+\frac{1}{8x^2}=C$

D. $\tan\frac{y}{x}+\frac{1}{4x^2}=C$

Answer: A

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20. For positive integer n, n^3 + 2n is always divisible by

A. 3

B. 7

C. 5

D. 6

Answer: A

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21. There are four balls of four different colours and four boxes of colours same as of these balls. Find the

number of ways to place the balls, one in each box not of it's colour.

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22. Let P be a non-singular matrix such that I+ P + $P^2 + \cdots + P^n$ = O (O denotes the null matrix) and $P^{-1} = P^{n\lambda}$, then find the value of λ

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23. A and B stand around a ring with 10 other people. If the probability that there are exactly 3 persons between A and B is m find $\frac{1}{m}$.

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24. If the point $\vec{a}$ is intersection of the lines $\vec{r} = 7\hat{i} + 10\hat{j} + 13\hat{k}$ and $+\lambda\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)\vec{r} = 3\hat{i} + 5\hat{j} + 7\hat{k} + \mu\left(\hat{i} + 2\hat{j} + 3\hat{k}\right)$ then find the value of $\vec{a}.\left(2\hat{i} - \hat{j} + \hat{k}\right)$.

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25. A complex number z satisfies arg $\left(\frac{z}{z-i}\right) = \frac{\pi}{3}$ and |z| = |z-i| then evaluate [Re (2z -i)] where [.] represents the greatest integer function

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26. Let f (x) = $\frac{x}{\frac{(1+x^n)^1}{n}} n \geq 2$

g(x)= $\left(\underbrace{fofo.... of}_{\text{n times}}\right)(x)$ and I (n,x) = f g(x) . x^{n-2} dx , If I (10,1) = $\frac{(p)^{\frac{m}{k}}}{q}$ then the value of 10 k - m - q + p =_____

(Given that G.C.D. (m, k) = 1))

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27. Let A(k) be the area bounded by the curves y = $x^2 - 3$ and y = kx + 2. If the range of A(k) is $[p, \infty)$, then find [p], where [] represents the greatest integer function.

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28. Let a, b, c be the roots of the equation

$x^4 + x^3 + x^2 + x + 1 = 0$. Let f(x) $= x^6 - 6x^2 + 6x + 7$ and g(x) $= px^2 + qx + r(p, q, r, \text{in} R, pIf \text{ne } `0)$.

f(a) = g (a) , f(b) = g (b) and f(c) = g (c) , then the maximum value of g(x) is

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