MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 64

Mathematics

1. In a ΔABC vertex A and B lies on 2 - axis and y -axis respectively, where A(a,0) is a fixed point, B is a variable point such that $\angle C = \frac{\tan^{-1} 4}{3}$ and AC = BC, then locus of C

A. $2x - 4y + 3a = 0$

B. $4x + 2y - 3a = 0$

C. $2x + 4y + 7a = 0$

D. $4x - 2y + 5a = 0$

Answer: A

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2. If $\left|\frac{a, a^2, 1+a^3}{b, b^2, 1+b^3}, \left(c, c^2, 1+c^3\right)\right| = 0$ and the vectors $\vec{A} = \left(1, a, a^2\right), \vec{B} = \left(1, b, b^2\right), \vec{C}$ non = $\left(1, c, c^2\right)$ coplanar then the product abc =

A. 0

B. 1

C. -1

D. None

Answer: C

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3. The sum of values of r for which

$^{18}C_{r-2} + 2.\ ^{18}C_{r-1} + {}^{18}C_r \geq {}^{20}C_{13}$

A. 40

B. 50

C. 60

D. 70

Answer: D

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4. $^{14}C_7 + \sum_{i=1}^{3} = {}^{17-i}C_6 =$

A. $^{16}C_7$

B. $^{17}C_7$

C. $^{17}C_8$

D. ${}^{16}C_8$

Answer: B

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5. The relation R defined as $R = \{(x, y)|x + y| = 10, x, y \in N\}$ is

A. reflexive only

B. symmetric only

C. transitive only

D. symmetric and transitive

Answer: B

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6. A straight line PQ touches ellipse $\frac{x^2}{(3)^2}+\frac{y^2}{(1)^2}=1$ and circle $x^2+y^2=4$. RS is a focal chord of ellipse. If RS is parallel to PQ and RS meets the circle at points R' and S', then the length of R' S' is

A. 1 unit

B. 2 unit

C. 3 unit

D. 4 unit

Answer: B

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7. A parabola is drawn through two given points A (2, 0) and B(-2, 0) such that its directrix always touch the circle $x^2+y^2=16$, then locus of focus of the parabola is

A. $3x^2+4y^2=48$

B. $4x^2 + 3y^2 = 48$

C. $3x^2 + 4y^2 = 60$

D. $4x^2 + 3y^2 = 60$

Answer: A

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8. The acute angle between two lines such that the direction cosines l, m, n, of each of them satisfy the equations $l + m + n = 0$ and $l^2 + m^2 - n^2 = 0$ is:

A. 15°

B. 30°

C. 60°

D. 45°

Answer: C

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9. Let $\vec{a} = \alpha\hat{i} + 2\hat{j} - 3\hat{k}$, $\vec{b} = \hat{i} + 2\alpha\hat{j} - 2\hat{k}$ and $\vec{c} = 2\hat{i} - \alpha\hat{j} + \hat{k}$ where $a \in R$ if $\left\{\left(\vec{a} \times \vec{b}\right) \times \left(\vec{b} \times \vec{c}\right)\right\} \times \left(\vec{c} \times \vec{a}\right) = 0$ then the value of α is

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

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

C. $\frac{3}{4}$

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

Answer: A

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10. If $\lim_{x \to 0} \frac{(4x-1)^{\frac{1}{3}} + a + bx}{x}$ exists and is equal to $\frac{1}{3}$ then ab =

A. 1

B. $1/2$

C. -1

D. $-1/2$

Answer: C

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11. The differential equation of the family of curves represented by $c(y+c)^2 = x^3$ is

A. $y\frac{d^2y}{dx^2} - y^2\left(\frac{dy}{dx}\right)^2 = 27x$

B. $12y\left(\frac{dy}{dx}\right)^2 = 8x\left(\frac{dy}{dx}\right)^3 - 27x$

C. $8y\left(\frac{dy}{dx}\right)^3 = 12x\left(\frac{dy}{dx}\right)^2 - 27x$

D. $\left(\frac{dy}{dx}\right)^3 - \left(\frac{dy}{dx}\right)^2 + \left(\frac{dy}{dx}\right) - y = 27x$

Answer: B

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12. $\int \frac{1-\cos x-x\sin x}{x^2+1-2x\sin x}dx = \tan^{-1}(f(x))+c$ the $f(n)$ is

A. continuous at x = 0

B. an odd function

C. an even function

D. $f\left(\frac{\pi}{2}\right)=1$

Answer: B

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13. If p, q, and r are the statements and $(p \wedge q) \wedge (q \wedge r)$ is true, then

A. p, q, r are all true

B. p,q are false and r is true

C. p,q are true and r is false

D. p, q, r are all false

Answer: A

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14. If marks scored by students of a class are $1, 2, 4, \ldots\ldots 2^{10}$ with frequency $1, 2, 3, 4\ldots\ldots 11$ then median is

A. 128

B. 64

C. 32

D. 16

Answer: A

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15. The least value of n for which $(n-2)x^2 + 8x + (n+4) > \sin^{-1}(\sin 12) + \cos^{-1}(\cos 12)\, \forall x \in R(n \in N$

is

A. 4

B. 5

C. 6

D. 7

Answer: B

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16. The point $\left(\frac{1}{e}, \frac{1}{e'}\right)$ lies on, if e and el are the eccentricities of the hyperbola

$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$

A. $x^2 + y^2 = 1$

B. $x^2 + y^2 = 2$

C. $x^2 + y^2 = 3$

D. $x^2 + y^2 = 4$

Answer: A

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17. The value of $\sin^2 \alpha + \sin\left(\frac{\pi}{3} - \alpha\right) \cdot \sin\left(\frac{\pi}{3} + \alpha\right)$ is equal to

A. $\frac{1}{4}$

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

C. $\frac{3}{4}$

D. 1

Answer: C

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18. A ten digit number is formed (without repetition), the probability that the difference of the digits at equal distances from the begining and the end is always 1 is ?

A. $\frac{17}{1944}$

B. $\frac{4}{27}$

C. $\frac{1}{945}$

D. $\frac{34}{243}$

Answer: C

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19. The area enclosed by $y = g(x), x = -3, x = 5$and x-axis where g(x) is the inverse of $f(x) = x^3 + 3x + 1$is

A. $\frac{5}{2}$

B. 3

C. $\frac{7}{2}$

D. $\frac{9}{2}$

Answer: D

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20. The upper $\left(\frac{3}{4}\right)^{th}$ portion of a vertical pole subtends an angle $\tan^{-1}\left(\frac{3}{5}\right)$ at a point in the horizontal plane through its foot and at a distance 40 m from the foot. The height of vertical pole is :

A. 20 m

B. 40 m

C. 60 m

D. 80 m

Answer: B

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21. Suppose P be the 7^{th} term from the beginning and Q be the 7^{th} term from the end in the expansion of $\left(\sqrt[3]{3}+\frac{1}{\sqrt[3]{4}}\right)^{n}$ where $n \in N$. If $\frac{Q}{P}=12$, then what will be the possible value of n.

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22. If the roots of the equation $x^2-5x+1=0$ are α and β, then the value of $\frac{1}{(\alpha-5)^2}+\frac{1}{(\beta-5)^2}$ is

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23. If two opposite vertices of a rectangle are (2,5) and (5,1) and the other two vertices points are on the straight line $y=2x+k$, then the absolute value of k is

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24. A 5.5 ft tall man walks at a speed 5.4 ft /s towards a lamp post (height = 22 ft). At what rate the shadow is moving (take absolute value) in ft/s ?

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25. Let $f(x)$ and $g(x)$ are two functions of degree 4 such that $g(\alpha) = g'(\alpha) = g''(\alpha) = 0$. If $\lim_{x \to \alpha} \frac{f(x)}{g(x)} = 0$, then the number of different real solutions of equation $\frac{d}{dx}(f(x)g(x)) = 0$is equal to

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26. The fundamental period of a function f, defined as $f(x) = \frac{1}{2}\left(\frac{|\sin x|}{\cos x} + \frac{\sin x}{|\cos x|}\right)$ is $m\pi$ then find the value of m.

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

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