MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 83

Mathematics

1. The last two digits of the number $(23)^{14}$ are 01 b. 03 c. 09 d. none of these

A. 01

B. 03

C. 09

D. 17

Answer: C

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2. Let $\vec{a}$ and $\vec{b}$ are unit vectors such that $\left|\vec{a}+\vec{b}\right|=\frac{3}{2}$, then the value of $\left(2\vec{a}+7\vec{b}\right).\left(4\vec{a}+3\vec{b}+2020\vec{a}\times\vec{b}\right)$ is equal to

A. $\frac{133}{4}$

B. 133

C. 30

D. 120

Answer: A

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3. Set of all the vectors of x saltsfying the inequality $\sqrt{x^2-7x+6}>x+2$ is

A. $x\in\left(-\infty,\frac{2}{11}\right)$

B. $x \in \left(\frac{2}{11}, \infty\right)$

C. $x \in (-\infty, 1] \cup [6, \infty)$

D. $x \in [6, \infty)$

Answer: A

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4. If the value of of the integral $I = \int_0^{2\pi} sgn(e^x)dx$ is equal to $k\pi$, then the smallest prime number greatest than 2k is (where, sgn (x) represents the signum functiono f x)

A. 3

B. 5

C. 7

D. 11

Answer: B

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5. Let A lies on $3x - 4y + 1 = 0$, B lies on $4x + 3y - 7 = 0$ and C is $(-2, 5)$. If ABCD is a rhombus, then the locus of D is a conic whose length of the latus rectum is equal to

A. 10 units

B. 15 units

C. 5 units

D. 20 units

Answer: A

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6. If $f(x) = \frac{x}{x-1}$, then the points of discontinuity of the function $f^{15}(x)$, where $f^n = fof.....of$ (n times), are

A. $x = 2, 1$

B. $x = 0, 1$

C. $x = 1, 2, 0$

D. continuous everywhere except x = 1

Answer: D

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7. All the students of a class performed poorly in physics. The teacher decided to give grace marks of 15 to the entire class. Which of the following statistical measures will not change even after the grace marks were given?

A. median

B. mode

C. variance

D. mean

Answer: C

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8. Two vertical poles AL and BM of height 4 m and 16 m respectively stand apart on a horizontal plane. If A, B be the feet of the poles and AM and BL intersect at P, then the height of P from the horizontal plane is equal to

A. 3.2 m

B. 2.5 m

C. 4 m

D. 8 m

Answer: A

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9. Let $A = \begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$ where $a, b \in N$. The number of matrices B such that $AB = BA$, is equal to

A. 0

B. 1

C. 2

D. infinite

Answer: D

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10. A line makes an angle θ with the x-axis and the y-axis. If it makes an angle α with the z - axis such that $\sin^2 \alpha = 3 \sin^2 \theta$, then $\cos^2 \theta$ is equal to

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

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

C. $\frac{3}{5}$

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

Answer: C

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11. The number of ways in which the letters of the word 'ARRANGE' can be arranged so that two A's are together is

A. 160

B. 200

C. 360

D. 900

Answer: C

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12. When two dice are thrown n number of times, the probability of getting a doublet atleast once in greater than $80\,\%$ and the least value of n is λ, then the value of λ is equal to

A. 62

B. 71

C. 80

D. 91

Answer: D

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13. Consider the integrals $I_1 = \int e^{x^2} \cos x dx$ and $I_2 = \int x e^{x^2} \sin x dx$. Then $I_1 + 2I_2$ simplifies to (Where, c is the constant of integration)

A. $e^x \sin x + c$

B. $e^{x^2} \cos x + c$

C. $2e^{x^2}\sin x + c$

D. $e^{x^2}\sin x + c$

Answer: D

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14. If

$$\frac{\sin^3\theta - \cos^3\theta}{\sin\theta - \cos\theta} - \frac{\cos\theta}{\sqrt{1+\cot^2\theta}} - 2\tan\theta\cot\theta = -1(\forall\theta \in [0, 2\pi],$$

then

A. $\theta \in \left(0, \frac{\pi}{2}\right) - \left\{\frac{\pi}{4}\right\}$

B. $\theta \in \left(\frac{\pi}{2}, \pi\right) - \left\{\frac{3\pi}{4}\right\}$

C. $\theta \in \left(\pi, \frac{3\pi}{2}\right) - \left\{\frac{5\pi}{4}\right\}$

D. $\theta \in (0, \pi) - \left\{\frac{\pi}{4}, \frac{\pi}{2}\right\}$

Answer: D

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15. The area bounded by $y + x^2 \leq 4x$ and $y \geq 3$ is k sq. units, then 3k is equal to

A. 2

B. 4

C. 6

D. 8

Answer: B

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16. The solution of the differential equation $2\sqrt{x}e^{\sqrt{x}}dy + e^{\sqrt{x}}ydx = \sqrt{x}\sin x dx$ is (where, c is arbitrary constant)

A. $2ye^{\sqrt{x}} + \sin x = c$

B. $y\sin x = e^{\sqrt{x}} + c$

C. $ye^{\sqrt{x}} + \sin x = c$

D. $2ye^{\sqrt{x}} + \cos x = c$

Answer: D

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17. The sum of all the values of λ for which the set $\{(x, y) : x^2 + y^2 - 6x + 4y = 12\} \cap \{(x, y) : 4x + 3y\lambda\}$ contains exactly one element is

A. 31

B. -31

C. 12

D. -19

Answer: C

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18. The range of the function $f(x) = \frac{\tan(\pi[x+1])}{x^4+1}$ (where, $[.]$ is the greatest integer function) is

A. $[0, 1]$

B. $[-1, 1]$

C. $\{0\}$

D. $(-\infty, \infty)$

Answer: C

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19. From a point on the line $x - y + 2 - 0$ tangents are drawn to the hyperbola $\frac{x^2}{6} - \frac{y^2}{2} = 1$ such that the chord of contact passes through a fixed point (λ, μ). Then, $\mu - \lambda$ is equal to

A. 2

B. 3

C. 4

D. 5

Answer: A

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20. Let $\omega(\omega \neq 1)$ is a cube root of unity, such that $\left(1+\omega^2\right)^8 = a + b\omega$ where a, b in R, then $|a+b|$ is equal to

A. 1

B. 3

C. 0

D. 2

Answer: D

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21. For the series $S = 1 + \frac{1}{(1+3)}(1+2)^2 + \frac{1}{(1+3+5)}(1+2+3)^2 + \frac{1}{(1+3+5+7)}($ if the 7^{th} term is K, then $\frac{K}{4}$ is equal to

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22. The value of $\lim_{x \to 2} \Sigma_{r=1}^{7} \frac{x^r - 2^r}{2r(x-2)}$ is equal to

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23. If $f(\theta) = \begin{vmatrix} \cos^2\theta & \cos\theta\sin\theta & -\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta & \cos\theta \\ \sin\theta & -\cos\theta & 0 \end{vmatrix}$ then, $f\left(\frac{\pi}{6}\right) + f\left(\frac{\pi}{3}\right) + f\left(\frac{\pi}{2}\right) + f\left(\frac{2\pi}{3}\right) + f\left(\frac{5\pi}{6}\right) + f(\pi) + \ldots\ldots + f\left(\frac{53\pi}{6}\right.$ is equal to

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24. The minimum possible distnace between the points $A(a, a-1)$ and $B\left(b, b^2+b+1\right) \forall a, b \in R$ is D units, then the value of D^2 is

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25. Let $2a+2b+c=0, l_1$ and l_2 are straight lines of the family $ax+by+c=0$ which are at 1 unit distance from the point (1, 1), then the area (in sq. units) bounded by l_1, l_2 and coordinate axes is

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