MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 65

Mathematics

1. The last three digits of 17^{256} are:

A. 680

B. 681

C. 689

D. None of these

Answer: B

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2. The area (in sq unit) of the triangle whose vertices are complex numbers $z, iz, z + iz$, the Argand diagram is:

A. $2|z|^2$

B. $\frac{|z|^2}{2}$

C. $4|z|^2$

D. $|z|^2$

Answer: B

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3. If $a_1b_1c_1$, $a_2b_2c_2$ and $a_3b_3c_3$ are 3 digit even natural numbers and $\Delta = \begin{vmatrix} c_1 & a_1 & b_1 \\ c_2 & a_2 & b_2 \\ c_3 & a_3 & b_3 \end{vmatrix}$, then

Δ is:

A. divisible by 2 but not necessarily by 4

B. divisible by 4 but not necessarily by 8

C. divisible by 8

D. none of these

Answer: A

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4. Consider two positive numbers a and b. If arithmetic mean of a and exceeds their geometric mean by -and geometric mean of a and 6 exceeds their harmonic mean by $\frac{6}{5}$, then the absolute value of $\left(a^2 - b^2\right)$ is equal to :

A. 153

B. 135

C. 154

D. 136

Answer: B

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5. Let S be the relation on N defined by:

$S = \left\{(x, y) : \frac{y}{2} \leq x \leq 2y\right\}$. Then S is:

A. reflexive only

B. transitive only

C. symmetric only

D. reflexive and symmetric

Answer: D

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6. The locus of the middle point of the chord of the circle $\hat{}\ x2 + y^2 - 12x + 4y + 4 = 0$, that subtends an angle $\frac{2\pi}{3}$ at the centre is:

A. $x^2 + y^2 - 12x + 4y + 30 = 0$

B. $x^2 + y^2 - 12x + 4y + 31 = 0$

C. $x^2 + y^2 + 12x + 4y + 31 = 0$

D. $x^2 + y^2 + 12x + 4y + 30 = 0$

Answer: B

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7. The equation of tangent to the parabola $y^2 = 4x + 5$ which is parallel to the line $y = 2x + 7$ is:

A. $y = 2x + 3$

B. $y = 2x + 4$

C. $y = 2x + 5$

D. y = 2x + 1`

Answer: A

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8. If the lines $\vec{r} = -\hat{i} + \hat{j} - \hat{k} + \lambda\left(2\hat{i} + \hat{j} + 3\hat{k}\right)$ and $\vec{r} = -2\hat{i} + \alpha\hat{j} + \hat{k} + \mu\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)$, are $(\lambda, \mu \in R)$ coplanar, then the value of α, is:

A. $-9/2$

B. $11/2$

C. $-11/2$

D. $15/2$

Answer: D

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9. If a vector $\vec{r}$ of magnitude $3\sqrt{6}$ is directed along the bisector of the angle between the vectors $\vec{a} = 7\hat{i} - 4\hat{j} - 4\hat{k}$ and $\vec{b} = -2\hat{i} - \hat{j} + 2\hat{k}$ then $\vec{r}$

A. $\hat{i} - 7\hat{j} + 2\hat{k}$

B. $\hat{i} + 7\hat{j} - 2\hat{k}$

C. $-\hat{i} + 7\hat{j} + 2\hat{k}$

D. $\hat{i} - 7\hat{j} - 2\hat{k}$

Answer: A

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10. If $y = \frac{\sin^{-1}(2x)}{1+x^2}$, then which of the following is not correct ?

A. $\frac{dy}{dx} = \frac{2}{1+x^2}$ for $|x| < 1$

B. $\frac{dy}{dx} = -\frac{2}{1+x^2}$ for $|x| > 1$

C. $\frac{dy}{dx} = 2$ for $|x| > 1$

D. $\frac{dy}{dx}$ does not exist at $|x| = 1$

Answer: C

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11. If $f(x) = \sqrt{1-\sqrt{1-x^2}}$, then at x = 0

A. f(x) is differentiable as well as continuous

B. f(x) is differentiable but not continuous

C. f(x) is continuous but not differentiable

D. f(x) is neither continuous nor differentiable

Answer: C

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12. The population of a country increases at the rate proportional to the number of inhabitants. Given that the population of country doubles in 30 years, then in how many years population of country will triple, (given that In2 = 0.6931, ln3 = 1.0986)

A. 30 years

B. 45 years

C. 48 years

D. 54 years

Answer: C

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13. $\int \frac{x^2-2}{x^3\sqrt{x^2-1}}$ dx is equal to:

A. $\frac{x^2}{\sqrt{x^2-1}}+C$

B. $-\frac{x^2}{\sqrt{x^2-1}}+C$

C. $\frac{\sqrt{x^2-1}}{x^2}+C$

D. $-\frac{\sqrt{x^2-1}}{x^2}+C$

Answer: D

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14. Slope of normal to the ellipse at a point P is $\frac{3}{4}$ and eccentricity of ellipse is $\frac{1}{3}$. If this normal makes acute angle 'ft' with its focal chord through P, then $\sin\beta$ is:

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

B. $\frac{3}{10}$

C. $\frac{1}{5}$

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

Answer: C

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15. If $\alpha + \sin\beta = 2018, \alpha + 2018\cos\beta = 2017, \beta$, then $\in \left(0, \frac{\pi}{2}\right]$, value of $[\alpha + \beta]$ is (where [.] denotes greatest integer function)

A. 2016

B. 2017

C. 2018

D. 2020

Answer: C

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16. The values of $\tan^{-1}\left(\frac{9}{19}\right)+\tan^{-1}\left(\frac{9}{49}\right)+\tan^{-1}\left(\frac{9}{97}\right)$ equals $+\tan^{-1}\left(\frac{9}{163}\right)+\ldots Infty$

A. $\tan^{-1}(3)$

B. $\tan^{-1}\left(\frac{1}{3}\right)$

C. $\tan^{-1}\left(\frac{2}{3}\right)$

D. $\tan^{-1}\left(\frac{3}{2}\right)$

Answer: D

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17. If from a pack of 52 well shuffled cards, cards are drawn one by one without replacement and the third card is found to be ACE. What is the probability that first two cards are not ACESS ?

A. $\frac{260}{329}$

B. $\frac{376}{425}$

C. $\frac{161}{329}$

D. None of these

Answer: B

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18. Let $f(x) = g(1)x^2 + xg'(x) + g''(x)$ and $g(x) = x^2 + xf'(1) + f''(2)$, then area bounded by $y = g(x)$ and x-axis is:

A. 9

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

C. $\frac{27}{2}$

D. 27

Answer: B

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19. The mean and median of 100 items are 50 and 52 respectively with largest item 100. It

was later found that largest item is 110 and not 100. The true mean and median are:

A. 50,10,51,5

B. 50,10,52

C. 50, 51.2

D. None of these

Answer: B

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20. Which of the following is equivalent to $p \vee -(p \rightarrow q)$, where p & q are any two statements ?

A. $p \wedge q$

B. p

C. $p \vee \sim q$

D. $\sim q \vee q$

Answer: B

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21. A possible value of for which the system of equations

$2x - 3y + 6z - 5t = 3, y - 4z + t = 1$ &

$4x - 5y + 8z - 9t = k$ has infinite number of solutions is:

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22. If P_n denotes the product of all the coefficient in the expansion of $(1 + x)^n$ and $9!$. $P_{n+1} = 10^9 P_n$, then n is equal to $(n \in N)$

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23. If a and £ are the roots of the quadratic equation. $x^2 - a(x+1) - b = 0$, then the value of $\frac{\alpha^2 + 2\alpha + 1}{\alpha^2 + 2\alpha + b} + \frac{\beta^2 + 2\beta + 1}{\beta^2 + 2\beta + b}$ is:

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24. The tangent at a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ meets one of its directrices in F. If PF subtends an angle 6 at the corresponding focus, then $\frac{\theta}{2\pi}$ is equal to:

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25. If the angle between the line joining the points (3, -1) & (4, -2) and x - axis is θ, then value of $\frac{\theta}{15}$ (in degree) is:

$\theta \in [0^\circ, 180^\circ]$

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26. Consider the curve $\frac{4}{\cos x + \frac{1}{1-\cos x}}$, where $x \in \left(-\frac{\pi}{2}, 0\right) \cup \left(0, \frac{\pi}{2}\right)$. The value of $a \in R$

for which the line y = a and the given curve has only one solution is:

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27. The value of $\lim_{x \to \infty} \left(\sqrt{3x^2 + \sqrt{3x^2 + \sqrt{3x^2}}} - \sqrt{3x^2} \right)$ is:

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28. If $\int_0^{\pi} (|\cos x|)^3 dx = \frac{k+1}{k}$, where $k > 0$, then the value of k is:

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29. If a, b, c and d are four numbers in the interval $[0, \pi]$ such that sina + 7sinb = 4 (sin c+ 2sind) and cosa + 7cos b = 4(cos c + 2 cosd), then numerical value of $\frac{7\cos(b-c)}{\cos(a-d)}$ is:

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30. If $f(x) = x^3 - x$ and $\phi(x) = \sin 2x$, then find the valu of $\left|2f\left(\phi\left(\frac{\pi}{2}\right)\right)\right|$

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