MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 30

Mathematics

1. The number of solutions of the equation $z^3 + \frac{3(\bar{z})^2}{|z|} = 0$ (where, z is a complex number) are

A. 2

B. 3

C. 6

D. 5

Answer: D

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2. If $f(x) = \left(x^3 + x + 1\right)\tan(\pi[x])$ (where, $[x]$ represents the greatest integer part of x), then

A. domain of f(x) is $R - (2n+1)\frac{\pi}{2}, n \in I$

B. range of $f(x) \in R$

C. $f(x)$ is an even function

D. $f(x)$ is a non - periodic function

Answer: C

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3. A five digit number is chosen at random. The probability that all the digits are distinct and digits at odd places are odd and digits at even places are even, is

A. $.^5P_2 \times \frac{.^5P_3}{9 \times 10^4}$

B. $\frac{.^5P_2 \times .^5P_3}{10^5}$

C. $\frac{.^5C_2 \times .^5C_3 \times 2}{10^4 \times 9}$

D. $\frac{.^5C_2 \times .^5C_3}{9 \times 10^4}$

Answer: A

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4. The length of the focal chord of the parabola $y^2 = 4x$ at a distance of 0.4 units from the origin is

A. 22 units

B. 23 units

C. 24 units

D. 25 units

Answer: D

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5. If p, q, r in N, then the number of points having position vector $p\hat{i}+q\hat{j}+r\hat{k}$ such that $8 \leq p+q+r \leq 12$ are

A. 110

B. 185

C. 144

D. 108

Answer: B

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6. Let α, β and γ be the roots of the equation $x^3 + 6x^2 - px - 42 = 0$. If α, β and γ are in arithmetic progression then $|\alpha| + |\beta| + |\gamma| =$

A. 10

B. 11

C. 12

D. 13

Answer: C

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7. The solution of the differential equation $\frac{ydx - xdy}{xy} = xdx + ydy$ is (where, C is an arbitrary constant)

A. $\frac{x}{y} = x + y + C$

B. $\frac{x}{y} = \frac{x^2 + y^2}{2} + c$

C. $\ln\left(\frac{x}{y}\right) = x^2 + y^2 + C$

D. $2\ln\left(\frac{x}{y}\right) = x^2 + y^2 + C$

Answer: D

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8. If a circle drawn by assuming a chord parallel to the transverse axis of hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ as diameter always pases through (2, 0), then

A. $|a| = |b| = 2$

B. $|b| \neq |a|$

C. $|b| = |a| = 1$

D. $|b| = |a| = 3$

Answer: A

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9. If A is a square matrix of order 2×2 and $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, such that $AB = BA$, then A can be

A. $\begin{bmatrix} 1 & 4 \\ 6 & 7 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 4 \\ 7 & 6 \end{bmatrix}$

C. $\begin{bmatrix} 2 & 2 \\ 2 & 4 \end{bmatrix}$

D. $\begin{bmatrix} 3 & 4 \\ 4 & 9 \end{bmatrix}$

Answer: A

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10. Let $\oplus$ and $\otimes$ are two mathematical operators. If $p \oplus (p \otimes q)$ is not a tautology, then $\oplus$ and $\otimes$ can be

A. $\vee$ and $\Rightarrow$ respectively

B. $\Rightarrow$ and $\wedge$ respectively

C. $\Rightarrow$ and $\vee$ respectively

D. None of these

Answer: B

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11. The coefficient of x^{10} in the expansion of $(1+x)^{15}+(1+x)^{16}+(1+x)^{17}+\ldots+(1+x)^{30}$

A. $.^{31}C_{10}-^{15}C_{10}$

B. $.^{31}C_{11}-^{15}C_{11}$

C. $.^{30}C_{10} - ^{15}C_{10}$

D. $.^{31}C_{10} - ^{14}C_{11}$

Answer: B

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12. A vector $\vec{r}$ is equally inclined with the vectors $\vec{a} = \cos\theta\hat{i} + \sin\theta\hat{j}$, $\vec{b} = -\sin\theta\hat{i} + \cos\theta\hat{j}$ and $\vec{c} = \hat{k}$, then the angle between $\vec{r}$ and $\vec{a}$ is

A. $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

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

C. $\cos^{-1}\left(\frac{1}{\sqrt{3}}\right)$

D. $\cos^{-1}.\frac{1}{2}$

Answer: C

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13. Let $f(x)$ be a non - constant polynomial such that $f(a) = f(b) = f(c) = 2$. Then the minimum number of roots of the equation $f''(x) = 0$ in $x \in (a, c)$ is/are

A. 2

B. 1

C. 0

D. 3

Answer: B

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14. Let the incentre of ΔABC is I(2, 5). If $A = (1, 13)$ and $B = (-4, 1)$, then the coordinates of C are

A. $(1, 10)$

B. $(10, 1)$

C. $(8, 2)$

D. $(9, 2)$

Answer: B

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15. Lying in the plane $x + y + z = 6$ is a line L passing through (1, 2, 3) and perpendicular to the line of intersection of planes $x + y + z = 6$ and $2x - y + z = 4$, then the equation of L is

A. $\frac{x-1}{4}=\frac{y-2}{-7}=\frac{z-3}{3}$

B. $\frac{x-1}{2}\frac{y-2}{1}=\frac{z-3}{-3}$

C. $\frac{x-1}{4}=\frac{y-2}{-5}=\frac{z-3}{1}$

D. $\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-3}{-4}$

Answer: C

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16. Let PQ and RS be tangents at the extremities of the diameter PR of a circle of radius r. If PS and RQ intersect at a point X on the circumference of the circle, then 2r equals

A. $\sqrt{PQ.\,RS}$

B. $\frac{PQ+RS}{2}$

C. $\frac{2PQ.\,RS}{PQ+RS}$

D. $\sqrt{\frac{PQ^2+RS^2}{2}}$

Answer: A

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17. Let A and B are two matrices of order 3×3, where $|A|=-2$ and $|B|=2$, then $\left|A^{-1}adj\left(B^{-1}\right)adj\left(2A^{-1}\right)\right|$ is equal to

A. 2

B. -2

C. 4

D. 8

Answer: B

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18. The sum to infinite terms of the arithmetic - gemoetric progression $3, 4, 4, \frac{32}{9}, \ldots\ldots$ is equal to

A. 27

B. 30

C. 24

D. 25

Answer: A

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19. The value of $\int_{-1}^{1}\left(\sin^{-1}x+\frac{x^5+x^3-1}{\cos x}\right)dx$ is equal to

A. $\tan 1$

B. 0

C. $2\tan 1$

D. $-2\tan 1$

Answer: D

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20. If $E = \cos^2 71^\circ + \cos^2 49^\circ + \cos 71^\circ \cos 49^\circ$, then the value of 10E is equal to

A. 7.5

B. 2.5

C. 3.5

D. 4.5

Answer: A

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21. If $x = 3\cos t$ and $y = 5\sin t$, where t is a parameter, then $9\frac{d^2y}{dx^2}$ at $t = -\frac{\pi}{6}$ is equal to

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22. The area (in sq. units) of the region bounded by the curves $y = 2 - x^2$ and $y = |x|$ is k, then the value of 3k is

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23. A number equal to 2 times the mean and with a frequency equal to k is inserted in a data having n observation. If the new mean is $\frac{4}{3}$ times the old mean, then the value of $\frac{k}{n}$ is

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24. If $f(x) = \begin{cases} \frac{\sqrt{x}}{\sqrt{4+\sqrt{x}}-a} & x > 0 \\ c & x = 0 \\ \frac{4e^{\frac{2}{x}}+3e^{\frac{1}{x}}}{e^{\frac{2}{x}}+be^{\frac{1}{x}}} & x < 0 \end{cases}$

continuous at x = 0 for some constants a, b and c, then the value of $\frac{50b}{a}$ is equal to

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25. The integral $I = \int \left(\sin\left(x^2\right) + 2x^2\cos\left(x^2\right)\right)dx$ (where $= xh(x) + c$, C is the constant of integration). If the range of $H(x)$ is $[a, b]$, then the value of $a + 2b$ is equal to

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