MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 60

Mathematics

1. The product of the real of the roots of $z^2 - z = 5 - 5i$ is

A. -25

B. -6

C. -5

D. 25

Answer: B

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2. If α, β are roots of equation $ax^2 + bx + c = 0$ then the system of equation

$x + y\cos(\beta - \alpha) + z\cos\alpha = 0,$

$x\cos(\alpha - \beta) + y + z\cos\beta = 0$ and $x\cos\alpha + y\cos\beta + z = 0$ has

A. only trivial solution

B. has no trivial solution

C. unique solution

D. exactly 3 solution

Answer: B

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3. If $\sum_{\alpha=4}^{x+3}(\alpha - 3) = Ax^2 + Bx + C$, then A+B-C is equal to ?

A. 2

B. 4

C. 8

D. 12

Answer: B

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4. A normal to the hyperbola $\frac{x^2}{4} - \frac{y^2}{1} = 1$, has equal intercepts on positive x and y -axes. If this normal touchs the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, then $3\left(a^2 + b^2\right)$ is equal to

A. 5

B. 25

C. 16

D. None of these

Answer: B

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5. A point is found such that the two tangents from it to the parabola $y^2 = 4ax$ will be normals to the parabola $x^2 = 4by$. Then least integral value of $\frac{a^2}{b^2}$ is

A. 9

B. 8

C. 7

D. 10

Answer: A

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6. The lines $lx + my + j = 0, mx + ny + l = 0$ and $nx + ly + m = 0$ are concurrent if

A. $l - m - n = 0$

B. $l + m - n = 0$

C. $l - m + n = 0$

D. $l^2 + m^2 + n^2 = lm + mn + nl$

Answer: D

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7. The angleof intersection of curves $Y = [|\sin x| + |\cos x|]$ and $x^2 + y^2 = 5,$ where [.] denotes the greatest integer function is

A. $\tan^{-1} 2$

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

C. $\tan^{-1}(\sqrt{2})$

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

Answer: A

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8. The equation of the image of the plane $x - 2y + 2z - 3 = 0$ in the plane $x + y + z + 1 = 0$ is

A. $x - 8y + 4z - 7 = 0$

B. $x - 8y + 4z - 11 = 0$

C. $x + 8y - 4z - 7 = 0$

D. $x + 8y - 4z - 11 = 0$

Answer: B

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9. Let f be a differentiable function on R and satisfying

$f(x) = -\left(x^2 - x + 1\right)e^x + .$ If $\int_0^x e^{x-y} f'(y)dy$

$f(1) + f'(1) = ke$, where $k \in N$ then is equal to

A. 0

B. 3

C. 5

D. 4

Answer: D

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10. The limit $\lim_{x \to \infty} \frac{\sum_{r=1}^{2018} (x+r)^{2019}}{\prod_{r=1}^{2019} (x+r)}$

A. does not exist

B. exists and equal to 0

C. exists and in non zero finite number

D. None of these

Answer: C

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11. If y(t) satisfies the differential equation $y'(t) + 2y(t) = 2e^{-2t}$, $y(0) = 2$, then y(1) equals

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

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

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

D. $\frac{4}{e^2}$

Answer: D

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12. $\int \frac{e^x(x-2)}{x(x^2+e^x)} dx \, \forall x > 0$ is equal to (c is the constant of integration)

A. $In\left(1+\frac{e^x}{x^2}\right)+c$

B. $In\left(-\frac{1}{2}+\frac{e^x}{x^2}\right)+c$

C. $In\left(2+\frac{e^x}{x^2}\right)+c$

D. $\in\left(x+\frac{e^x}{x^2}\right)+c$

Answer: A

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13. Find the negation of th statement No square of real number is less than zero.

A. For every real number a, a^2 is non negative

B. $\forall aI \in R, a^2 \geq 0$

C. For every real number a, a^2 is non negative $\forall a \in R, a^2 \geq 0$

D. None of these

Answer: D

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14. If the median and the range of four numbers $\{x, y, 2x + y, x - y\}$, there $0 < y < x < 2y$, arwe 10 and 28, respectively then the mean of the four numbers is

A. 18

B. 10

C. 5

D. 14

Answer: D

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15. If two vertical poles 20m and 80m high stand apart on a horizontal plane, then the height (in m) of the point of intersection of the lines joinig the top of each pole to the foot of other is

A. 16

B. 18

C. 50

D. 15

Answer: A

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

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. $\frac{\cot^2\frac{\pi}{6}+\operatorname{cosec}\frac{5\pi}{6}+3\tan^2\frac{7\pi}{6}}{2\cos^2\frac{\pi}{3}+\operatorname{cosec}^2\frac{7\pi}{6}.\cot^2\frac{\pi}{3}}$ is equal to

A. $\frac{1}{11}$

B. $\frac{12}{11}$

C. $\frac{36}{11}$

D. $\frac{84}{11}$

Answer: C

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18. If $0 \leq x \leq \pi$ and $16^{\sin^2 x} + 16^{\cos^2 x} = 10$, then number of solutions of the equation is

A. 2

B. 4

C. 6

D. 0

Answer: B

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19. If the number of points of discontinuity and number of points of non differentiability of $f(x)$ =minimum $\{\sin x, \sin^{-1}(\cos x)\}$ in $(0, 2\pi)$ are pa and q respectively, then ordered pair (p,q) is

A. (1,2)

B. (1,3)

C. (0,2)

D. (0,3)

Answer: D

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20. A dice is constructed such that probability of occurrence of a number is proportional of occurrence of a number is proportional to

the square of number, then probability that three occur at least once when dice is thrown 10 times is equal to

A. ${}^{10}C_1 \times \left(\frac{82}{91}\right)^9 \left(\frac{9}{91}\right)$

B. $\left(\frac{82}{91}\right)^{10}$

C. $\frac{91^{10} - 82^{10}}{91^{10}}$

D. None of these

Answer: C

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21. If P is the coefficient of x^8 in the expansion of $\left(1 + x + x^2 + x^3 + x^4 + x^5\right)^8$, then the integral part of the value $\frac{P}{700}$ is

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22. If the matrix $\begin{pmatrix} a & \frac{2}{3} & \frac{2}{3} \\ \frac{2}{3} & \frac{1}{3} & b \\ c & x & y \end{pmatrix}$ is an orthogonal matrix, then $3a - 6b =$

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23. The number of wards can be formed with the letters of the word PATALIPUTRA without changing the relative positions of vowels and consonants is

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24. If the roots of $7x^2 - 15x + \alpha = 0$ are rational numbers, then the number of all possible positive integral values of α is

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25. Let $C_1 : 4(x-4)^2 + 25y^2 - 100 = 0$ and $C_2 : 4(x+1)^2 + y^2 - 4 = 0$ be conics. If a straight line L touches C_1 at P and C_2 at Q and O be the origin, then $\sin(\angle POQ) =$

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26. Find the number of common tangents to the circles $x^2 + y^2 - 4x - 6y - 12 = 0$ and $x^2 + y^2 + 6x + 18y + 26 = 0$

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27. Let O be any point inside a tetrahedron $ABCD$. The line joining O to the vertices meet the opposite faces in P, Q, R, S respectively. If $\frac{OP}{AP} + \frac{OQ}{BQ} + \frac{OR}{CR} + \frac{OS}{DS} = k$, then the value of k

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28. If [.] represents the greatest integer function where

$f(x) = \cos\left[\pi^2\right]x + \cos\left[-\pi^2\right]x$, then find the value of

$f\left(\frac{\pi}{2}\right) + f(p) + \frac{1}{2}f(\pi) + \sqrt{2}f\left(\frac{\pi}{4}\right)$.

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29. If $\int_0^{\infty} \frac{\sin x}{x}dx = A$ and $F(t) = \int_0^{\infty} \frac{1-\cos(tx)}{x^2}dx$, then the value of $\frac{F(5)}{A}$ is equal to

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30. let $f(x) = \sum_{k=0}^{8} A_k x^k$. If $f(x) + f(\omega x) + f\left(\omega^2 x\right)$, where $= n\left(A_0 + A_n x^n + A_{2n}x^{2n}\right)$

ω is cube root of unity, then the possible value of n must be equal to:

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