MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 54

Mathematics

1. The value of $I = \lim_{n \to \infty} \Sigma_{r=1}^{n} \frac{r}{n^2 + n + r}$ is equal to

A. $\frac{1}{3}$

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

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

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

Answer: B

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2. Find the coordinates of the point P on the line x+y=-13, nearest to the circle $x^2 + y^2 + 4x + 6y - 5 = 0$.

A. $(-15, 2)$

B. $(-5, -6)$

C. $(-6, -7)$

D. $(-7, -6)$

Answer: C

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3. If α, β and γ are the roots of the equation $x^3 - 13x^2 + 15x + 189 = 0$ and one root exceeds the other by 2, then the value of $|\alpha| + |\beta| + |\gamma|$ is equal to

A. 23

B. 17

C. 13

D. 19

Answer: D

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4. The arithmetic mean of two positive numbers a and b exceeds their geometric mean by 2 and the harmonic mean is one - fifth of the greater of a and b, such that $\alpha = a + b$ and $\beta = |a - b|$, then the value of $\alpha + \beta^2$ is equal to

A. 96

B. 234

C. 74

D. 84

Answer: C

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5. Total number of solution of $\tan 3x - \tan 2x - \tan 3x \tan 2x = 1$ in $[0, 2\pi]$ is equal to

A. 0

B. 2

C. 4

D. 3

Answer: B

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6. Which of the following is not a statement ?

A. Every set is a finite set

B. 18 is multiple of 6

C. Prime numbers are irrational numbers

D. None of these

Answer: D

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7. If $\tan^{-1}.\frac{1}{2x+1}+\tan^{-1}.\frac{1}{4x+1}=\cot^{-1}\left(\frac{x^2}{2}\right)$, then the number of all possible values of x is/are

A. 1

B. 2

C. 3

D. 0

Answer: B

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8. The function $f(x) = \lim_{n \to \infty} \cos^{2n}(\pi x) + [x]$ is (where, $[.]$ denotes the greatest integer function and $n \in N$)

A. continuous at $x = 1$ but discontinuous at $x = \frac{3}{2}$

B. continuous at $x = 1$ and $x = \frac{3}{2}$

C. discontinuous at $x = 1$ and $x = \frac{3}{2}$

D. discontinuous at $x = 1$ but continuous at $x = \frac{3}{2}$

Answer: D

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9. The length of the longest interval in which the function $y = \sin 2x - 2\sin x$ increases for $x \in [0, \pi]$ is

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

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

C. $\frac{2\pi}{3}$

D. $\frac{\pi}{6}$

Answer: B

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10. The value of the integral $I = \int_0^{100\pi} \frac{dx}{1 + e^{\sin x}}$ is equal to

A. 100π

B. 50π

C. 25π

D. 10π

Answer: B

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11. The coefficient of x^9 in expansion of $\left(x^3+\frac{1}{2^{\log\sqrt{2}\left(\frac{x^3}{2}\right)}}\right)^{11}$ is equal to

A. -5

B. 330

C. 520

D. $5+\log_{\sqrt{2}}3$

Answer: B

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12. The order of the differential equation of the family of curves $y=k_1 2^{k_2 x}+k_3 3^{x+k_4}$ is (where, k_1, k_2, k_3, k_4 are arbitrary constants)

A. 4

B. 5

C. 3

D. 6

Answer: C

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13. The sum of the intercepts on the coordinate axes made by a line passing through the point (a, b) and the common point of $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{b}+\frac{y}{a}=1$ is

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14. The area (in sq. units) bounded by $y=4x-x^2$ and $y=x$is

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

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

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

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

Answer: C

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15. If the lines $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}, \frac{x-k}{3}=\frac{y-3}{-1}=\frac{z-4}{h}$ and $\frac{2x+1}{3}=\frac{y-1}{1}=\frac{z-2}{1}$ are concurrent, then the value of $2h-3k$ is equal to

A. 3

B. 2

C. -4

D. 4

Answer: D

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16. The probability distribution of a random variable (X) is

$$P(X) = \begin{cases} \frac{x}{12} & : \quad X = 1, 2, 3, 4, 5, 6 \\ 0 & : \quad \text{otherwise} \end{cases}$$

Then, the conditional probability

$$P\left(\frac{\frac{3}{2} < X < \frac{7}{2}}{X > 2}\right)$$ is

A. $\frac{5}{6}$

B. $\frac{5}{18}$

C. $\frac{1}{6}$

D. $\frac{7}{12}$

Answer: C

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17. Let $\vec{x}$ and $\vec{y}$ are 2 non - zero and non - collinear vectors, then the largest value of k such that the non - zero vectors $\left(k^2 - 5k + 6\right)\vec{x} + (k - 3)\vec{y}$ and $2\vec{x} + 5\vec{y}$ are collinear is

A. 3

B. 6

C. $\frac{12}{5}$

D. -1

Answer: C

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18. A skew - symmetric matrix of order n has the maximum number of distinct elements equal to 73, then the order of the matrix is

A. 7

B. 8

C. 9

D. 10

Answer: B

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19. For a complex number Z, the equation of the line of common chord of the circles $|Z-3|=2$ and $|Z|=2$ is

A. $Z+\overline{Z}=3$

B. $Z-\overline{Z}=3$

C. $\overline{Z}-Z=3$

D. $Z+\overline{Z}+3=0$

Answer: A

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20. If the integral $I=\int e^{\sin x}\left(\cos x.\, x^2+2x\right)dx=e^{f(x)}\,g(x)+C$ (where, C is the constant of integration), then the number of solution(s) of $f(x)=g(x)$ is/are

A. 0

B. 2

C. 4

D. 6

Answer: B

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21. If $(0, 3+\sqrt{5})$ is a point on the ellipse whose foci and (2, 3) and $(-2, 3)$, then the length of the semi - major axis is

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22. A straight is a five card hand containing consecutive values. If m is equal to the number of ways in which all the five cards, in a straight, are not from the same suit, then the value of $\frac{m}{1500}$ is equal to (Consider the value of J as 11, Q as 12, K as 13 and Ace as 14)

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23. Let $A = [a_{ij}]_{3\times 3}$ be a matrix such that $a_{ij} = \frac{i+2j}{2}$ where $i, j \in [1, 3]$ and $i, j \in N$. If C_{ij} be a cofactor of a_{ij}, then the value of $a_{11}C_{21} + a_{12}C_{22} + a_{13}C_{23} + a_{21}C_{31} + a_{22}C_{32} + a_{33}C_{33} + a_{31}C_{11} + a_{32}C_{12}$ is equal to

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24. Let the focus (S) of a parabola divides its one of the focal chords PQ in the ratio $2:1$. If the tangent at Q cuts the directrix at R such that RQ = 6, then the distance (in units) of the focus from the tangent at P is

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25. An equilateral triangle's sides increase at the rate of 2cm/sec. If the area of its incircle increases at a rate of $kcm^2/\sec$ (when the length of

the side is $\frac{6}{\pi} cm$), then the value of k is

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