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## MATHS

## BOOKS - NTA MOCK TESTS

## NTA JEE MOCK TEST 54

Mathematics

1. The value of $I=\lim _{n \rightarrow \infty} \Sigma_{r=1}^{n} \frac{r}{n^{2}+n+r}$ is equal to
A. $\frac{1}{3}$
B. $\frac{1}{2}$
C. $\frac{\pi}{2}$
D. $\frac{\pi}{3}$

Answer: B
2. Find the coordinates of the point $P$ on the line $x+y=-13$, nearest to the circle $x^{2}+y^{2}+4 x+6 y-5=0$.
A. $(-15,2)$
B. $(-5,-6)$
C. $(-6,-7)$
D. $(-7,-6)$

## Answer: C

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3. If $\alpha, \beta$ and $\gamma$ are the roots of the equation $x^{3}-13 x^{2}+15 x+189=0$ and one root exceeds the other by 2 , then the value of $|\alpha|+|\beta|+|\gamma|$ is equal to
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 $\tan 3 x-\tan 2 x-\tan 3 x \tan 2 x=1$ 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 $\tan ^{-1} \cdot \frac{1}{2 x+1}+\tan ^{-1} \cdot \frac{1}{4 x+1}=\cot ^{-1}\left(\frac{x^{2}}{2}\right)$, then the number of all possible values of $x$ is/are
A. 1
B. 2
C. 3
D. 0

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8. The function $f(x)=\lim _{n \rightarrow \infty} \cos ^{2 n}(\pi x)+[x]$ 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 $y=\sin 2 x-2 \sin x$ 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 $I=\int_{0}^{100 \pi} \frac{d x}{1+e^{\sin x}}$ is equal to
A. $100 \pi$
B. $50 \pi$
C. $25 \pi$
D. $10 \pi$

## Answer: B

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 $(\mathrm{a}, \mathrm{b})$ 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 $y=4 x-x^{2}$ 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 $\frac{x}{1}=\frac{y}{2}=\frac{z}{3}, \frac{x-k}{3}=\frac{y-3}{-1}=\frac{z-4}{h} \quad$ and $\frac{2 x+1}{3}=\frac{y-1}{1}=\frac{z-2}{1}$ are concurrent, then the value of $2 h-3 k$ is equal to
A. 3
B. 2
C. -4
D. 4

## Answer: D

16. The probability distribution of a random variable $(X)$ is $P(X)=\left\{\begin{array}{lll}\frac{x}{12} & : & X=1,2,3,4,5,6 \\ 0 & : & \text { otherwise }\end{array}\right.$
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 $\left(k^{2}-5 k+6\right) \vec{x}+(k-3) \vec{y}$ 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

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. $Z+\bar{Z}=3$
B. $Z-\bar{Z}=3$
c. $\bar{Z}-Z=3$
D. $Z+\bar{Z}+3=0$

## Answer: A

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20. If the integral $I=\int e^{\sin x}\left(\cos x . x^{2}+2 x\right) d x=e^{f(x)} g(x)+C$ (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 $12, \mathrm{~K}$ as 13 and Ace as 14)

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23. Let $A=\left[a_{i j}\right]_{3 \times 3}$ be a matrix such that $a_{i j}=\frac{i+2 j}{2}$ where $i, j \in[1,3]$ and $i, j \in N$. If $C_{i j}$ be a cofactor of $a_{i j}$, 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 $R Q=6$, 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 $2 \mathrm{~cm} / \mathrm{sec}$. If the area of its incircle increases at a rate of $\mathrm{kcm}^{2} / \mathrm{sec}$ (when the length of
the side is $\frac{6}{\pi} \mathrm{~cm}$ ), then the value of k is

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