# MATHS

## BOOKS - NTA MOCK TESTS

## NTA JEE MOCK TEST 76

**Mathematics**

**1.** The domain of the fuction $f(x) = 2\sin^{-1}\left\{\log_2\left(\frac{1}{2}x^2\right)\right\}$ is

A. $[-2, -1] \cup (1, 2]$

B. $(-2, -1] \cup [1, 2]$

C. $[-2, -1] \cup [1, 2]$

D. $(-2, -1) \cup (1, 2)$

**Answer: C**

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**2.** Which of the following is a function whose graph is symmetrical about the origin ?

A. $f(x) = \left(2^x + 2^{-x}\right)$

B. $f(x) = \left[\log\left(x + \sqrt{1 + x^2}\right)\right]^2$

C. $f(x + y) = f(x) + f(y)\, \forall x, y \in R$

D. None of these

**Answer: C**

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**3.** Let the function $f(x) = x^2 \sin\left(\frac{1}{x}\right)$, $\forall x \neq 0$ is continuous at x = 0. Then, the vaue of the function at x = 0 is

A. 0

B. $-1$

C. 1

D. indeterminate

**Answer: A**

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**4.** All the students of a class performed poorly in Mathematics. The teacher decided to give grace marks of 12 to the entire class. Which of the following statistical measures will not change even after the grace marks were given?

A. Median

B. Mode

C. Variance

D. Mean

**Answer: C**

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**5.** If p,q and r are simple propositions with truth values T,F and T , respectively, then the truth value of $(\sim p \vee q) \wedge \sim r \rightarrow p$ is

A. True if the truth values of p, q, r are T,F,T respectively

B. False if the truth values of p, q, r are T,F,T respectively

C. False if the truth values of p, q, r are T,F,F respectively

D. True if the truth values of p, q, r are F,T,F respectively

**Answer: A**

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**6.** A bag contains 5 white balls, 3 black balls, 4 yellow balls. A ball is drawn from the bag, its colour is noted and put back into the bag with 5

additional balls of the same colour. The process is repeated. The probability that a yellow ball is drawn in the $1^{st}$ draw given that a white ball is drawn in the $2^{nd}$ draw is

A. $\frac{9}{55}$

B. $\frac{4}{17}$

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

D. $\frac{2}{11}$

**Answer: B**

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**7.** Let $P(1, 7, \sqrt{2})$ be a point and the equation of the line L is $\frac{x-1}{\sqrt{2}} = \frac{y-7}{1} = \frac{z-\sqrt{2}}{-1}$. If PQ is the distnace of the plane $\sqrt{2}x + y - z = 1$ from the point P measured along a line inclined at an angle $60^\circ$ with L, then the length of PQ is

A. 3 units

B. $3\sqrt{2}$ units

C. 6 units

D. 8 units

**Answer: C**

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**8.** Let $x = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$ be a matrix. If $X^6 = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then the number of divisors of $(a + b + 2020c + d)$ is equal to

A. 7

B. 14

C. 21

D. 28

**Answer: B**

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**9.** Let $A = \begin{bmatrix} x & 2 & -3 \\ -1 & 3 & -2 \\ 2 & -1 & 1 \end{bmatrix}$ be a matrix and $|adj(adjA)| = (12)^4$, then the sum of all the values of x is equal to

A. $-24$

B. 24

C. $-18$

D. 1

**Answer: C**

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**10.** Let the coordinates of two points P and Q be (1, 2) and (7, 5) respectively. The line PQ is rotated thorugh $315^\circ$ is clockwise direction about the point of trisection of PQ which is nearer to Q. The equation of the line in the new position is

A. $2x - y - 6 = 0$

B. $x - y - 1 = 0$

C. $3x - y - 11 = 0$

D. $3x - y - 9 = 0$

**Answer: C**

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**11.** If the circles $(x-3)^2 + (y-4)^4 = 16$ and $(x-7)^2 + y-7)^2 = 9$ intersect at points A and B, then the area (in sq. units) of the quadrilateral $C_1AC_2B$ is equal to (where, $C_1$ and $C_2$ are centres of the given circles)

A. 6

B. 12

C. 18

D. 24

**Answer: B**

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**12.** If the eccentricity of the hyperbola $x^2 - y^2 \sec^2 \alpha = 5$ is $\sqrt{3}$ times the eccentricity of the ellipse $x^2 \sec^2 \alpha + y^2 = 25$, then $\tan^2 \alpha$ is equal to

A. 2

B. 1

C. 3

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

**Answer: B**

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**13.** Number of complex numbers satisfying equation $z^3 = \bar{z} \& arg(z+1) = \frac{\pi}{4}$ simultaneously is

A. $i$

B. $1 + 2i$

C. $2 + 3i$

D. $3 + 4i$

**Answer: A**

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**14.** The coefficient of $x^6$ in $\left\{(1+x)^6 + (1+x)^7 + \ldots\ldots . + (1+x)^{15}\right\}$ is

A. $.^{16}C_9$

B. $.^{16}C_5 - .^{16}C_5$

C. $.^{16}C_6 - 1$

D. $.^{16}C_6$

**Answer: A**

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**15.** The position vector of a point $P$ is $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ where $x, y, z \varepsilon N$ and $\vec{a} = \hat{i} + \hat{j} + \hat{k}$. If $\vec{r}.\vec{a} = 10$, then the number of possible position of $P$ is

A. 36

B. 72

C. 66

D. 54

**Answer: A**

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**16.** If the equation $2x^2 - 7x + 9 = 0$ and $ax^2 + bx + 18 = 0$ have a common root, then $(a, b \in R)$

A. $a = 2, b = -7$

B. $a = \frac{-7}{2}, b = 1$

C. $a = 4, b = -14$

D. $a = 4, b = -7$

**Answer: C**

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**17.** Consider the integral $I_n = \int_0^{\frac{n}{4}} \frac{\sin(2n-1)x}{\sin x} dx$, then the value of $I_{20} - I_{19}$ is

A. $\frac{1}{20}$

B. $\frac{-1}{19}$

C. $\frac{-1}{25}$

D. $\frac{1}{19}$

**Answer: B**

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**18.** The area (in sq. units) bounded between $y = 3\sin x$ and $y = -4\sin^3 x$ from $x = 0$ to $x = \pi$ is

A. $4\pi$

B. $34\pi$

C. 4

D. $\frac{34}{3}$

**Answer: D**

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**19.** If $f(x)$ is a differentiable function satisfying $|f'(x)| \leq 2 \forall x \in [0, 4]$ and $f(0) = 0$, then

A. $f(x) = 18$ has no solution in $x \in [0, 4]$

B. $f(x) = 18$ has more than 2 solutions in $x \in [0, 4]$

C. $f(x) = 14$ has 3 solutions in $x \in [0, 4]$

D. $f(x) = 20$ has 2 solutions in $x \in [0, 4]$

**Answer: A**

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**20.** The equation of the curve satisfying the differential equation $\frac{dy}{dx} + \frac{y}{x^2} = \frac{1}{x^2}$ and passing through $\left(\frac{1}{2}, e^2 + 1\right)$ is

A. $y = e^x + 1$

B. $y = e^{\frac{1}{x}} - 1$

C. $y = 1 + e^{\frac{1}{x}}$

D. $y = 1 + e^{-x}$

**Answer: C**

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**21.** If from the top of a tower, 60 meters high, the angles of depression of the top an floor of a house are $3^\circ \text{ and } 60^\circ$ respectively, then the height (in meters) of the house is

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**22.** Let $\vec{p}, \vec{q}, \vec{r}, \vec{s}$ are non - zero vectors in which no two of them are perpenedicular and no three of them are coplanar. If $\left(\vec{p} \times \vec{r}\right).\left(\vec{p} \times \vec{s}\right) + \left(\vec{r} \times \vec{p}\right).\left(\vec{q} \times \vec{s}\right) = k\left[\left(\vec{p} \times \vec{q}\right).\left(\vec{s} \times \vec{r}\right)\right.$, then the value of $\frac{k}{2}$ is equal to

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**23.** A point P on the parabola $y^2 = 4x$, the foot of the perpendicular from it upon the directrix and the focus are the vertices of an equilateral triangle. If the area of the equilateral triangle is $\beta$ sq. units, then the value of $\beta^2$ is

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**24.** Let the sets $A = \{2, 4, 6, 8 \ldots\}$ and $B = \{3, 6, 9, 12 \ldots\}$ such that $n(A) = 200$ and $n(B) = 250$. If $n(A \cup B) = k$, then $\frac{k}{100}$ is equal to

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**25.** The area (in sq. units) bounded by the curve $e^x y - 2 = 0$ with the x - axis from x = 0 to x = ln 2 is

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