# MATHS

## BOOKS - NTA MOCK TESTS

## NTA JEE MOCK TEST 48

**Mathematics**

**1.** Given that $a_4 + a_8 + a_{12} + a_{16} = 224$, the sum of the first nineteen terms of the arithmetic progression

$a_1, a_2, a_3, \ldots$ is equal to

A. 1540

B. 1064

C. 3125

D. 1980

**Answer: B**

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**2.** If $z = \frac{\pi}{4}(1+i)^4\left(\frac{1-\sqrt{\pi}i}{\sqrt{\pi}+i} + \frac{\sqrt{\pi}-i}{1+\sqrt{\pi}i}\right), then\left(\frac{|z|}{amp(z)}\right)$ equals

A. $\pi$

B. 4

C. 1

D. $3\pi$

**Answer: B**

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**3.** The value of $\lim_{n\to\infty}\left(\frac{1}{2n} + \frac{1}{2n+1} + \frac{1}{2n+2} + \ldots\ldots + \frac{1}{4n}\right)$ is equal to

A. $e^2$

B. ln 2

C. ln 4

D. 3 ln 2

**Answer: B**

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**4.** If $\alpha$ and $\beta$ are the solution of $\cot x = -\sqrt{3}$ in $[0, 2\pi]$ and $\alpha$ and $\gamma$ are the roots of $\text{cosec}\, x = -2$ in $[0, 2\pi]$, then the value of $\frac{|\alpha - \beta|}{\beta + \gamma}$ is equal to

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

B. 2

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

D. 3

**Answer: A**

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**5.** If $f: R \to R$ be a function such that $f(x) = x^3 + x^2 + 3x + \sin x$, then discuss the nature of the function.

A. one - one and onto

B. one -one and into

C. many - one and onto

D. many - one and into

**Answer: A**

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**6.** If $y = x + c$ touches the ellipse $3x^2 + 4y^2 = 12$ at the point P, then the value of the length OP (where O is the origin) is equal to

A. $\sqrt{3}$ units

B. $\sqrt{7}$ units

C. $\frac{5}{\sqrt{7}}$ units

D. $\sqrt{\frac{7}{5}}$ units

**Answer: C**

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**7.** If $f(x) = \begin{cases} a + \cos^{-1}(x+b) & : \quad x \geq 1 \\ -x & : \quad x < 1 \end{cases}$ is differentiable at x = 1, then the value of $b - a$ is equal to

A. 0

B. 1

C. $-1$

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

**Answer: D**

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**8.** If $x \in \left(0, \frac{\pi}{2}\right)$, then show that $\cos^{-1}\left(\frac{7}{2}(1+\cos 2x)+\sqrt{\left(\sin^2 x-48\cos^2 x\right)}\sin x\right)=x-\cos^{-1}(7\cos x$

A. 1

B. 5

C. 7

D. 14

**Answer: C**

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**9.** Two cyclists start from the junction of two perpendicular roads, there velocities being $3m/s$ and $4m/s$, respectively. Find the rate at which the two cyclists separate.

A. 5m/sec

B. 25m/sec

C. 4m/sec

D. 3m/sec

**Answer: A**

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**10.** The value of $\int \frac{\left(\tan^{-1}(\sin x + 1)\right)\cos x}{(3 + 2\sin x - \cos^2 x)} dx$ is (where c is the constant of integration)

A. $\tan^{-1}(\sin x) + c$

B. $\left(\tan^{-1}(\sin x)\right)^2 + c$

C. $\frac{\left(\tan^{-1}(\sin x + 1)^2\right)}{2} + c$

D. $\frac{\left(\tan^{-1}(\sin x)\right)^2}{2} + c$

**Answer: C**

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**11.** The number of polynomials of the form $x^3 + ax^2 + bx + c$ that are divisible by $x^2 + 1$, where a, b,c $\in \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$, is

A. 5

B. 10

C. 20

D. 100

**Answer: B**

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**12.** If the circle $x^2 + y^2 - 10x + 16y + 89 - r^2 = 0$ and $x^2 + y^2 + 6x - 14y + 42 = 0$ have common points, then the number of

possible integral values of r is equal to

A. 13

B. 14

C. 15

D. 18

**Answer: D**

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**13.** The differential equation of the family of curves whose tangent at any point makes an angle of $\frac{\pi}{4}$ with the ellipse $\frac{x^2}{4} + y^2 = 1$ is

A. $\frac{dy}{dx} = \frac{x+y}{x-y}$

B. $\frac{dy}{dx} = \frac{x+4y}{x-4y}$

C. $\frac{dy}{dx} = \frac{x}{4y}$

D. $\frac{dy}{dx} = \frac{4y}{x}$

**Answer: B**

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**14.** The length of two opposite edges of a tetrahedron are 12 and 15 units and the shortest distance between them is 10 units. If the volume of the tetrahedron is 200 cubic units, then the angle between the 2 edges is

A. $\sin^{-1}.\frac{1}{2}$

B. $\sin^{-1}.\frac{2}{3}$

C. $\sin^{-1}.\frac{3}{4}$

D. $\sin^{-1}.\frac{4}{5}$

**Answer: B**

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**15.** If 4 distinct numbers are chosen randomly from the first 100 natural numbers, then the probability that all 4 of them are either divisible by 3 or divisible by 5 is

A. $\frac{.^{6}C_4}{\hat{}\,(.100)C_4}$

B. $\frac{.^{33}C_4}{.^{100}C_4}$

C. $\frac{.^{20}C_4}{.^{100}C_4}$

D. $\frac{.^{47}C_4}{.^{100}C_4}$

**Answer: D**

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**16.** If the system of equations

$x - ky + 3z = 0,$

$2x + ky - 2z = 0$ and $3x - 4y + 2z = 0$ has non - trivial solutions, then the value of $\frac{10y}{x}$ is equal to

A. 3

B. $-\frac{15}{2}$

C. $\frac{5}{7}$

D. $-\frac{5}{7}$

**Answer: B**

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**17.** The statement $(\sim(p \Leftrightarrow q)) \wedge p$ is equivalent to

A. $p \wedge q$

B. $q \Leftrightarrow p$

C. $p \wedge \sim q$

D. $\sim p \wedge q$

**Answer: C**

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**18.** Mid point of $A(0, 0)$ and $B(1024, 2048)$ is $A_1$. mid point of $A_1$ and $B$ is $A_2$ and so on. Coordinates of $A_{10}$ are.

A. (1025, 2050)

B. (1022, 2044)

C. (1023, 2046)

D. None of these

**Answer: C**

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**19.** In ten observation, the mean of all 10 numbers is 15, the mean of the first six observation is 16 and the mean of the last five observation is 12. The sixth number is

A. 6

B. 9

C. 12

D. 3

**Answer: A**

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**20.** If A is a non - null diagonal matrix of order 3 such that $A^4 = A^2$, then the possible number of matrices A are

A. 27

B. 26

C. 8

D. 7

**Answer: B**

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**21.** If $53^{53} - 33^3$ is divided by 10, then the remainder obtained is

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**22.** Let tangent PQ and PR are drawn from the point $P(-2, 4)$ to the parabola $y^2 = 4x$. If S is the focus of the parabola $y^2 = 4x$, then the value (in units) of $RS + SQ$ is equal to

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**23.** The value of $\lim_{x \to \frac{\pi}{3}} \frac{2 - \sqrt{3}\sin x - \cos x}{(3x - \pi)^2}$ is equal to the reciprocal of the number

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**24.** Consider $f(x) =$ minimum $\left(x+2, \sqrt{4-x}\right), \forall x \leq 4$. If the area bounded by $y = f(x)$ and the x - axis is $\frac{22}{k}$ square units, then the value of k is

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**25.** If the length of the projection of the line segment joining the points $(1, 2, -1)$ and $(3, 5, 5)$ on the plane $3x - 4y + 12z = 5$ is equal to d units, then the value of $169d^2$ equal to

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