# MATHS

## BOOKS - NTA MOCK TESTS

## NTA JEE MOCK TEST 82

### Mathematics

**1.** The eqautions of lines $L_1$ and $L_2$ are $y = mx$ and $y = nx$, respectively. Suppose $L_1$ makes twice as large an angle with the horizontal (measured counterclockwise from the positive x - axis) as does $L_2$ and m = 4n, then the value of $\frac{(m^2+4n^2)}{(m^2-6n^2)}$ is equal to (where, $n \neq 0$)

A. 3

B. $-3$

C. 2

D. $-2$

**Answer: C**

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**2.** If $f(x) = \begin{cases} e^{2x^3+x} & x > 0 \\ ax+b & x \leq 0 \end{cases}$ is differentiable at x = 0, then

A. $a = 1, b = -1$

B. $a = -1, b = 1$

C. $a = 1, b = 1$

D. $a = -1, b = -1$

**Answer: C**

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**3.** Let $I_1 = \int_0^{\alpha} \frac{1+2\cos x}{1+e^x} dx$ and $I_2 = \int_0^{\alpha} \frac{1+e^x}{1+2\cos x} dx$, where $\alpha$ is the root of the equation $2\cos x - e^x = 0$. and $\alpha$ is positive Then,

A. $I_1 = I_2$

B. $I_1 > I_2$

C. $I_1 + I_2 = 0$

D. $I_1 < I_2$

**Answer: B**

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**4.** A bag contains 5 white, 4 black and 2 red balls. Balls are drawn one by one without replacement. The probability that the $5^{\text{th}}$ ball is a red ball, is

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

B. $\frac{4}{11}$

C. $\frac{3}{7}$

D. $\frac{6}{11}$

**Answer: A**

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**5.** Let L be the line through the intersection of the planes $3x - y + 2z + 1 = 0$ and $3x - 2y + z = 3$. Then, the equation of the plane passing through $(2, 1, 4)$ and perpendiculr to the line L is

A. $x + y - z = 2$

B. $x + y - z + 1 = 0$

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

D. $2x - 3y + 4z = 17$

**Answer: B**

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6. If the points $A(3-x, 3, 3), B(3, 3-y, 3), C(3, 3-y, 3)$ and $C(3, 3, 3-z)D(2, 2, 2)$ are coplanar, then $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ is equal to

A. $-1$

B. 1

C. 3

D. 5

**Answer: B**

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7. For a matrix A, if $A^2=A$ and $B=I-A$ then $AB+BA+I-(I-A)^2$ is equal to (where, I is the identity matrix of the same order of matrix A)

A. B

B. A

C. AB

D. I

**Answer: B**

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**8.** If only the $4^{\text{th}}$ term in the expansion of $\left(2+\frac{3\pi}{8}\right)^{10}$ has the greatest numerical value, then the integral values of x are

A. $\{-3, -2, 2, 3\}$

B. $\{-2, -1, 1, 2\}$

C. $\{-3, 3\}$

D. $\{-3, -2, -1, 0, 1, 2, 3\}$

**Answer: C**

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**9.** The number of ways in which letter of the word $'\mathrm{ARRANGE}'$ can be arranged, such that no two R's are together, is

A. 160

B. 200

C. 360

D. 900

**Answer: D**

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**10.** If $\alpha$ and $\beta$ the roots of the equation $x^2 - 2x + 3 = 0$, then the sum of roots of the equation having roots as $\alpha^3 - 3\alpha^2 + 5\alpha - 2$ and $\beta^3 - \beta^2 + \beta + 5$ is

A. 1

B. 3

C. 5

D. 7

**Answer: B**

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**11.** In triangle $ABC$, if $\sin A \cos B = \frac{1}{4} and 3 tan A = tan B, then \cot^2 A$ is equal to 2 (b) 3 (c) 4 (d) 5.

A. 2

B. 3

C. 4

D. 5

**Answer: B**

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**12.** The average weght of the students in a class of 39 students is 40 kg. If the weight of the teacher is to be included, then the average rises by $\frac{1}{4}$ kg. The weight of the teacher is

A. 40.5 kg

B. 50 kg

C. 41 kg

D. 51 kg

**Answer: B**

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**13.** If two parabolas $y^2 = 4a(x-k)$ and $x^2 = 4a(y-k)$ have only one common point P, then the coordinates of P are

A. $(2k, 2k)$

B. $(k, k)$

C. $(a, 2k)$

D. $(k, 2a)$

**Answer: A**

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**14.** The locus of a point $P(\alpha, \beta)$ moving under the condition that the line $y = ax + \beta$ moving under the condtion that the line $y = \alpha x + \beta$ is a tangent to the hyperbola $\frac{x^2}{1} - \frac{y^2}{b^2} = 1$ is a conic, with eccentricity equal to

A. 1

B. 2

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

D. $\sqrt{2}$

**Answer: D**

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15. For a complex number Z, if the argument of $3+3i$ and $(Z-2)\left(\overline{Z}-1\right)$ are equal, then the maximum distance of Z from the x - axis is equal to (where, $i^2=-1$)

A. $\dfrac{\left(1+\sqrt{2}\right)}{2}$ units

B. $2$ units

C. $\dfrac{3}{2}$ units

D. $\dfrac{\left(\sqrt{2}+2\right)}{2}$ units

**Answer: A**

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16. If the function $f(x)=x^3-3ax$ has a local minimum at $x=\lambda(\lambda\geq 4)$ and $a\in[10, 18]$, then the sum of all the possible integral values of a is

A. 50

B. 112

C. 51

D. 16

**Answer: C**

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**17.** If the integral $I = \int \frac{2x^2}{4+x^2} dx = 2x - f(x) + c$, where $f(2) = \pi$, then the minimum value of $y = f(x) \, \forall x \in [-2, 2]$ is (where, c is the constant of integration)

A. 0

B. $-\pi$

C. $2\pi$

D. $-4\pi$

**Answer: B**

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**18.** An isosceles triangle of wood of base 10 feet and height $\frac{8}{\sqrt{3}}$ feet is placed vertically with its base on the ground and vertex directly above. The triangle faces the sun whose altitude is $30^{\circ}$. Then, the tangent of the angle at the apex of the shadow is

A. 80

B. $\frac{80}{39}$

C. $\frac{89}{2}$

D. $\frac{80}{217}$

**Answer: B**

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**19.** The solution of the differential equation $xdy - ydx + 3x^2y^2e^{x^3}dx = 0$ is (where, c is an arbitrary constant)

A. $x = 2ye^{x} + c$

B. $x = ye^{x^3} + cy$

C. $x = y^2e^{x^3} + c$

D. $xy = e^{x^3} + c$

**Answer: B**

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**20.** If $\cot^{-1}\left(x - \frac{x^2}{2} + \frac{x^3}{4} - \ldots\ldots\ldots\ldots\right) + \tan^{-1}\left(x^2 - \frac{x^4}{2} + \frac{x^6}{4} - \ldots\ldots$

, then x is equal to

A. 0 only

B. 1 only

C. 0, 1 both

D. None of these

**Answer: B**

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**21.** The value of $\lim_{x \to 1} \frac{\sqrt[5]{x^2} - 2\sqrt[5]{x} + 1}{4(x-1)^2}$ is equal to

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**22.** If A be a square matrix of order 3, such that $|A| = \sqrt{5}$, then $\left|Adj(-3A^{-2})\right|$ is equal to

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23. For the series $S = 1 + \frac{1}{(1+3)}(1+2)^2 + \frac{1}{(1+3+5)}(1+2+3)^2 + \frac{1}{(1+3+5+7)}($

if the sum of the first 10 terms is K, then $\frac{4K}{101}$ is equal to

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24. Consider circles $C_1$ and $C_2$ touching both the axes and passing through $(4, 4)$, then the x - intercept of the common chord of the circles is

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25. The area bounded by $y = \min(x, 2-x)$ with $y = (x-1)^2$ is K sq. units, then $[K]$ is equal to (where, $[.]$ is the greatest integer function)

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