MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 40

Mathematics

1. Let the tangents at point P and R on the parabola $y = x^2$ intersects at T. Tangent at point Q (lies in between the points P and R) on the parabola intersect PT and RT at A and B respectively. The value of $\frac{TA}{TP} + \frac{TB}{TR}$ is

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

B. 1

C. 2

D. 4

Answer: B

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2. If

$$f(x) = \sqrt{x - 4\sqrt{x-4}} + \tan^{-1}\left(\frac{1-2x}{2+x}\right), \forall 4 < x < 8,$$

then the value of $f'(5)$ is equal to

A. $-\frac{7}{13}$

B. 0

C. $\frac{5}{13}$

D. $-\frac{8}{13}$

Answer: A

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3. The statement $\sim(p \Leftrightarrow q)$ is not equivalent to

A. $\sim p \Leftrightarrow q$

B. $(p \wedge \sim q) \vee (q \wedge \sim q)$

C. $(p \vee q) \wedge (\sim p \vee \sim q)$

D. $(p \vee q) \Rightarrow (p \wedge q)$

Answer: C

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4. For the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, distance between the foci is 10 units. Form the point $(2, \sqrt{3})$, perpendicular tangents are drawn to the hyperbola, then the value of $\left|\frac{b}{a}\right|$ is

A. 0.25

B. 5

C. 0.75

D. 1

Answer: C

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5. The mean square deviation of a set of observation $x_1, x_2 \ldots\ldots x_n$ about a point m is defined as

$\frac{1}{n}\Sigma_{i=1}^{n}(x_i - m)^2$. If the mean square deviation about -1 and 1 of a set of observation are 7 and 3 respectively. The standard deviation of those observations is

A. $\sqrt{2}$

B. 2

C. 5

D. $\sqrt{3}$

Answer: D

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6. If $f(x) = \begin{cases} x^{p+1}\cos.\frac{1}{x}: & x \neq 0 \\ 0: & x = 0 \end{cases}$ then at x = 0 the function f(x) is

A. continuous if $p > -1$ and differentiable if $p > 0$

B. Continuous if $p > 0$ and differentiable if $p > -1$

C. Continuous and differetiable if $p > -1$

D. None of these

Answer: A

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7. The sum of the roots of the equation $\left|x^2 - x - 6\right| = x + 2$ is

A. 0

B. -2

C. 2

D. 4

Answer: D

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8. The sum (upto two decimal places) of the infinite series $\frac{7}{17}+\frac{77}{17^2}+\frac{777}{17^3}+\ldots\ldots\ldots\ldots$ is

A. 1.06

B. 2.06

C. 3.06

D. 4.06

Answer: A

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9. The value of $\lim_{n \to \infty} \left(\cos x \cos. \frac{x}{2} \cos. \frac{x}{4} . . \cos. \frac{x}{2^n} \right)$ is equal to

A. $\frac{x}{\sin x}$

B. $\frac{\sin x}{x}$

C. $\frac{\sin 2x}{2x}$

D. $\frac{2x}{\sin 2x}$

Answer: C

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10. Two friends A and B have equal number of sons. There are 3 cinema tickets which are to be distributed among the sons of

A and B. The probability that all the tickets go to the sons of B is $1/20$. The no. of sons each of them having is

A. 3

B. 4

C. 5

D. 6

Answer: A

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11. If $\arg\left(\frac{z-(10+6t)}{z-(4+2i)}\right)=\frac{\pi}{5}$ (where z is a complex number), then the perimeter of the locus of z is

A. $\frac{\sqrt{13}\pi}{4}$ units

B. $\frac{3\sqrt{13}\pi}{4}$ units

C. $3\sqrt{13}\pi$ units

D. $\frac{3\pi}{2}\sqrt{26}$ units

Answer: D

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12. If $(1+x)^n = C_0 + C_1 x + C_2 x^2 + \ldots$ and $+ C_n x^n$ $\Sigma_{r=0}^{50} \frac{C_r^2}{(r+1)} = \frac{m!}{(n!)^2}$, then the value of $(m+n)$ is equal to (where C_r represents $.^n C_r$)

A. 149

B. 152

C. 155

D. 146

Answer: B

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13. The maximum slope of the curve $y = -x^3 + 3x^2 - 4x + 9$ is

A. 1

B. -1

C. 2

D. 3

Answer: B

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14. The value of the integral $\int \frac{\text{cosec}^2 x - 2019}{\cos^{2019} x} dx$ is equal to (where C is the constant of integration)

A. $\frac{\cot x}{(\cos x)^{2019}} + C$

B. $\frac{-\cot x}{(\cos x)^{2019}} + C$

C. $\cot x (\cos x)^{2019} + C$

D. $-\cot x (\cos x)^{2019} + C$

Answer: B

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15. If $\int_0^\infty \frac{\sin x}{x} dx = k$, then the value of $\int_0^\infty \frac{\sin^3 x}{x} dx$ is equal to

A. k

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

C. $\frac{k}{4}$

D. 2k

Answer: B

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16. The equation of the locus of the foot of perpendicular drawn from (5, 6) on the family of lines $(x-2)+\lambda(y-3)=0$ (where $\lambda \in R$) is

A. $(x-1)(x-3)+(y-2)(y-6)=0$

B. $(x-5)(x-6)+(y-2)(y-6)=0$

C. $(x-2)(x-5)+(y-3)(y-6)=0$

D. $(x+2)(x+5)+(y+3)(y+6)=0$

Answer: C

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17. If $\left\{\begin{bmatrix}5&1&4\\7&6&2\\1&3&5\end{bmatrix}\begin{bmatrix}1&6&-7\\6&2&4\\-7&4&3\end{bmatrix}\begin{bmatrix}5&7&1\\1&6&3\\4&2&5\end{bmatrix}\right\}^{2020}=\begin{bmatrix}a_1&a_2&a_3\\b_1&b_2&b_3\\c_1&c_2&c_3\end{bmatrix}$, then the value of $2|a_2-b_1|+3|a_3-c_1|+4|b_3-c_2|$ is equal to

A. 0

B. 1

C. 2

D. 3

Answer: A

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18. The lengths of the tangents from any point on the circle $x^2 + y^2 + 8x + 1 = 0$ to the circles $x^2 + y^2 + 7x + 1 = 0$ and $x^2 + y^2 + 4x + 1 = 0$ are in the ratio

A. $1:2$

B. $1:3$

C. $1:4$

D. $1:\sqrt{2}$

Answer: A

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19. Let A and B are two non - singular matrices of order 3 such that $|A| = 3$ and $A^{-1}B^2 + 2AB = O$, then the value of $\left|A^4 - 2A^2B\right|$ is equal to (where O is the null matrix of order 3)

A. 0

B. 5^6

C. $2^2 5^6$

D. $3^4 5^3$

Answer: D

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20. The distance of the plane $x + 2y - z = 2$ from the point $(2, -1, 3)$, measured in the direction with the direction ratios (2, 2,1) is

A. 1 units

B. 2 units

C. 3 units

D. 4 units

Answer: C

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21. The number of the positive integral solutions (x, y, z) of the equation xyz = 24 is t, then the number of all possible

factors of t is

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22. If $f(x) = \cos^{-1}\left(x^{\frac{3}{2}} - \sqrt{1 - x - x^2 + x^3}\right), \forall 0 \leq x \leq 1$ then the minimum value of $f(x)$ is

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23. If $\vec{a}, \vec{b}$ are vectors perpendicular to each other and $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 3, \vec{c} \times \vec{a} = \vec{b}$, then the least value of $2\left|\vec{c} - \vec{a}\right|$ is

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24. If the order of the differential equation of the family of circle touching the x - axis at the origin is k, then 2k is equal to

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25. If the area bounded by the curve $y + x^2 = 8x$ and the line $y = 12$ is K sq. units, then the vlaue of $\frac{3K}{10}$ is

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