MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 46

Mathematics

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1. If $-3 < \dfrac{x^2 - \lambda x - 2}{x^2 + x + 1} < 2$ for all $x \in R$,

then the value of λ belongs to

A. $(- 1, 7)$

B. $(- 6, 2)$

C. $(- 1, 2)$

D. $(- 6, 7)$

Answer: C

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2. Three numbers a, b and c are in geometric

progression. If 4a, 5b and 4c are in arithmetic

progression and $a + b + c = 70$, then the value of $|c - a|$ is equal to

A. 10

B. 20

C. 30

D. 40

Answer: C

3. The exponent of 7 in $100C_{50}$ is

A. 0

B. 1

C. 2

D. 3

Answer: A

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4. If α and β are the solution of $\sin x = -\dfrac{1}{2}$ in $[0, 2\pi]$ and α and γ are the solutions of $\cos x = -\dfrac{\sqrt{3}}{2}$ in $[0, 2\pi]$, then the value of $\dfrac{\alpha + \beta}{|\beta - \gamma|}$ is equal to

A. 1

B. 2

C. 3

D. 4

Answer: C

5. The value of the integral

$$I = \int_0^\pi [|\sin x| + |\cos x|] dx, \quad \text{(where} \quad [.]$$

denotes the greatest integer function) is equal to

A. 1

B. 2

C. π

D. 2π

Answer: C

6. The value of $\lim\limits_{x \to 0} \dfrac{(\sec x + \tan x)^{1}}{x}$ is equal to

A. e

B. e^2

C. e^{-1}

D. 1

Answer: A

7. The minimum value of the function

$$f(x) = \frac{\tan x}{3 + 2\tan x}, \quad \forall x \in \left[0, \frac{\pi}{2}\right) \text{ is}$$

A. 0

B. $\dfrac{1}{2}$

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

D. $\dfrac{1}{6}$

Answer: A

8. The solution of the differential equation

$$y\left(\sin^2 x\right)dy + \left(\sin x \cos x\right)y^2 dx = x\,dx \qquad \text{is}$$

(where C is the constant of integeration)

A. $\sin^2 x.\, y = x^2 + C$

B. $\sin^2 x.\, y^2 = x^2 + C$

C. $\sin x.\, y^2 = x^2 + C$

D. $\sin^2 x.\, y^2 = x + C$

Answer: B

9. The negation of $(\sim p \wedge q) \vee (p \wedge \sim q)$ is

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

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

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

D. both SO_4^{2-} and NO_3^{-}

Answer: B

10. If $f(x) = \begin{cases} \dfrac{e^{\,|x|\,+\,|x|\,-\,1}}{|x|\,+\,|x|} & : & x \neq 0 \\ -1 & : & x = 0 \end{cases}$ (where

$[.]$ denotes the greatest integer integer

function), then

   A. $f(x)$ is continuous at x = 0

   B. $\lim\limits_{x \to 0^+} f(x) = -1$

   C. $\lim\limits_{x \to 0^-} f(x) = 1$

   D. $\lim\limits_{\to 0^+} f(x) = 1$

Answer: D

11. If $\int \dfrac{dx}{x^2 + x} = \ln|f(x)| + C$ (where C is the constant of integration), then the range of $y = f(x), \forall x \in R - \{-1, 0\}$ is

A. $R - \{1\}$

B. $R - \{0\}$

C. $R - \{0, 1\}$

D. $R - \{0, -1\}$

Answer: C

12. Let $\vec{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}$, $\vec{b} = \hat{i} - 2\hat{j} + j\hat{k}$ and $\vec{c} = \hat{i} + \hat{j} - \hat{k}$. If $\vec{r} \times \vec{a} = \vec{b}$ and $\vec{r} \cdot \vec{c} = 3$, then the value of $\left|\vec{r}\right|$ is equal to

A. $\sqrt{155}$

B. $\sqrt{17}$

C. $2\sqrt{17}$

D. 3

Answer: A

13. The chords passing through (2, 1) intersect the hyperbola $\dfrac{x^2}{16} - \dfrac{y^2}{9} = 1$ at A and B. The locus of the point of intersection of tangents at A and B on the hyperbola is

 A. $x - y = 1$

 B. $x + y = 3$

 C. $9x - 8y = 72$

D. $9x + 8y = 7$

Answer: C

14. If $\begin{vmatrix} \cos\theta & -1 & 1 \\ \cos 2\theta & 4 & 3 \\ 2 & 7 & 7 \end{vmatrix} = 0$, then the number

of values of θ in $[0, 1\pi]$ is

A. 1

B. 2

C. 3

D. 4

Answer: B

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15. A box contains x red balls and 10 black balls. 3 balls are drawn one by one without replacement. If the probability of choosing 3 red balls is equal to the probability of

choosing 2 red and 1 black ball, then the possible value of x can be

A. 1

B. 32

C. 53

D. 40

Answer: B

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16. The equation of the external bisector of $\angle BAC$ to $\triangle ABC$ with vertices $A(5, 2), B(2, 3)$ and $C(6, 5)$ is

A. $2x + y + 12 = 0$

B. $x + 2y - 12 = 0$

C. $2x + y - 12 = 0$

D. $x - 2y - 1 = 0$

Answer: D

17. Chord joining two distinct point $P(a, 4b)$ and $Q\left(c, -\dfrac{16}{b}\right)$ (both are variable points) on the parabola $y^2 = 16x$ always passes through a fixed point (α, β). Then, which of the following statements is correct?

A. $\alpha + \beta = 2$

B. $\alpha - \beta = 4$

C. $|\alpha| + |\beta| = 8$

D. $|\alpha| = |\beta|$

18. A plane P = 0 passing through the point (1, 1, 1) is perpendicular to the planes $2x - y + 2z = 5$ and $3x + 6y - 2z = 7$. If the distance of the point (1, 2, 3) from the plane P = 0 is k units, then the value of $34k^2$ is equal to

A. $\dfrac{8}{\sqrt{17}}$

B. 16

C. 64

D. 128

Answer: D

19. Let the complex numbers Z_1, Z_2 and Z_3 are the vertices A, B and C respectively of an isosceles right - angled triangle ABC with right angle at C, then the value of $\dfrac{(Z_1 - Z_2)^2}{(Z_1 - Z_3)(Z_3 - Z_2)}$ is equal to

A. 2

B. 1

C. -2

D. -1

Answer: A

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20. Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0$. If the tangents at the points B (1, 7) and $D(4, -2)$ on the

circle meet at the point C, then the perimeter of the quadrilateral ABCD is

A. 60 units

B. 20 units

C. 40 units

D. 50 units

Answer: C

21. If the coefficient of x^6 in the expansion of $(2+x)^3(3+x)^2(5+x)^3$ is K, then the value of $\dfrac{K}{100}$ is

22. The maximum value of x that satisfies the equation $\sin^{-1}\left(\dfrac{2\sqrt{15}}{|x|}\right) = \cos^{-1}\left(\dfrac{14}{|x|}\right)$ is

23. The number of all possible symmetric matrices of order 3×3 with each entry 1 or 2 and whose sum of diagonal elements is equal to 5, is

24. The mean of 40 observations 20 and their standard deviation is 5. If the sum of the square of the observations k, then the value of $\dfrac{k}{1000}$ is

25. If $I_n = \dfrac{d^n}{dx^n}(x^n \ln x)$, then the value of $\dfrac{1}{50}(I_7 - 7I_6)$ is equal to