MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 52

Mathematics

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1. The coefficient of x20 in the expansion of

$$\left(1 + x^2\right)^{40} \cdot \left(x^2 + 2 + \frac{1}{x^2}\right)^{-5} \text{ is :}$$

A. $.^{30}C_{10}$

B. .$^{30}C_{15}$

C. .$^{30}C_{25}$

D. .$^{30}C_{20}$

Answer: C

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2. Consider the function $f(x) = (x-2)\left|x^2 - 3x + 2\right|$

, then the incorrect statement is

A. f(x) is continuous at x = 1

B. f(x) is continuous at x = 2

C. f(x) is differentiable at x = 1

D. f(x) is differentiable at x = 2

Answer: C

3. Let the vertices of a triangle are

$A = (-3 + 2\sin\theta, 4 + 2\cos\theta)$, and

$B = (-3 + 2\cos\theta, 4 - 2\cos\theta)$, then the distance

between the centroid and the circumcentre of $\triangle ABC$

is

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

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

C. $\dfrac{1}{2}$ units

D. $\dfrac{1}{3}$ units

Answer: A

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4. The compound statement $(p \to q) \vee (p \wedge \sim q)$ is logically equivalent to

A. $p \leftrightarrow q$

B. $p \wedge q$

C. tautology

D. contradiction

Answer: C

5. If A and B are two sets such that $n(A) = 2$ and $n(B) = 4$, then the total number of subsets of $A \times B$ not having more than 5 elements are

A. 219

B. 247

C. 239

D. 248

Answer: A

6. For a function $f(x) = \dfrac{2(x^2 + 1)}{[x]}$ (where $[.]$ denotes the greatest integer function), if $1 \le x < 4$. Then

A. the range of f is $\left(4, \dfrac{17}{2}\right)$

B. f is bijective function

C. the maximum value of $f(x)$ is $\dfrac{34}{3}$

D. the minimum value of $f(x)$ is 4

Answer: D

7. The value of $\lim\limits_{x \to \pi} \dfrac{\sin(2\pi \cos^2 x)}{\tan(\pi \sec^2 x)}$. Is equal to

A. 1

B. 2

C. -2

D. 0

Answer: C

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8. The number of times the digit 0 is used in writing the numbers from 1 to 1000 is equal to

A. 189

B. 300

C. 192

D. 270

Answer: C

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9. The integral

$$I = \int e^x \left(\frac{1 + \sin x}{1 + \cos x} \right) dx = e^x f(x) + C$$

(where, C is the constant of integration).

Then, the range of $y = f(x)$ (for all x in the domain of $f(x)$) is

A. $\left[-1, 1 \right]$

B. $\left(-\infty, \infty \right)$

C. $\left(-1, 1 \right)$

D. $\left[0, \infty \right)$

Answer: B

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10. Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$, A_1 be a matrix formed by the cofactors of the elements of the matrix A and A_2 be a matrix formed by the cofactors of the elements of matrix A_1. Similarly, If A_{10} be a matrrix formed by the cofactors of the elements of matrix A_9, then the value of $|A_{10}|$ is

A. 3^{10}

B. 3^{20}

C. 9

D. 3^{1024}

Answer: D

11. The area bounded by the parabola $4y = 3x^2$, the line $2y = 3x + 12$ and the y - axis is

A. 10 sq. units

B. 20 sq. units

C. 30 sq. units

D. 36 sq. units

Answer: B

12. The solution of the differential equation $\frac{dy}{dx} = \frac{xy+y}{xy+x}$ is $y - \lambda x = \ln\left(\frac{x}{y}\right) + C$ (where, C is an arbitrary constant and $x, y > 0$). Then, the valeu of λ is equal to

A. 1

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

C. 2

D. 4

Answer: A

13. The mean and variance of a random variable X having a binomial probability distribution are 6 and 3 respectively, then the probabiltiy $P(X \geq 2)$ is

A. $\dfrac{13}{4096}$

B. $\dfrac{4083}{4096}$

C. $\dfrac{3}{1024}$

D. $\dfrac{13}{2048}$

Answer: B

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14. Let $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4, \left|\vec{c}\right| = 5$ and $\vec{a} \times \left(\vec{a} \times \vec{c}\right) + 4\vec{b} = 0$, then the value of $\left|\vec{a} \times \vec{c}\right|^2$ equals to

A. $\dfrac{9}{256}$

B. $\dfrac{16}{3}$

C. $\dfrac{256}{9}$

D. $\dfrac{3}{16}$

Answer: C

15. If $A = \begin{bmatrix} 2 & 2 \\ 9 & 4 \end{bmatrix}$ and $A^2 + aA + bI = O$. Then

$a + 2b$ is equal to (where, I is an identity matrix and O

is a null matrix of order 2 respectively)

A. 27

B. -26

C. 24

D. 12

Answer: B

16. The value of the definite integral

$$I = \int_{-1}^{1} \ln\left(\frac{2 - \sin^3 x}{2 + \sin^3 x}\right) dx \text{ is equal to}$$

A. ln 4

B. ln 2

C. 0

D. $\ln\left(\frac{1}{2}\right)$

Answer: C

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17. The length of the perpendicular (in units) from the point $(1, 2, 4)$ on the straight line $\dfrac{x-2}{1} = \dfrac{y-7}{2} = \dfrac{z-3}{-1}$ lies in the interval

A. $\left(1, \dfrac{3}{2}\right)$

B. $(2, 3)$

C. $(0, 2]$

D. $[4, 5)$

Answer: C

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18. Let the images of the point A(2, 3) about the lines

$y = x$ and $y = mx$ are P and Q respectively. If the line

PQ passes through the origin, then m is equal to

A. $\dfrac{3}{2}$

B. $\dfrac{2}{3}$

C. -1

D. 5

Answer: C

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19. If the sum of the series

$$1 + \frac{3}{2} + \frac{5}{4} + \frac{7}{8} + \ldots\ldots + \frac{(2n-1)}{(2)^{n-1}}$$ is $f(n)$, then

the value of $f(8)$ is

A. $4 + \dfrac{12}{2^5}$

B. $5 + \dfrac{13}{2^7}$

C. $6 - \dfrac{19}{2^7}$

D. $5 - \dfrac{13}{2^7}$

Answer: C

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20. The focus and corresponding directrix of an ellipse are $(3,\ 4)$ and $x + y - 1 = 0$ respectively. If the eccentricity of the ellipse is $\dfrac{1}{2}$, then the coordinates of the centre of the ellipse are

    A. $(2, 3)$

    B. $(4, 5)$

    C. $(8, 9)$

    D. $(1, 2)$

Answer: B

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21. If $\left(\dfrac{4i^3 - i}{2i + 1}\right)^2 = r(\cos\theta + i\sin\theta)$, then

$\cos\theta + \sin\theta$ is equal to (where, $i^2 = -1$)

22. The distance between the focus and the directrix of

the conic $\left(\sqrt{3x} - y\right)^2 = 48\left(x + \sqrt{3}y\right)$ is :

23. If the direction ratios of a line are $1 + \lambda, 2 - \lambda, 4$

and if it makes an angle of $60°$ with the y- axis, then

the sum of the values of λ is

24. If

$$\sin^{-1}\left(\frac{5}{x}\right) + \sin^{-1}\left(\frac{12}{x}\right) = \sin^{-1}\left(\frac{2}{x}\right) + \cos^{-1}\left(\frac{2}{x}\right)$$

then the value of x is equal to

25. The volume of the greatest cone obtained by rotating a right - angled triangle of hypotenuse 2 units about a side is $\dfrac{k\pi}{9\sqrt{3}}$ cubic units, then the value of k is equal to