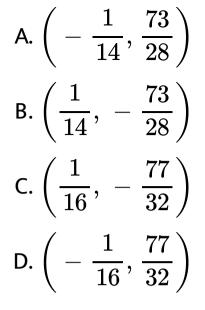# MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 60

Mathematics

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1. Find the coordinates the those point on the line $3x + 2y = 5$ which are equisdistant from the lines $4x + 3y - 7 = 0$ and $2y - 5 = 0$

A. $\left(-\dfrac{1}{14}, \dfrac{73}{28} \right)$

B. $\left(\dfrac{1}{14}, -\dfrac{73}{28} \right)$

C. $\left(\dfrac{1}{16}, -\dfrac{77}{32} \right)$

D. $\left(-\dfrac{1}{16}, \dfrac{77}{32} \right)$

Answer: A

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2. A man wants to distribute 101 coins a rupee each, among his 3 sons with the condition that no one receives more money than the

combined total of other two. The number of ways of doing this is :-

A. $.^{103}C_2 - 3.^{52}C_2$

B. $\dfrac{.^{103}C_2}{3}$

C. $\dfrac{.^{103}C_2}{6}$

D. $.^{103}C_2 - 3.^{50}C_3$

Answer: A

3. If the sum of the first 100 terms of an arithmetic progression is -1 and the sum of the even terms is 1, then the 100th term of the arithmetic progression is

A. $\dfrac{47}{25}$

B. $\dfrac{149}{50}$

C. $\dfrac{74}{25}$

D. $-\dfrac{149}{50}$

Answer: C

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4. The number of solutions of the equation

$$\left(\log_2 \cos \theta\right)^2 + \log. \frac{4}{\cos \theta}\left(16 \cos \theta\right) = 2 \text{ in the}$$

interval $[0, 2\pi)$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

5. Find the equation of the circle whose radius is $5\ and$ which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at the point $(5, 5)$.

A. $(x - 9)^2 + (y + 8)^2 = 25$

B. $(x - 9)^2 + (y - 8)^2 = 25$

C. $(x + 8)^2 + (y + 8)^2 = 25$

D. $(x + 8)^2 + (y - 9)^2 = 25$

Answer: B

6. The value of the integral $\int_{-4}^{4} e^{|x|}\{x\}dx$ is equal to (where $\{.\}$ denotes the fractional part function)

A. e^4

B. $e^4 + 1$

C. $\left(e^4 - 1\right)$

D. e^2

Answer: C

7.   If $f : N \to Z$ defined   as

$$f(n) = \begin{cases} \frac{n-1}{2} & : & \text{if n is odd} \\ \frac{-n}{2} & : & \text{if n is even} \end{cases}$$ and

$g : N \to N$ defined as $g(n) = n - (-1)^n$,

then fog is (where, N is the set of natural

numbers and Z is the set of integers)

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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8. Which of the following is not a tautology?

A. $(p \land q) \rightarrow (p \lor q)$

B. $p \rightarrow (p \vee q)$

C. $q \rightarrow (p \rightarrow q)$

D. $p \rightarrow (p \wedge q)$

Answer: D

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9. If

$y = \tan^{-1} . \dfrac{1}{1 + x + x^2} + \tan^{-1} . \dfrac{1}{x^2 + 3x + 3}$ upto $+ \tan^{-1} . \dfrac{1}{x^2 + 5x + 7} + \ldots + 2n$

terms $(\forall x \geq 0),$ then y(0) is

A. $\tan^{-1}(n)$

B. $\tan^{-1}(2n)$

C. $2\tan^{-1}(n)$

D. 0

Answer: B

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10. If the mean of a set of observations

$x_1, x_2, \ldots\ldots, x_{10}$ is 40, then the mean of

$x_1 + 4, x_2 + 8, x_3 + 12, \ldots\ldots, x_{10} + 40$ is

A. 54

B. 62

C. 38

D. 50

Answer: B

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11. The differential equation of the curve for which the point of tangency (closer to the x - axis) divides the segment of the tangent

between the coordinate axes in the ratio $1:2$, is

A. $xdy = 2ydx$

B. $xdy = ydx$

C. $xdy + 2ydx = 0$

D. $xdy + ydx = 0$

Answer: C

12. The locus of the centre of the circle described on any focal chord of the parabola $y^2 = 4ax$ as the diameter is

A. $y^2 = 2a(x + a)$

B. $y^2 = a(x + a)$

C. $y^2 = 2a(x - a)$

D. $y^2 = 4a(x - a)$

Answer: C

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13. $\displaystyle\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x}\,dx =$

A. $\dfrac{\sin 2x}{2} + C$

B. $-\dfrac{\sin 2x}{2} + C$

C. $\cos 2x + C$

D. $\dfrac{\cos x}{2} + C$

Answer: B

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14. Let

$$f(x) = \begin{vmatrix} 4x+1 & -\cos x & -\sin x \\ 6 & 8\sin\alpha & 0 \\ 12\sin\alpha & 16\sin^2\alpha & 1+4\sin\alpha \end{vmatrix} \text{ and }$$

$f(0) = 0$. If the sum of all possible values of α

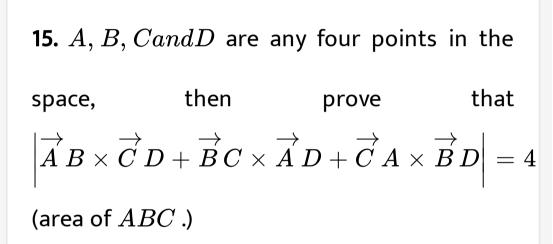is $k\pi$ for $\alpha \in [0, 2\pi]$, then the value of k is

equal to

A. 2

B. 4

C. 6

D. 8

Answer: C

15. $A, B, C and D$ are any four points in the space, then prove that $\left| \overrightarrow{A} B \times \overrightarrow{C} D + \overrightarrow{B} C \times \overrightarrow{A} D + \overrightarrow{C} A \times \overrightarrow{B} D \right| = 4$ (area of ABC .)

A. 2

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

C. 4

D. $\dfrac{1}{4}$

Answer: C

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16. 2 dice are thrown. Suppose a random variable X is assigned a value 2k, if the sum on the dice is equal to k, then the expected value of X is
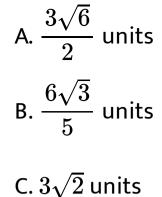
A. 10

B. 12

C. 14

D. $\dfrac{50}{9}$

Answer: C

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17. The length of the perpendicular from P(1,0,2) on the line $\dfrac{x+1}{3} = \dfrac{y-2}{-2} = \dfrac{z+1}{-1}$ is

A. $\dfrac{3\sqrt{6}}{2}$ units

B. $\dfrac{6\sqrt{3}}{5}$ units

C. $3\sqrt{2}$ units

D. $2\sqrt{3}$ units

Answer: A

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18. Let there are exactly two points on the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ whose distance from (0,

0) are equal to $\sqrt{\dfrac{a^2}{2} + b^2}$. Then, the eccentricity of the ellipse is equal to

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

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

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

D. None of these

Answer: C

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19. The area (in sq. units) bounded by the curve $|y| = |\ln|x||$ and the coordinate axes is

A. 2

B. 4

C. 6

D. 8

Answer: B

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20. The volume of a cube is increasing at the rate of $9cm^3/\sec$. The rate $(\text{in }\ cm^2/\sec)$ at which the surface area is increasing when the edge of the cube is 9 cm, is

A. 1

B. 2

C. 3

D. 4

Answer: D

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21. Let M and N are two non singular matrices of order 3 with real entries such that $(adjM) = 2N$ and $(adjN) = M.$ If $MN = \lambda I$, then the value the values of λ is equal to (where, (adj X) represents the adjoint matrix of matrix X and I represents an identity matrix)

22. The value of $\lim\limits_{x \to 0} \dfrac{\ln(2 - \cos 15x)}{\ln^2(\sin 3x + 1)}$ is equal to

23. If the number of terms in the expansion of $(1 + x)^{101}(1 + x^2 - x)^{100}$ is n, then the value of $\dfrac{n}{25}$ is euqal to

24. If the function f(x), defined as

$$f(x) = \begin{cases} \dfrac{a\,(\,1 - x \sin x\,) + b \cos x + 5}{x^2} & : \quad x \neq 0 \\ 3 & : \quad x = 0 \end{cases}$$

is continuous at $x = 0$, then the value of

$\dfrac{b^4 + a}{5 + a}$ is equal to

25. Let the points A, B, C and D are represented

by complex numbers Z_1, Z_2, Z_3 and Z_4

respectively, If A, B and C are not collinear and

$2Z_1 + Z_2 + Z_3 - 4Z_4 = 0$, then the value of

$\dfrac{\text{Area of } \Delta DBC}{\text{Area of } \Delta ABC}$ is equal to

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