MATHS

BOOKS - NTA MOCK TESTS

NTA JEE MOCK TEST 81

Mathematics

1. If the function $f(x)$ is symmetric about the line $x = 3$, then the value of the integral $I = \int_{-2}^{8} \frac{f(x)}{f(x) + f(6 - x)} dx$ is

A. 0

B. 5

C. 10

D. 16

Answer: B

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2. The normal to the parabola $y^2 = 8ax$ at the point (2, 4) meets the parabola again at eh point

A. $(-18, -12)$

B. $(-18, 12)$

C. $(18, 12)$

D. $(18, -12)$

Answer: D

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3. The number of values of $x \in [-2\pi, 2\pi]$ which satisfy the equation $\operatorname{cosec} x = 1 + \cot x$ is equal to

A. 0

B. 2

C. 4

D. 6

Answer: B

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4. If the integral $I = \int \frac{x\sqrt{x} - 3x + 3\sqrt{x} - 1}{x - 2\sqrt{x} + 1} dx = f(x) + C$ (where, $x > 0$ and C is the constant of integration) and $f(1) = \frac{-1}{3}$, then the value of $f(9)$ is equal to

A. 3

B. 6

C. 9

D. 12

Answer: C

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5. The number of ways of arranging the letters AAAAA, BBB, CCC, D, EE and F in a row, if the letters B are separated from one another, is equal to

A. $\frac{13!}{5!3!3!2!}$

B. $\frac{14!}{3!3!2!}$

C. $\frac{15!}{(3!)^2 2!5!}$

D. $.^{13}C_3 \times \frac{12!}{5!3!2!}$

Answer: D

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6. If $a, b, c \in R^+$ such that $a + b + c = 27$, then the maximum value of $a^2b^3c^4$ is equal to

A. $2^8 . 3^{10}$

B. $2^9 . 3^{12}$

C. $2^{10} . 3^{12}$

D. $2^{11} . 3^{13}$

Answer: C

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7. Find the degrees and radians the angle between the hour hand and the minute hand of a clock at half past

three.

A. 90°

B. 80°

C. 75°

D. 60°

Answer: C

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8. If $f(x) = 2\sin x - x^2$, then in $x \in [0, \pi]$

A. $f(x)$ has no local maximum

B. $f(x)$ has one local minimum

C. $f(x)$ has 2 local maxima

D. $f(x)$ has one local maximum

Answer: D

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9. 15 coins are tossed. If the probability of getting at least 8 heads is equal to p, then $\frac{8}{p}$ is equal to

A. 2

B. 4

C. 8

D. 16

Answer: D

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10. A normal line with positive direction cosines to the plane P makes equal angles with the coordinate axis. The distance of the point A(1, 2, 3) from the line $\frac{x-1}{1} = \frac{y+2}{1} = \frac{z-3}{2}$ measured parallel to the plane P is equal to

A. 3 units

B. $\sqrt{13}$ units

C. $\sqrt{14}$ units

D. $2\sqrt{5}$ units

Answer: C

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11. Let $A = \left[a_{ij}\right]_{3\times 3}$ be a scalar matrix whose elements are the roots of the equation $x^9 - 15x^8 + 75x^7 - 125x^6 = 0$. If $|A.\ adjA| = k$, then the vlaue of k is equal to

A. 5^{12}

B. 5^9

C. 3^{12}

D. 3^9

Answer: B

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12. For three non - zero vectors $\vec{a}, \vec{b}$ and $\vec{c}$, if $\left[\vec{a} \quad \vec{b} \quad \vec{c}\right] = 4$, then $\left[\vec{a} \times \left(\vec{b} + 2\vec{c}\right) \quad \vec{b} \times \left(\vec{c} - 3\vec{a}\right) \quad \vec{c} \times \left(3\vec{a} + \vec{b}\right)\right]$ is equal to

A. 12

B. 16

C. 84

D. 144

Answer: D

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13. Let $f:[-1,1] \Rightarrow B$ be a function defined as $f(x)=\cot^{-1}\left(\cot\left(\frac{2x}{\sqrt{3}(1+x^2)}\right)\right)$. If f is both one - one and onto, then B is the interval

A. $\left(0, \frac{\pi}{3}\right)$

B. $\left[0, \frac{2\pi}{3}\right)$

C. $\left[\frac{\pi}{3}, \frac{2\pi}{3}\right]$

D. $\left(\frac{\pi}{3}, \pi\right)$

Answer: C

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14. If p, q are r are three logical statements, then the truth value of the statement $(p \wedge q) \vee (\sim q \rightarrow r)$, where p is true, is

A. True if q is false

B. False if q is false

C. True if q is true

D. False if q is true

Answer: C

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15. If $f(x) = \begin{cases} \frac{e^{[2x]+2x+1}-1}{[2x]+2x+1} & : \quad x \neq 0 \\ 1 & : \quad x = 0 \end{cases}$, then (where $[.]$ represents the greatest integer function)

A. $\lim_{x \to 0^+} f(x) = 1$

B. $\lim_{x \to 0^-} f(x) = e - 1$

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

D. $f(x)$ is discontinuous at x = 0

Answer: D

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16. The set $(A \cup B \cup C) \cap (A \cap B' \cap C')'$ is equal to

A. $A \cap B$

B. $A \cap C'$

C. $B \cup C$

D. $B \cap C$

Answer: C

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17. Let the circumcentre of ΔABC is $S(-1, 0)$ and the midpoints of the sides AB and AC are $E(1, -2)$ and $F(-2, -1)$ respectively, then the coordinates of A are

A. $(0, -3)$

B. $(0, 3)$

C. $(-3, 0)$

D. $(3, 0)$

Answer: B

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18. For a ΔABC the vertices are $A(0, 3), B(0, 12)$ and $C(x, 0)$. If the circumcircle of ΔABC touches the x - axis, then the area (in sq. units) of the ΔABC is

A. 36

B. 27

C. 30

D. 24

Answer: B

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19. The solution of the differential equation $\left(\frac{dy}{dx}\right)^4 - \left(\frac{dy}{dx}\right)^2 - 2 = 0$ is $y = \pm\sqrt{\lambda}x + C$ (where, C is an arbitrary constant). Then, λ^2 is equal to

A. 2

B. 4

C. 8

D. 16

Answer: B

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20. For the complex number z satisfying the condition $\left|z+\frac{2}{z}\right|=2$, the maximum value of $|z|$ is

A. $\sqrt{3}-1$

B. $\sqrt{3}+1$

C. $\sqrt{2}+\sqrt{3}$

D. $\sqrt{3}$

Answer: B

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21. If the area bounded by $y \leq e - |x - e|$ and $y \geq 0$ is A sq. units, then $\log_e(A)$ is equal is

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22. If the middle term in the expansion of $\left(\frac{1}{x} + x \sin x\right)^{10}$ is equal to $7\frac{7}{8}$, then the number of values of x in $[0, 2\pi]$ is equal to

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23. Let $A = \begin{bmatrix} 2 & -1 & 1 \\ -2 & 3 & -1 \\ -4 & 4 & -x \end{bmatrix}$ be a matrix. If $A^2 = A$, then the value of x is equal to

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24. The value of $\lim_{x \to 0} (\cos x + \sin x)^{\frac{1}{x}}$ is equal to to (take e = 2.71)

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25. A tangent of slope 2 of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{1} = 1$ passes through $(-2, 0)$. Then, three times the square of the eccentricity of the ellipse is equal to

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