MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 103

Mathematics

1. If last three digits of the expression 17^{256} are A_1, A_2 & A_3 respectively then the value of expression $2A_2 + A_3 - 44A_1$ equals

A. 0

B. -4

C. 5

D. -7

Answer: D

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2. The line passing through the extremity A of the major axis and extremity B of the minor axis of the elliopse $x^2 + 9y^2 = 9$, meets the auxillary circle at the point M, then the area of the triangle with vertices at A,M and the origin O is N

A. $\frac{31}{10}$

B. $\frac{29}{10}$

C. $\frac{21}{10}$

D. $\frac{27}{10}$

Answer: D

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3. If the expression $(p \oplus q) \wedge (\sim p 0.\ q)$ is equivalent of $p \wedge q$ (where $\odot, \oplus, \in \{\vee, \wedge\},$)then the ordered pair $(\oplus, \odot)$ is equivalent to

A. $(\vee, \wedge)$

B. $(\wedge, \wedge)$

C. $(\vee, \vee)$

D. $(\wedge, \vee)$

Answer: D

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4. The value of x obtained from the equation $\begin{vmatrix} x+\alpha & \beta & \gamma \\ gama & x+\beta & \alpha \\ \alpha & \beta & x+\gamma \end{vmatrix} = 0$

A. 0 and $-(\alpha+\beta+\gamma)$

B. 0 and $(\alpha+\beta+\gamma)$

C. 1 and $(\alpha-\beta-\gamma)$

D. 0 and $\left(\alpha^2+\beta^2+\gamma^2\right)$

Answer: A

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5. If A,B and C are any three sets, then $A \times (B \cup C)$ is equal to

A. $(AxXB) \cup (A \times C)$

B. $(A \cup B) \times (A \cup C)$

C. $(A \times B) \cap (A \times C)$

D. None of these

Answer: A

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6. A hyperbola, having the tranverse axis of length $2\sin\theta$, is confocal with the ellipse $3x^2 + 4y^2 = 12$. Then its equation

is

A. $x^2 \cos ec^2\theta - y^2 \sec^2\theta = 1$

B. $x^2 \sec^2\theta - y^2 \cos ec^2\theta = 1$

C. $x^2 \sin^2\theta - y^2 \cos^2\theta = 1$

D. $x^2 \cos^2\theta - y^2 \sin^2\theta = 1$

Answer: A

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7. For any three positive real numbers, a,b and c if

$4\left(a^2 + 9b^2\right) + 3\left(3c^2 - 2ac\right)$, then $= 6b(2a + 3c)$

A. a,b,c are in A.P

B. a,c,b are in G.P

C. b,c,a are in A.P.

D. a,c,b are in G.P.

Answer: D

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8. Nine digit numbers are formed using 1,2,3,.....9 without repetition. The probability that number is divisible by 4 is

A. $\frac{2}{7}$

B. $\frac{3}{8}$

C. $\frac{1}{9}$

D. $\frac{2}{9}$

Answer: D

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9. Consider three planes $2x + py + 6z = 8, x + 2y + qz = 5$ and $x + y + 3z = 4$, then these planes inresect at a point if

A. $p = 2, q \neq 3$

B. $p \neq 2, q \neq 3$

C. $p \neq 2, q = 3$

D. None of these

Answer: B

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10. If $e^{-\frac{\pi}{2}} < \theta < \frac{\pi}{2}$ then

A. $\cos \log \theta > \log \cos \theta$

B. $\cos \log \theta < \log \cos \theta$

C. $\cos \log \theta = \log \cos \theta$

D. $\cos \log \theta = \frac{2}{3} \log \cos \theta$

Answer: A

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11. The minimum valueof $|z|$ if $|z - 2 - 2i| = 1$, is

A. $2\sqrt{2} - 1$

B. $2\sqrt{2}$

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

D. $2\sqrt{2}-2$

Answer: A

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12. The value of $\lim_{x\to} \frac{\sin 4x - \sin 4x.\cos x}{x^3}$ is

A. 1

B. 2

C. 4

D. 8

Answer: B

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13. How many points of the function $f(x) = \left(e^{|x|} - 1\right)(\ |\ x(x-1)(x-2)$ is not $\left|\left(x^2 - 1\right)\right.$ differentiable?

A. 0

B. 1

C. 2

D. 3

Answer: B

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14. $\int 4 \sin x \cos \frac{\pi}{2} \cos \frac{3x}{2} dx$ is equal to

A. $\cos x + \frac{1}{2} \cos 2x - \frac{1}{3} \cos 3x + C$

B. $\cos x - \frac{1}{2} \cos 2x - \frac{1}{3} \cos 3x + C$

C. $\cos x + \frac{1}{2} \cos 2x + \frac{1}{3} \cos 3x + C$

D. $\cos x - \frac{1}{2} \cos 2x + \frac{1}{3} \cos 3x + C$

Answer: B

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15. If the tangents are drawn from any point on the line $x + y = 3$ to the circle $x^2 + y^2 + 9$, then the chord of contact always passes through fixed point. Find that point

A. (3,5)

B. (3,3)

C. (5,3)

D. None of these

Answer: B

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16. The area (in sdq. Units) of the region $\{(x, y): y^2 \geq 2x$ and $x^2 + y^2 \leq 4x, x \geq 0, y \geq 0\}$ is

A. $\pi - \frac{4\sqrt{2}}{3}$

B. $\frac{\pi}{2} - \frac{2\sqrt{2}}{3}$

C. $\pi - \frac{4}{3}$

D. $\pi - \frac{8}{3}$

Answer: D

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17. $\cos\left(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right)$ would be equal to

A. $\frac{6}{6\sqrt{13}}$

B. $\frac{5}{6\sqrt{13}}$

C. $\frac{6}{\sqrt{13}}$

D. $\frac{5}{\sqrt{13}}$

Answer: A

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18. Equation of image of the line $x + y = \sin^{-1}(\lambda^6 + 1) + 5\cos^{-1}(\lambda^4 + 1) - \tan^{-1}(\lambda^2 + 1)$, where $\lambda \in R$ about x-axis is given by

A. $x - y = 0$

B. $x - y = \frac{\pi}{2}$

C. $x - y = \pi$

D. $x - y = \frac{\pi}{4}$

Answer: D

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19. Differential equation

$\left\{\frac{1}{x}-\frac{y^2}{(x-y)^2}\right\}dx+\left\{\frac{x^2}{(x-y)^2}-\frac{1}{y}\right\}dy=0$ has the solution .....{c is an arbitraty constant }

A. $In\left|\frac{x}{y}\right|+\frac{xy}{(x-y)}=c$

B. $\frac{xy}{(x-y)}=ce^{xy}$

C. $\frac{xy}{(x-y)}=ce^{xy}$

(where c is an arbitrary constant)

D. $\text{In}\left|\frac{x}{y}\right|-\frac{xy}{(x-y)}=c$

Answer: A

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20. If n is a natural number than $\left(\frac{n+1}{2}\right)^n \geq n!$ is true when

A. $n > 1$

B. $n \geq 1$

C. $n > 2$

D. $n \geq 2$

Answer: B

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21. If

$y = (\cos \xi \sin x)(\cos 3x + i \sin 3x) \times (\cos 5x + i \sin 5x)$

and $..(\cos 15x + i\sin 15x)\frac{dy}{dx} - iay = 0$ then find the value of a

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22. If ${}^{n+2}C_8 : {}^{n-2}P_4 = 57:16$ then find the digital sum of n

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23. If

$f(x) = |(x, x-1, x-2), (x+1, \times, +2), (x+1, x-1, x)|$

then evaluate $\sum_{x=1}^{10} f(x)$.

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24. f is a function from $A \to A$ where A={1,2,3,.....,10}. If all the discrete points on the graph of f(x) are joined ten the probability that f is onto and the resulting graphs has only one local minima and no local maxima is $\frac{\lambda}{10^9}$ then the number of factors of λ is

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25. The volumeof the tetrahderon included between the plane

$3x + 4y - 5z - 60 = 0$ and the coordinate plane is equal to

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26. If $\int_0^1 \frac{\log(1+x)}{1+x^2}dx = \frac{\pi}{a^b}\log a$, where G.C.D. $(a, b) = 1$ then find the value of a+b.

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27. If $\Delta ABC, \angle A = 45^\circ, \angle B = 75^\circ$ and $a + c\sqrt{2} = kb$, then find k.

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28. If $\cot\left(7\frac{1}{2}\right)^2 = \sqrt{ab} + \sqrt{a} + \sqrt{b} + a$, then find $\frac{b}{a}$

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29. The number of real solutions of $(7+4\sqrt{3})^{|x|-8}+(7-4\sqrt{3})^{|x|-8}=14$ is

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