MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 37

Mathematics

1. The coefficient of x^{10} in the expansion of: $\left(3x^2 - \frac{1}{x^2}\right)^{15}$ is:

A. $\frac{15!}{10!5!}3^{10}$

B. $-\frac{15!}{10!5!}3^{10}$

C. $-\frac{15!3^5}{10!5!}$

D. $\frac{15!}{7!8!}3^8$

Answer: B

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2. Given that z_1, z_2 and z_3 are complex numbers with $|z_1| = |z_2| = |z_3| = 1, z_1 + z_2 + z_3 = 1$ and

$z_1 z_2 z_3 = 1$, then $|(z_1 + 2)(z_2 + 2)(z_3 + 2)|$ is equal to:

A. 14

B. 15

C. 20

D. 9

Answer: B

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3. Let $f(x) = \ln\left(x + \sqrt{x^2 + 1}\right.$, then the value of determinant:

$$\begin{vmatrix} f(\sin 2017\pi) & f\left(\frac{\sin \pi}{6}\right) & f(e^x) \\ f\left(\frac{\cos(2\pi)}{3}\right) & f\left(\frac{\cos(2017\pi)}{2}\right) & f\left(\frac{\tan \pi}{3}\right) \\ f(-e^x) & f\left(\frac{\cot(5\pi)}{6}\right) & f(0) \end{vmatrix}$$ is:

A. 0

B. $\sqrt{3}$

C. $e^{\sqrt{3}}$

D. π

Answer: A

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4. Which of the following is correct ?

A. f A and B are square matrices of order 3 such that $|A| = -1, |B| = 3$, then the determinant of 3AB is equal to 27.

B. If A is an invertible matrix, then det (A^{-1}) is equal to det (A)

C. If A and B are matrices of the same order, then

$(A+B)^2 = A^2 + 2AB + B^2$ is

possible if AB = 1.

D. None of these

Answer: D

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5. A line is drawn from A(—4, 0) to intersect the curve $\frac{x^2}{8} + \frac{y^2}{4} = 1$ at P and Q above z-axis. If $\frac{1}{AP} + \frac{1}{AQ} \geq \frac{\sqrt{3}}{2}$, then the maximum value of the slope of line is:

A. $2\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. $\frac{4}{5}$

D. $\sqrt{3}$

Answer: B

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6. If $n(A) = 1000, n(B) = 500$ and if $n(A \cap B) \geq 1$ and $n(A \cup B) = p$, then

A. $500 \leq p \leq 1000$

B. $1001 \leq p \leq 1498$

C. $1000 \leq p \leq 1498$

D. $1000 \leq p \leq 1499$

Answer: D

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7. A circle passes through the points of intersection of the parabola $y + 1 = (x - 4)^2$

and x-axis. Then the length of tangent from origin to the circle is:

A. 8

B. 15

C. $\sqrt{8}$

D. $\sqrt{15}$

Answer: D

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8. An equilateral triangle is inscribed in ellipse whose equation is $x^2 + 4y^2 = 4$, one vertex of triangle is (0, 1) and one altitude is contained in y -axis and length of each side is $\sqrt{\frac{m}{n}}$ (where m and n are relatively prime), then m + n is:

A. 937

B. 973

C. 793

D. 739

Answer: A

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9. The number of integral values of a for which three distinct chords of the ellipse $\frac{x^2}{2a^2} + \frac{y^2}{a^2} = 1$ passing through the point $\left(20a, -\frac{a^2}{2}\right)$ are bisected by the parabola $y^2 = 4ax$ is:

A. 14

B. 8

C. 6

D. 20

Answer: A

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10. If $ax^2 + 2hxy - ay^2 = 0, a > 0,$ represents a pair of straight lines forming with $2x + 3y = -8$ an isosceles triangle which is right angled at origin, then (a + h) is:

A. 7

B. 17

C. -7

D. -17

Answer: C

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11. If $x\cos\alpha + y\sin\alpha = p$ is tangent to the curve $y = -\sqrt{x}$, then range of a is:

A. $\cup_{n \in N} (2n\pi, (2n+1)\pi)$

B. $\cup_{n \in N} \left(n\pi, \left(n + \frac{1}{2}\right)\pi\right)$

C. $\cup_{n \in N} \left(\frac{n\pi}{2}, (n+1)\frac{\pi}{2}\right)$

D. $(-\infty, \infty)$

Answer: C

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12. Let P = (-1,0), Q = (0,0) and $R = \left(3, 3\sqrt{3}\right)$ be three point. The equation of the bisector of the angle PQR is:

A. $\frac{\sqrt{3}}{2}x + y = 0$

B. $x + \sqrt{3}y = 0$

C. $\sqrt{3}x + y = 0$

D. $x + \frac{\sqrt{3}}{2}y = 0$

Answer: C

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13. If $\sum_{n=1}^{k}\left[\frac{1}{3} + \frac{n}{90}\right] = 21$, where [x] denotes the integral part of x, then is equal to

A. 84

B. 80

C. 85

D. 86

Answer: B

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14. If the tangent at any point on the curve $x^4 + y^4 = a^4$ cuts off intercepts p and q on

the co-ordinate axes then the value of $p^{-4/3} + q^{-4/3}$ is:

A. $a^{-4/3}$

B. $a^{-1/2}$

C. $a^{1/2}$

D. None

Answer: A

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15. A continuous function $f: R \to R$ satisfies the differential equation $f(x) = \left(1 + x^2\right)\left[1 + \frac{f_0^x (f(t))^2}{1 + t^2} dt\right]$, then f(-3) is:

A. $\frac{13}{10}$

B. $\frac{8}{5}$

C. $\frac{10}{13}$

D. $\frac{5}{8}$

Answer: C

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16. If

$$\int \sqrt{2}\sqrt{1+\sin x}dx = -4\cos(ax+b)+C$$

then the value of (a,b) is :

A. $\left(\frac{1}{2}, \frac{\pi}{4}\right)$

B. $\left(1, \frac{\pi}{2}\right)$

C. (1,1)

D. None of these

Answer: A

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17. p : Every quadratic equation has one real root and q Every quadratic equation has two real roots, then truth value of p and q are:

A. p is true and q is false

B. p is false and q is true

C. p and q both true

D. p and g both false

Answer: D

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18. The S.D. of the following data is nearly:

x_i	140	145	150	155	160	165
f_i	4	6	15	30	36	24

A. 8.64

B. 7.26

C. 7.05

D. None

Answer: B

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19. Number of solutions of the equation

$$\frac{\sqrt{6}-\sqrt{2}}{\sin x}+\frac{\sqrt{2}+\sqrt{6}}{\cos x}=8 \quad \text{in} \quad \left(0, \frac{\pi}{2}\right)$$

is/are:

A. 1

B. 0

C. 2

D. 4

Answer: C

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20. Number of solutions of the equation $\sin^{-1}(\sin 6x) = x$ in $x \in [0, \pi]$ is:

A. 4

B. 5

C. 6

D. 7

Answer: A

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21. The tens digit of 1! + 2! + 3! + ... + 49! Is:

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22. Let k_1 and k_2 are two values of k for which the equation $4x^2 - 4(5x + 1) + k^2 = 0$ has one root equals to two more than the other, then find the value of: $\left(k_1^2 - k_2^2\right)$

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23. Let $\vec{a}$, $\vec{b}$ and $\vec{c}$ be three vectors such that $\left|\vec{b}\right| = 2\left|\vec{a}\right|$ and $3\left|\vec{a}\right|$.The Angle between each pair of vectors is 60° such that $\left|\vec{a} + 2\vec{b} + 3\vec{c}\right| = \sqrt{21}$, then $\sqrt{7}\left|\vec{c}\right|$ is equal to:

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24. Let $(\lim)_{h \to 0}\left(\frac{1}{h\sqrt[3]{8+h}} - \frac{1}{2h}\right) = k$, then find $96k + 3$.

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25. Let $L = \lim_{n \to \infty} \frac{1}{n^3} \sum_{k=1}^{n} k^2 e^{\frac{k}{n}}$, then find the value of e-L

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26. If $f(x) \geq 0 \forall x \in (0, 2)$ and y = f (x) makes positive intercepts having length 2 and 1 unit(s) on coordinate axes respectively and encloses an area of $\frac{3}{4}$ sq. units with axes, then the value of $3 - 4\int_0^2 x f(x) dx$ is:

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27. Find $f(x) = \dfrac{(a^x - 1)^3}{\sin(x \log a)\log\left(1 + x^2 \log a^2\right)}$ and $f(0) = m \log a$. Find m such that f is continuous at $x = 0$.

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28. If x = 9 is the chord of contact of the hyperbola $x^2 - y^2 = 9$, then the equation of

the pair of tangents forming the chord of contact is $ax^2 - by^2 - 18x + 9 = 0$. Find the value of a + b.

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29. If $\tan(\pi \cos\theta) = \cot(\pi \sin\theta)$, then $2\cos^2\left(\theta - \frac{\pi}{4}\right)$ is:

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30. An urn contains 6 white and 4 black balls. A fair die is rolled and that number of balls are chosen from the urn. Find the probability that balls selected are white.

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