MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 57

Mathematics

1. Ket $\left(1+x+x^2\right)^{25}=a_0+a_1x+a_2x^2+\ldots\ldots\ldots+a_{50}x^{50}$. If $A=\left(a_3-a_5+a_7-a_9+\ldots\ldots-a_{49}\right)$., then find $\frac{A}{8}$:-

A. 1

B. 0

C. 3

D. $\frac{3^{25}-1}{2}$

Answer: C

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2. For $\alpha, \beta, \gamma \in R, A = \begin{bmatrix} \alpha^2 & 6 & 8 \\ 3 & \beta^2 & 9 \\ 4 & 5 & \gamma^2 \end{bmatrix}$ and $B = \begin{bmatrix} 2\alpha & 3 & 5 \\ 2 & 2\beta & 6 \\ 1 & 4 & 2\gamma - 3 \end{bmatrix}$. If tr(A) = tr(B), the value of

$\left(\alpha^{-1}+\beta^{-1}+\gamma^{-1}\right)$ is (Where tr(X) = denotes trace of matrix X)

A. 4

B. 3

C. 2

D. 1

Answer: B

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3. Consider the system of equations $2x + P^2y + 6z = 8, x + 2y + 2qz = 5$ and

$x + y + 3z = 4$

A. Given system has unique solution for $P \neq \pm\sqrt{2}$ and $q = \frac{3}{2}$

B. Given system has no solution for $P = \pm\sqrt{2}$ and $q = \frac{3}{2}$

C. Given system has infinite solution for $P = \pm\sqrt{2}$ and $q \in R$

D. None of these

Answer: C

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4. If $\cot(\theta+\alpha), 3\cot\theta, \cot(\theta-\alpha)$ are in AP, then value of $\frac{\sin^2\theta}{\sin^2\alpha}$, wherever defined, is

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

B. 3

C. $\frac{2}{3}$

D. 2

Answer: A

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5. Which of the following is an empty set ?

A. The set of prime numbers which are even

B. The solution set of the equation

$$\frac{2(2x+3)}{x+1} - \frac{2}{x+1} + 3 = 0, x \in R$$

C. $(A \times B) \cap (B \times A)$,where A and B are disjoint.

D. The set of real which satisfy

$$x^2 + ix + i - 1 = 0$$

Answer: C

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6. There are two circles C_1 and C_2 whose radii are r_1, r_2, respectively. If distance between their centre is

$3r_1 - r_2$ and length of direct common tangent is twice of the length of transverse common tangent. Then $r_1 : r_2$ is:

A. $5:4$

B. $6:5$

C. $7:6$

D. $8:7$

Answer: C

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7. For a parabola passing through (1,2), (2,1), (3,4) and (4,3), the equation of axis of the parabola is-

A. $x - y + 3 = 0$

B. $x - y = 0$

C. $x + y - 1 = 0$

D. line $x + y = 0$

Answer: B

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8. The four sides of a quadrilateral are given by the equation $xy(x-2)(y-3)=0$. The equation of the line parallel to $x-4y=0$ that divides the quadrilateral in two equal areas is:

A. $x-4y-5=0$

B. $x-4y+5=0$

C. $x-4y-1=0$

D. $x-4y+1=0$

Answer: B

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9. Let S be the set of real values of A for which the function $f(x) = x^3 - 3(2\lambda - 1)x^2 + 6\lambda x$ has exactly one local maximum and exactly one local minimum, then S can be

A. (0,6)

B. (1,4)

C. $(-\infty, 0)$

D. $(0, \infty)$

Answer: C

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10. The three planes:

$4y + 6z = 5, 2x + 3y + 5z = 5$ &

$6x + 5y + 9z = 10$

A. meet in a point

B. have a line in common

C. form a triangular prism

D. none of these

Answer: B

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11. Solution set of equation:

$\left|1-\log_{\frac{1}{6}} x\right|+\left|\log_2 x\right|+2=\left|3-\log_{\frac{1}{6}} x+\log_{\frac{1}{2}} x\right|$ is $\left[\frac{a}{b}, a\right], a, b \in N$, then the value of (a+b) is:

A. 5

B. 6

C. 7

D. 8

Answer: C

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12. Value of $(\lim)_{x \to 1}(x)^{\frac{1}{\ln x}}$ is:

A. $\frac{1}{e}$

B. e^2

C. e

D. does not exist

Answer: C

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13. If area bounded by curve:

$y = \left|\cos^{-1}(\sin x)\right| + \left|\frac{\pi}{2} - \cos^{-1}(\cos x)\right|$ x-axis and

$\frac{\pi}{2} \leq x \leq \pi$ Is equal to $\frac{\pi^2}{k}$ (where $k \in I$, then k is)

A. 12

B. 8

C. 4

D. 2

Answer: C

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14. If y = f(x) satisfies the differential equation $x\frac{dy}{dx} + y(2x+1) = xe^x$ and f(0) = 0, then the number of solution(s) of $f(x) = \frac{2}{x}$ is equal to:

A. 0

B. 1

C. 2

D. more than 2

Answer: C

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15. If p,q and r are false statements, then which among the following is false ?

A. $-q \vee r$ is true

B. $-r \vee q$ is true

C. $(-q \vee r) \wedge (-r \vee q)$ is false

D. $p \wedge [(-q \vee r) \wedge (-r \wedge q)]$ is false.

Answer: C

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16. $x_1, x_2, \ldots\ldots\ldots, x_{10}$ are 10 observations of x, such that $\sum x_i = 50$ and $\sum x_i x_j = 1100 Aai \neq j$, then standard deviation of $x_1, x_2, \ldots\ldots, x_{10}$ equal to:

A. 5

B. 10

C. $\sqrt{5}$

D. $\sqrt{10}$

Answer: C

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17. Two flagstaffs stand on a horizontal plane. A and B are two points on the line joining their feet and between them. The angles of elevation of the tops of the flagstaffs as seen from A are 30° and 60° and as seen from B are 60" and 45°. If AB is 30m, the distance between the flagstaffs in metres is

A. $3 + 15\sqrt{3}$

B. $45 + 15\sqrt{3}$

C. $60 - 15\sqrt{3}$

D. $60 + 15\sqrt{3}$

Answer: D

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18. If $a\tan^{-1}(e^x) - b\tan^{-1}(e^{-x}) = c$, then value of $\cot^{-1}(e^x)$ is:

A. $\dfrac{a\pi + 2c}{2(a+b)}$

B. $\frac{a\pi - 2c}{2(a+b)}$

C. $\frac{a\pi + 2c}{2(a-b)}$

D. $\frac{a\pi - 2c}{2(a-b)}$

Answer: B

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19. If $A + B = \frac{\pi}{2}$ and sinA + sinA = 1, then sin2A is equal to:

A. 1

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

C. 0

D. $-\frac{1}{\sqrt{2}}$

Answer: C

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20. The equation $k\sin\theta + \cos 2\theta = 2k - 7$ possesses a solution if :

A. $2 \leq k \leq 6$

B. $k > 2$

C. $k > 6$

D. $k < 2$

Answer: A

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21. If z is any complex number satisfying $|z - 4 - ri| = 2$ in argand plane. The maximum and minimum values of |z| are α and β respectively, then $\frac{\alpha + \beta}{4}$ is:

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22. Calculate the number of ways 5 balls can be placed In 3 boxes, such that no box remains empty, if balls as well as boxes are identical ?

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23. $x^2 + 5x^2 + px + q = 0$ and $x^3 + 7x^2 + px + r = 0$, two roots in common. If their third roots are λ_1 and λ_2 respectively, then $|\lambda_1 + \lambda_2|$ is equal to:

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24. At a point A (1,1) on ellipse, equation of tangent is y = x. If one of the foci of ellipse is (0,2) and the coordinates of center of ellipse are (α, β) then the value of $\alpha + \beta$ is (Given length of major axis of ellipse is $4\sqrt{10}$ units)

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25. If the volume of parallelepiped determined by vectors $\left(2\bar{a} \times \bar{b}\right)$, $\left(\bar{b} \times \overline{3c}\right)$ and $5(\bar{c} \times \bar{a})$ is equal to the volume of the parallelepiped determined by vectors $5\left(\bar{a} + \bar{b}\right)$, $6\left(\bar{b} + \bar{c}\right)$ and $2(\bar{c} + \bar{a})$, then find

the volume of parallelepiped determined by vectors $\bar{a}$, $\bar{b}$ and $\bar{c}$ in cubic units.

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26. If $f'(x) = \phi(x)$ and $\phi'(x) = f(x)$ for all x. Also, $f(3) = 5$ and $f'(3) = 4$. Then, value of $[f(10)]^2 - [\phi(10)]^2$ = _____

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27. If $f(x) = \int_x^{x^2} (t-1)dt, 1 \leq x \leq 3$, then global maximum value of $f(x)$ is:

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28. If e Is the eccentricity of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and θ be the angle between the asymptotes, and let $\sec\theta/2$ is equal to Ke, then K is equal to

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29. Find the value of $(fgh)'(0)$, if f, g and h are differentiable functions with f(0) = 1, p(0) = 2, h(0) = 3 and the derivatives of their pair wise products at x = 0 are $(fg)'(0) = 6, (gh)' = 0 = 4$ and $(hf)'(0) = 5.$

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30. Let $f(x) = \max. \left\{ \left| x^2 - 2|x| \right|, |x| \right\}$ and $g(x) = \min. \left\{ \left| x^2 - 2|x| \right|, |x| \right\}$then if f(x) is not differentiable at 'p' number of points and g(x) is non differentiable at 'q' number of points, then find |p-q|.

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