MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 43

Mathematics

1. The co-efficient of x in the expansion of $\left(x^2+\frac{x}{x}\right)^5$ is

A. 20c

B. 10 x

C. $10c^3$

D. $20c^3$

Answer: C

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2. The greatest and the least value of $|z_1 + z_2|$ if $z_1 = 24 + 7i$ and $|z_2| = 6$ respectively are

A. $31, 19$

B. $19, 25$

C. $-19, -25$

D. $-25, -19$

Answer: A

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3. If

$$\Delta(x) = \begin{vmatrix} e^x & \sin 2x & \tan x^2 \\ \ln(1+x) & \cos x & \sin x \\ \cos x^2 & e^x - 1 & \sin x^2 \end{vmatrix} = A + Bx + Cx^2 + \ldots\ldots .$$

then B =

A. 0

B. 1

C. 2

D. None of these

Answer: A

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4. In a regular decagon, the probability that the two diagonal chosen at random will intersect inside the decagon is

A. $\frac{6}{17}$

B. $\frac{12}{17}$

C. $\frac{5}{17}$

D. None

Answer: A

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5. Let $f(x) = \left(x^2 - 5x + 4\right)\left(x^2 + 5x + 4\right)$ and α, β, γ (where $\alpha < \beta < \gamma$) are roots of $f'(x) = 0$, then the value of $\frac{[\alpha]^2 + [\beta + 1]}{[\gamma]}$ is equal to (where [.] denote greatest integer function)

A. 0

B. $\frac{5}{3}$

C. $\frac{5}{2}$

D. 5

Answer: D

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6. If $\sum_{r=1}^{\infty} \tan^{-1}\left(\frac{4}{r^2+r+16}\right) = \tan^{-1}\left(\frac{\alpha}{10}\right)$, then α is

A. 80

B. 40

C. 20

D. 30

Answer: B

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7. For any two real numbers θ and ϕ, we defined $\theta R \phi as \sin^2\theta + \cos^2\phi = 1$, then relation R is

A. reflexie but not transitive

B. symmetric but not reflexive

C. an equivalence relation

D. none of these

Answer: C

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8. Let AB be the chord of constant of the point (5, -5) w.r.t the circe $x^2 + y^2 = 5$, then the locus of the orthocentre of ΔPAB where P is any point moving on the circle is

A. $(x-1)^2 + (y+1)^2 = 5$

B. $(x-1)^2+(y+1)^2=\frac{5}{2}$

C. $(x+1)^2+(y-1)^2=5$

D. $(x+1)^2+(y+1)^2=\frac{5}{2}$

Answer: A

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9. The eccentricity of the hyperbola

$x^2-3y^2-2x-8=0$ is

A. 23

B. 13

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

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

Answer: C

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10. The point (2a, a) lies inside the region bounded by the parabola $x^2 = 4y$ and its latus rectum. Then,

A. $0 \leq a \leq 1$

B. $0 < a < 1$

C. $a > 1$

D. $a < 0$

Answer: B

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11. Let A be (100, 50) , a point B on the line y = x and point C on x-axis such that AB + BC + CA is minimum, then the coordinates of C

is

A. $(50, 0)$

B. $\left(\frac{200}{3}, 0\right)$

C. $\left(\frac{250}{3}, 0\right)$

D. $\left(\frac{400}{3}, 0\right)$

Answer: C

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12. If the line $\frac{x-2}{3} = \frac{y+1}{2} = \frac{z-1}{-1}$ intersects the plane $2x + 3y - z + 13 = 0$ at a point P and the plane

$3x + y + 4z = 16$ at a point Q, then PQ is equal to

A. $2\sqrt{14}$

B. $\sqrt{14}$

C. $2\sqrt{7}$

D. 14

Answer: A

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13. If $\vec{a} = \vec{i} + \vec{j} + \vec{k}$, $\vec{b} = 4\vec{i} + 3\vec{j} + 4\vec{k}$ and $\vec{c} = \vec{i} + \alpha\vec{j} + \beta\vec{k}$ are lineerly independent vectors and $\left|\vec{c}\right| = \sqrt{3}$, then

A. $\alpha = 1, \beta = -1$

B. $\alpha = 1, \beta = \pm 1$

C. $\alpha = -1, \beta = \pm 1$

D. $\alpha = +1, \beta = 1$

Answer: D

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14. If $f(x) = ||\sin(|x| - 2)| - 3|,$ then

A. f(x) is continuous but not differentiable at $x = 4$

B. f (x) is discontinuous at x =4

C. f (x) is differentiable at x =4 and f ' (4) = cos 2

D. f (x) is differentiable at x =4 and f ' (4) =- cos 2

Answer: D

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15. Let f be a composite function of x defined by

$$f(u) = \frac{1}{u^2 + u - 2}\,'u(x) = \frac{1}{x - 1}.$$

Then the number of points x where f is discontinuous is :

A. 6

B. 3

C. 2

D. 1

Answer: B

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16. $\int \frac{3e^x - 5e^{-x}}{4e^x + 5e^{-x}} = ax + b \ln \text{ then } \left(4e^x + 5e^{-x}\right) + c,$

A. $a = -1/8, b = 7/8$

B. $a = 1/8, b = -7/8$

C. $1 = 1/8, b = 7/8$

D. $a = -1/8, b = -7/8$

Answer: A

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17. Let $f(x+y) = f(x).\ f(y)$ for all x and y and f (1) = 2 . If in a triangle ABC, $a = f(3), b = f(1) + f(3), c = f(2) + f(3),$ then 2 A is equal to

A. C

B. 2 C

C. 3C

D. 5C

Answer: A

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18. Let $f(x) = \sin x + 2\sin^2 x + 3\sin^3 x + 4\sin^4 x + ... \infty$

then number of solution (s) of equation f(x) =2

in $x \in [-\pi, \pi] - \left\{\pm \frac{\pi}{2}\right\}$ is -

A. 0

B. 2

C. 4

D. 8

Answer: B

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19. If

$\theta = \sin^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{1}{3}\right)$ and $\theta_2 = \cos^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{1}{3}\right)$,

then

A. $\theta_1 > \theta_2$

B. $\theta_1 = \theta_2$

C. $\theta_1 < \theta_2$

D. None of these

Answer: C

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20. If p is true and q is false then which of the following is having its truth value as true ?

A. $p \rightarrow \sim q$

B. $p \leftrightarrow q$

C. $p \rightarrow \sim p$

D. Both (a) and(c)

Answer: D

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21. Let x be the number of diagonal matrices A of rela etries and order 3×3, such that $A^7 + 3A^5 + 7A = 11I$ and y be the number of diagonal matrices B of complex entries with at least ne non zero real entry and order 3×3, such that $B^5 = I$, then $y - 55x =$ (Where I is an identity matrix of order 3×3)

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22. If $d: A \to B$ where $A = \{2, 3, 4\}$ and $B\{6, 2, 3, 4, 5\}$, then the number of non-decreasing functions on f that can be defined are _____

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23. If the function $f(x) = x^3 + e^{\frac{\pi}{2}}$ and $g(x) = f^{-1}(x)$, then the value of g '(1) = _____

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24. $\int_0^{\frac{1}{2}} \frac{1+\sqrt{3}}{\left((x+1)^2(1-x)^6\right)^{\frac{1}{4}}} dx =$

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25. Let f (x) be a differentiable function and satisfying the equation $f'(x) + f(x) = 4xe^{-x}.\sin 2x$ and $f(0) = 0$ if $\lim_{n\to\infty} \sum_{k=1}^{n} f(k\pi) = \frac{-p\pi e^{\pi}}{(e^{\pi}-1)^2}$ then p =

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26. The mean of 10 terms is 3. If the first term is increased by 1, second by 2, third by 3 and so on, then the new mean is -

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27. Find the value of $f(e^{4.2})$, if $3f(x) - f\left(\frac{1}{x}\right) = \log x^4$ for all x where $x \neq 0$.

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28. Let $F(x) = \int_x^{\frac{\pi}{3}+x^2} 2\cos^2 t dt, x \in R$ and $f: \left[0, \frac{1}{2}\right] \to [0, \infty)$ be a continuous function . For $a \in \left[0, \frac{1}{2}\right]$. $IfF'(a) + 2$ is the area of the region bounded by $y = f(x), x = 0,$ x-axis and $x = a,$ then find f(0).

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29. If number of ways of arranging letters aaaabbbbccdd' in a line so that there should be at least one 'b' in between $2a'sisk$. Then |14855-k| is

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30. Consider the three vectors

$\lambda\hat{i}+\hat{j}+2\hat{k}, \hat{i}+\lambda\hat{j}-\hat{k}$ and $2\hat{i}-\hat{j}+\lambda\hat{k}$ are coplanar, ten $|\lambda|$ is equal to

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