MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 70

Mathematics

1. Suppose that f and g are function such that

(i) $g(x) = f'(x)$ and

(ii) $f''(x) = -f(x)$

If $h(x) = f^2(x) + g^2(x)$ satisfies h(0)=2010 then the value of $h\left(\sqrt{\pi}\right)$ is

A. 0

B. 1

C. 2010

D. None of these

Answer: C

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2. The point at shortest distance from the line $x + y = 7$ and lying on an eillipse $x^2 + 2y^2 = 6$, has co ordinates

A. $(\sqrt{2}, \sqrt{2})$

B. $(0, \sqrt{3})$

C. $(2, 1)$

D. $\left(\sqrt{5}, \frac{1}{\sqrt{2}}\right)$

Answer: C

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3. Let x,y,z and w be whole numbers. Then the number of 4 digit numbers xyzw that can be formed such that $x < y$ and $z > w$ is

A. $1,008$

B. $1,296$

C. $1,620$

D. $2,025$

Answer: C

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4. p:57 is an odd prime number.

q:8 is divisor of 24.

r:12 is L.C.M of 5 and 3 are three logical statements, then which one of the following is false?

A. $p \vee (\sim q \wedge r)$

B. $\sim p \vee (q \wedge r)$

C. $(p \wedge)v \sim r$

D. $(p \vee q) \wedge \sim r$

Answer: A

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5. IF $\begin{bmatrix} \alpha & \beta \\ \gamma & -\alpha \end{bmatrix}$ is to be the square root of order two unit matrix, then α, β and γ should satisfy the relation

A. $1 + \alpha^2 + \beta\gamma = 0$

B. $1 - \alpha^2 - \beta\gamma = 0$

C. $1 - \alpha^2 + \beta\gamma = 0$

D. $\alpha^2 + \beta\gamma - 1 = 0$

Answer: D

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6. The equation of the common tangent to the parabolas $y^2 = 4ax$ and $x^2 = 4$ by is given by

A. $xa^{1/3} + yb^{1/3} + a^{2/3}b^{2/3} = 0$

B. $xb^{1/3} + ya^{1/3} + a^{2/3}b^{2/3} = 0$

C. $x^{1/3} + yb^{1/3} - a^{2/3}b^{2/3} = 0$

D. None of the

Answer: A

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7. The range of a such that the line $\left(\log_2\left(1+5a-a^2\right)\right)x-5y-a^2-5$ is =0 a normal to the curve $xy=1$ is

A. $(-\infty, 0)$

B. $(5, \infty)$

C. $(0, 5)$

D. None of these

Answer: C

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8. If $a, b, c \in R^+$ such that $a + b + c = 27$ and maximum value of $a^2b^3c^4 = 2^m \times 3^n$m, then the sum of six A.M.'s between m and n is

A. 66

B. 132

C. 120

D. 176

Answer: A

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9. If 12 identical balls are to be placed randomly in 3 identical boxes, then the probability that one of the boxes contains exactly 3 balls is

A. $\frac{4}{19}$

B. $\frac{55}{3}\left(\frac{2}{3}\right)^{11}$

C. $\frac{(428)^{12}C_3}{3^{11}}$

D. $\frac{5}{19}$

Answer: C

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10. The minimum distance of the curve $y^2 = 2x^3 + 9 - 3x^2$ from point $Q(1, 0)$ is

A. 2

B. $2\sqrt{2}$

C. $4\sqrt{2}$

D. 8

Answer: B

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11. The value of

$$\lim_{x \to \infty} \arccos\left(\frac{arc\sin\left(\frac{\pi}{x}\right) + \arctan\left(\frac{x}{\pi}\right)}{x\sin\frac{\pi}{x}}\right)$$ is

equal to

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

B. $\frac{\pi}{6}$

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

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

Answer: A

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12. Let $f(x) = \max\{\cos x, x, x^2\}$ in $-3 \leq \leq 3$ then

A. f(x) is continuous everywhere but not differentiable at exactly 3 ponts

B. f(x) is continuous everywhere but not differentiable at exactly 2 points

C. f(x) is not differentiable at 4 points

D. None of these

Answer: A

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13. The value of $\int x^3\sqrt{3+5x^4}\,dx$ equals

A. $\frac{1}{30}\left(3+5x^4\right)^{3/2}+c$

B. $\frac{1}{20}\left(3+5x^4\right)^{1/2}+c$

C. $\frac{1}{20}\left(3+5x^4\right)^{3/2}+c$

D. $\frac{1}{30}\left(3+5x^4\right)^{1/2}+c$

Answer: A

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14. If in a $\Delta ABC, \angle C = 90^\circ$, then value of $\tan(A-B)$ is

A. $\frac{\left|a^2+b^2\right|}{2ab}$

B. $\frac{|a^2 - b^2|}{2ab}$

C. $\frac{c^4}{2ab}$

D. $\frac{ca}{2b}$

Answer: B

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15. The slope of the tangent to a cruve $y = f(x)$ at $(x, f(x)0$ is $2x + 1$.If the curve passes through the point (1,2) then the area of

the region bounded by the curve,the x-axis and the lien x=1 is

A. $\frac{5}{6}$ sq. units

B. $\frac{6}{5}$ sq.units

C. $\frac{1}{6}$ sq. units

D. 6 sq. units

Answer: A

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16. In $\Delta ABC, \angle a = \frac{\pi}{6}$ then the maximum value of $\sin^2 B + \sin^2 C$ is

A. $\sqrt{3} - 1$

B. $1 + \frac{\sqrt{3}}{2}$

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

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

Answer: B

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17. If $\sin^{-1}\left(\frac{x}{5}\right) + \sec^{-1}\left(\frac{5}{3}\right) = \frac{\pi}{2}$ tne a value of x is

A. 1

B. 2

C. 3

D. 4

Answer: C

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18. Find the quartile deviation of daily wages (in Rs.) of 7 persons given below:

Wages is Rs. 12,7,15,10,17,17,25

A. 14.5

B. 5

C. 9

D. 4.5

Answer: B

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19. The solution of the curves $\frac{xdx+ydx}{xdy-ydx}=\sqrt{\frac{1-x^2-y^2}{x^2+y^2}}$ are

A. circles passing through the origin

B. parabola

C. circles of radius $\frac{1}{2}$ through the origin

D. not circle

Answer: C

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20. Let $R = \{(x, y) : x, y \in N$ and $x^2 - 4xy + 3y^2 = 0\}$ where N is the set of all natural numbers. Then the relation R is

A. reflexive but neither symmetric nor transitive

B. Symmetric and transitive

C. reflexive and symmetric.

D. reflexive and transitive

Answer: D

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21. The sumof the coefficients of even powers of x in the binomial expansion of $\left(1+x+x^2+x^3\right)^5$ is

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22. A is a square matrix of order n

l=m maximum number of distinct entries if A is a triangular matrix,

m=maxmum numberof distinct entries if A is a

diagonal matrix,

p=minimum number of zerois if A is a triangular matrix,

If $l - p = 2m - 5$, then the order of the matrix is ...

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23. Let a,b are two integers such that $a, b \in \{1, 2, 3, 4, 5, 6, \}$ then the number of ordered pairs of (a,b) which satisfy the equation $\left(\frac{a^x + b^x}{2}\right)^{\frac{2}{x}} = 6$ is

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24. A plane P is perpendicular to the vector $\vec{A} = 2\hat{i} + 3\hat{j} + 6\hat{k}$ and cotains the point $B\left(\hat{i} + 5\hat{j} + 3\hat{k}\right)$. Then find square of the pependicular disance from the origin to the plane P.

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25. In a triangle ABC $2\hat{i}+\hat{j}, 5\hat{i}+\hat{j}$ & $2\hat{i}+7\hat{j}$ be the position vectors of points A,B& C respectively. Let $\overrightarrow{AB}, \overrightarrow{AB}$ & $\overrightarrow{AC}$ are non coplanar vectors. If M is minimum integral value of $\left(\overrightarrow{AD}\right)^2+\left(\overrightarrow{BD}\right)^2+\left(\overrightarrow{CD}\right)^2$ then sum of digits of M is

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26. Let $|z-2-3i|=1$ and the greatest value of $|z|$ is $r+\sqrt{c}$ then the value of

$\sqrt{r+c+2}$ is

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27. If $F(a)=\int_0^1 \frac{\sin(\pi+Ina^x)dx}{x}$ and $a>0$, then $\left|\lim_{a\to 1} F'(a)\right| =$

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28. If the minimum distance between the curves

$y = \cos^{-1}\left(\frac{(x^2 - 4x + 5)\sin^{-1}(1-x)}{\cot^{-1}(\cos^{-1}(3-x))}\right)$

& $(x-8)^2 + (y-\pi)^2 = 1$ is equal to α then the value of $\frac{25}{\alpha}$ is

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29. The ratio in which the line joining the points (-1,1) and (5,7) is divided by the line $x + y = 1$ is$1 : \alpha$ then the value of α is .

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30. Let k are roots of equation $8x^3 + 1001x + 2008 = 0,$ then the value of $(r+s)^3 + (s+t)^3 + (t+r)^3$ is 7k3 (where k is at ten's place). Then k=

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