MATHS

BOOKS - NTA MOCK TESTS

NTA TPC JEE MAIN TEST 69

Mathematics

1. Let f " (x) = $\sec^4 x + 6$ and f(0) = f'(0) = 0 then f(x) is

A. $\frac{1}{3}$ln (sec x) + 1/6$\tan^2$ x + $3x^2$

B. $\frac{2}{3}\ln(\sec x) + \frac{1}{3}\tan^2 x + 3x^2$

C. $-\frac{1}{3}\ln(\cos x) + \frac{1}{3}\tan^2 x + 3x^2$

D. $\frac{2}{3}\ln(\sec x) + \frac{1}{6}\tan^2 x + 3x^2$

Answer: D

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2. The locus of the mid- point of the chords of the ellipse $49x^2 + 16y^2 = 784$, the tangents at the ends of which intersect on the circle $x^2 + y^2 = 100$ is

A. $\left(49x^2+16y^2\right)^2$

$=\left(\frac{784}{10}\right)^2\left(x^2-y^2\right)$

B. $\left(49x^2+16y^2\right)=\frac{784}{10}$

C. $\left(49x^2+16y^2\right)^2$

$=\left(\frac{784}{10}\right)^2\left(x^2+y^2\right)$

D. None of these

Answer: C

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3. A positive integer n is of the form $n = 2^{\alpha}3^{\beta}$, where $\alpha, \beta > 1$. If n has 12 positive divisors and 2n has 15 positive divisors then number of positive divisors of 6n is

A. 21

B. 20

C. 16

D. 15

Answer: B

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4. If p : "All rational numbers are real numbers" and q: "All real numbers are not complex numbers" then which of the following is correct :

A. $p \vee q$ = F(false)

B. $p \wedge q$ = T(true)

C. $P \rightarrow q$= F(false)

D. $p \leftrightarrow q$ = T(True)

Answer: C

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5. If P = $\begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ \frac{-1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}$, $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and Q = PAP^T then $P^T Q^{2005}$ P is equal to

A. $\begin{bmatrix} 1 & 2005 \\ 0 & 1 \end{bmatrix}$

B. $\begin{bmatrix} \frac{\sqrt{3}}{2} & 2005 \\ 1 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 1 & 2005 \\ \frac{\sqrt{3}}{2} & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & \frac{\sqrt{3}}{2} \\ 0 & 2005 \end{bmatrix}$

Answer: A

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6. The straight line joining any point P on the parabola y^2 = 4ax to the vertex and perpendicular from the focus to the tangent at P, intersect at R, then the equation of the locus of R is -

A. $x^2 + 2y^2$ - ax = 0

B. $2x^2 + y^2$ - 2ax = 0

C. $2x^2$ + $2y^2$ - ay = 0

D. $2x^2 + y^2$ - 2ay = 0

Answer: B

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7. Area of the quadrilateral formed with the foci of the hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is

A. $4\left(a^2 + b^2\right)$

B. $2\left(a^2 + b^2\right)$

C. $\left(a^2 + b^2\right)$

D. $1/2\left(a^2 + b^2\right)$

Answer: B

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8. If all roots of the equation f (x) = $x^6 - 12x^5 + bx^4 + cx^3 + dx^2$ are +ex+ 64 = 0 positive, then which has the greatest numerical (absolute) value

A. b

B. c

C. d

D. e

Answer: D

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9. Box contains 2 one rupee, 2 five rupee, 2 ten rupee and 2 twenty rupee coin. Two coins are drawn at random simultaneously. The probability that their sum is Rs. 20 or more, is

A. 0.25

B. 0.5

C. 0.75

D. 0.125

Answer: B

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10. The equation of normal to the curve $y = 2x^3$ + 6x + 5, which is parallel to $x + 12y + 15 = 0$ is

A.

B. x + 12y - 157 = 0

C. x + 12y - 108 = 0

D. x + 12y + 13 = 0

Answer: B

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11. If f (a) = 3, f' (a) = - 2, g (a) = - 1,, g' (a) = 4 then

$$\lim_{x \to a} \frac{g(x)f(a) - g(a)f(x)}{x - a}$$

A. -5

B. 10

C. -10

D. 5

Answer: B

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12. If the function f (x) is

$$= \begin{cases} -x & x < 1 \\ a + \cos^{-1}(x + b) & 1 \leq x \leq 2 \end{cases}$$

differentiable at x = 1, then $\frac{a}{b}$ is equal to :-

A. $\frac{\pi + 2}{2}$

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

C. $\frac{-\pi - 2}{2}$

D. $-1 - \cos^{-1}(2)$

Answer: A

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13. $\int \frac{3\cos x}{2\cos x + 5\sin x}$ dx is equal to [Note : where C is integration constant]

A. $\frac{15}{29}x + \frac{6}{29}\text{In}|2\cos x + 5\sin x| + C$

B. $\frac{6}{29}x - \frac{15}{29}\text{In}|2\cos x + 5\sin x| + C$

C. $\frac{6}{29}x + \frac{15}{29}In|2\cos x + 5\sin x| + C$

D. None of these

Answer: C

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14. If x cos $\theta = y\cos\left(\theta + \frac{2\pi}{3}\right)$, then value of = z cos ($\theta + \frac{4\pi}{3}\Big)xy + yz + zx$ is

A. 1

B. 0

C. 2

D. 3

Answer: B

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15. The area bounded by the curve $y^2(2a - x) = x^3$ and the line x = 2 a is

A. $3\pi a^2$ sq. unit

B. $\frac{3\pi a^2}{2}$ sq.unit

C. $\frac{3\pi a^2}{4}$

D. $\frac{6\pi a^2}{5}$ sq. unit

Answer: B

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16. If $a^{2x} - 14a^x + 53 + ||b+3| - 4|$ where $= |4\cos\theta|$

x , a, b and $\theta \in$ R, then the sum of the possible values of bis equal to

A. -6

B. 6

C. 4

D. -4

Answer: A

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17. If the equation

$\sin^{-1}\left(4x^2 - 12x + 10\right) + \cos^{-1}\left(12x - 4x^2 - 10\right) +$

lamda$x = 0$ has a real solution, then λ is equal to

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

B. $-\pi$

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

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

Answer: B

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18. If the standard deviation of the observations

$-5, \ -4, \ -3, \ -2, \ -1, o, 1, 2, 3, 4, 5$

is $\sqrt{10}$ then standard deviation for the observations

` -5, -3, -1, 1 , 3, 5, 7, 9, 11, 13, 15 is

A. $2\sqrt{10}$

B. $3\sqrt{10}$

C. $2\sqrt{15}$

D. $3\sqrt{15}$

Answer: A

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19. If y = y(x)and

$$\frac{2+\sin x}{(y+1)}\frac{dy}{dx} = -\cos x, y(0) = 1 \text{ then } y\left(\frac{\pi}{2}\right) \text{ is}$$

equal to

A. $\frac{1}{3}$

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

C. $\frac{1}{4}$

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

Answer: A

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20. Given two real sets

$A = \{a, a_2, a_3 \ldots a_{2n}\}$ and

$B = \{b_1, b_2, \ldots b_n\}$. If f : $A \to B$ is a function such that every element of B has an inverse image and

$f(a_1) \leq f(a_2) \leq f(a_3) \leq f(a_4) \ldots \leq f(a_{2n}),$

then the number of such mappings are

A. $2n_{C_n}$

B. $2n_{C_{n-1}}$

C. $2n - 1_{C_{n-1}}$

D. $2n + 1_{C_n}$

Answer: C

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21. Consider,

f (x) = $\sqrt{\frac{\pi}{2} - \tan^{-1}\sqrt{\frac{-x^2}{(x^2-9)(x-7)^2(x-9)(x-3)}}}$

a_i are the integral values of x for which f (x) is defined and

$a_i < a_i + 1 \forall i = 1, 2, ...8$ If the matrix A = $\begin{bmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{bmatrix}$ and $B^3 - pB^2 + qB - rI = 0$, (where B = adjA), then (2r + p) =

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22. If $\log_{245} 175 = a, \log_{1715} 875 = b$ then $\frac{1-ab}{a-b}$ =

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23. If the line of intersection of plane

P : 2x + y + z = 2 with xy plane is L_1,

with zx plane is L_2 and with yz plane is

L_3 then the area of triangle formed by

lines L_1, L_2, L_3 is $\triangle$, then the value of $\triangle^2$ is

equal to

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24. Let $L_1 : \frac{x-1}{3} = \frac{y-2}{1} = \frac{z-3}{-3}$ be a line and P : 4x + 3y + 5z = 50 be a plane. L_2 is parallel to the line L_1. If a plane P containing both the lines L_1 and L_2 are given by the equation 14x - by+ 5z + d = 0 (b,d $\in$ R), then the value of (b-d) is equal to

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25. Let z be a complex number i.e z = cosθ+ i sinθ which is a root of the equation

$$x^n + p_1^{x^{n-1}} + p_2^{x^{n-2}} + \ldots\ldots + P_n = 0$$

where i =$\sqrt{-1}$ and $p_1, p_2, p_3 \ldots\ldots . p_n \in R,$ then

the value of 2 + 7 $(p_1 \sin\theta + p_2 \sin 2\theta + p_3 \sin 3\theta$ is +.....+ $p_n \sin(n\theta))$

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26. Let f be a real-valued function defined on the interval (- 1, 1) such that $f(x).\, e^{-x} = 2 + f_0^x \sqrt{t^4 + 1} dt$ for all x $\in$ (- 1, 1). If f^{-1} is the inverse function off, then the value of $3\left(f^{-1}\right).(2)$ is

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27. AB is any chord of the circle $x^2 + y^2 - 6x - 8y - 11 = 0$, which subtend 90° at (1, 2). IF locus of mid-point of AB is circle $x^2 + y^2 - 2ax - 2by - c = 0$, then value of (a + b + c) .

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28. The distance of the line 2 x - 3 y = 4 from the point (1, 1) measured along the line x + y = 1 is- (use $\sqrt{2}$ = 1. 41)

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29. If α, β, γ are roots of the cubic equation $x_3 + 2x_2 + 3x + 3 = 0$, then the value of $\left(\frac{\alpha}{\alpha+1}\right)^3 + \left(\frac{\beta}{\beta+1}\right)^3 + \left(\frac{\gamma}{\gamma+1}\right)^3 =$ _ _

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