# MATHS

## BOOKS - NTA MOCK TESTS

## NTA TPC JEE MAIN TEST 51

**Mathematics**

**1.** If $\left(1+x+x^2\right)^{100} = a_0 + a_1 x + a_2 x^2 + \ldots\ldots + a_{200} x^{200}$ where $a_0, a_1, a_2, \ldots\ldots, a_{200}$ are real constant and x is a variable then $a_0 + a_1 + a$, equals

A. 5050

B. 4949

C. 5151

D. 5252

**Answer: C**

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**2.** If $z_1, z_2, z_3, z_4$ be the vertices of a quadrilateral taken in order such that $z_1 + z_3 = z_2 + z_4$ and $|z_1 - z_3| = |z_2 - z_4|$ , then arg $\left(\frac{z_1 - z_2}{z_3 - z_2}\right)$ =

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

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

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

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

**Answer: B**

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**3.** If the system of equation, $\lambda x + 2y + 3z = x$

$\lambda y - 2z = y$

$y + \lambda z = 4z$

have a non zero solution then sum of all possible values of $\lambda$ is

A. 2

B. $-5$

C. 6

D. 8

**Answer: C**

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**4.** In a $\Delta ABC$ , if $\begin{vmatrix} 1 & a & b \\ 1 & c & a \\ 1 & b & c \end{vmatrix} = 0$ then value of $\tan^2\left(\frac{A}{2}\right) + \tan^2\left(\frac{B}{2}\right) + \tan^2\left(\frac{C}{2}\right)$ is equal to

[ Note: All symbols used have usual meaning in $\Delta ABC$]

A. $-1$

B. 0

C. 1

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

**Answer: C**

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**5.** The number of five digit numbers that can be formed using all the digits 0,1,3,6, 8 greater than 30,000 that are divisible by 11 is

A. 10

B. 8

C. 12

D. 16

**Answer: C**

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**6.** The equation $x^2 + \left(1 - 2^{2013}\right)x + 2^{2012}\left(2^{2012} - 1\right) - 2 = 0$ have roots $\alpha$ and $\beta$ then the value of $(\alpha - \beta)^{2014}$ is

A. $\left(2^{2012} - 1\right)1007$

B. $(3)^{4018}$

C. $3^{2014}$

D. $(2)^{1007}$

**Answer: C**

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**7.** Value of $\frac{5}{(2+4)^2}+\frac{7}{(2+4+6)^2}+\frac{9}{(2+4+6+8)^2}+\ldots\ldots\infty$ is

A. $\frac{1}{9}$

B. $\frac{1}{8}$

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

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

**Answer: C**

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**8.** Given that relation R= {(1,2,), (2,3)} on the set {1,2,3}, the minimum number of ordered pairs which when added to R make it an equivalence relation is

A. 5

B. 6

C. 7

D. 8

**Answer: C**

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**9.** The length of the diameter of circle whose normal at the point (-4,3) cuts the circle again at point common to the line 5x +y = 0 and $x^2 + y^2 - \frac{x}{5} + y = 0$ is

A. $4/3$

B. $3/5$

C. $\frac{29}{5}$

D. 10

**Answer: C**

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**10.** Two tangents to the hyperbola $\frac{x^2}{100} - \frac{y^2}{81} = 1$ having slopes $m_1$ and $m_2$ cuts the coordinate axes at four concyclic points. If $m_1$ and $m_2$ satisfy the equation $2\alpha^2 - 5\alpha + k = 0$, then the value of k is

A. 1

B. 2

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

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

**Answer: B**

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**11.** The acute angle between the curve $y = xe^{-x}$ and the straight line 3x + 2y = 0 is

A. $\frac{\pi}{2} - \tan^{-1}\frac{3}{2}$

B. $\frac{3\pi}{4} - \tan^{-1}\frac{3}{2}$

C. $\pi - \tan^{-1}\frac{3}{2}$

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

**Answer: B**

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**12.** Consider the planes $P_1: 2x - y + 2z = 1, P_2: x + 2y - z$ and $= 2$ $P_3: 3x + 6y - 3z = 6$. Then the number of point(s) where plane $P_1, P_2$ and $P_3$ intersect is/are

A. 0

B. exactly one

C. exactly two

D. infinite

**Answer: D**

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**13.** Three unit vector $\hat{p}, \hat{q}, \hat{r}$ are such that $\hat{p} + \hat{q} = \hat{r}$ , then $|\hat{p} - \hat{q} + \hat{r}|$ is

A. 1

B. $\sqrt{2}$

C. $\sqrt{3}$

D. 2

**Answer: D**

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**14.** Let $f(x) = e^x, g(x) = \sin^{-1} x$ and $h(x) = f(g(x))$ then h'(x)/h(x) =

A. $e^{\sin^{-1} x}$

B. $1/\sqrt{1-x^2}$

C. $\sin^{-1} x$

D. $1/(1-x^2)$

**Answer: B**

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**15.** Let

$$L = \Pi_{n=3}^{\infty}\left(1 - \frac{4}{n^2}\right), M\Pi_{n=2}^{\infty}\left(\frac{n^3 - 1}{n^3 + 1}\right), N = \Pi_{n=1}^{\infty}\frac{\left(1 + n^{-1}\right)^2}{1 + 2n^{-1}}$$

then the value of $L^{-1} + M^{-1} + M^{-1}$ is

A. 0

B. 1

C. 8

D. 10

**Answer: C**

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**16.** If

$I_1 = \int_{-5}^{6} \frac{(dx)}{(6+2x-2x^2)(1+e^3-6x)}$ and $I_2 = \int_{-5}^{6} \frac{dx}{6+2x=2x^2}$ then $\frac{l_1}{l_2}$ is equal to

A. 1

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

C. 2

D. none of these

**Answer: B**

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**17.** The solution of the differential equation $2x^3ydy + \left(1-y^2\right)\left(x^2y^2+y^2-1\right)dx$ is = 0 (Note: Where C is a constant)

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

B. $x^2y^2 = (Cx + 1)(1 + y^2)$

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

D. none of these

**Answer: C**

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**18.** If $f(x) = 2\sin^2 x + \cos^4 x + 3 \forall x \in R$, then number of integers in range of f (x), is

A. 1

B. 2

C. 3

D. 4

**Answer: B**

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**19.** The area enclosed by the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1, \frac{(x-7)^2}{16}+\frac{y^2}{4}=1$ and y = 2 is

A. $\frac{28-\pi}{2}$ sq. units

B. $\frac{28-3\pi}{2}$ sq. units

C. $\frac{28-5\pi}{2}$ sq. units

D. $\frac{28-7\pi}{2}$ sq. units

**Answer: D**

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**20.** If $\sum_{n=1}^{89} \frac{1}{\sin((n+1)k)\sin nk} + \frac{\cot 90k}{\sin k} = \frac{2}{3}$, then k is given by

A. $n\pi \pm \frac{\pi}{3}l, n \in I$

B. $2n\pi \pm \frac{\pi}{3}l, n \in I$

C. $n\pi \pm \frac{\pi}{6}l, n \in$

D. $2n\pi \pm \frac{\pi}{6}l, n \in I$

**Answer: B**

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**21.** Suppose P and Q be two distinct points on the parabola having equation $y^2 = 4x$ such that circle for which PQ is diameter passes through vertex of the given parabola. If area of OPQ(O is origin) is 20 sq. units and the diameter of circumcircle of OPQ is d units, then $\frac{d^2}{65}$ =

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**22.** A point on the hypotenuse of a right angled triangle is at distance 8 cm and 1 cm from the other sides of the triangle. Minimum length of hypotenuse is $\sqrt{\lambda}$ Then value of $\frac{\lambda}{10}$ is

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**23.** If $g(x) = \left(4\cos^4 x - 2\cos 2x - \frac{1}{2}\cos 4x - x^7\right)^{\frac{1}{7}}$ then the sum of digits of the value of g(g(100)) is equal to

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**24.** Consider $I = \int \frac{2x+4}{(x^2+2x+2)^2} dx = f(1+x)$ then $+\frac{g(x)}{(x+1)^2+1} + c$ the number of solutions of the equation g(x) = f(x + 1) is/are:

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**25.** If the value of the expression $\tan\left(\frac{1}{2}\cos^{-1}\frac{2}{\sqrt{5}}\right)$ is is in the form of $a+\sqrt{b}$ where $a, b \in Z$, then the value of $\frac{a+b}{b}$ is

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**26.** A bag contains a mixed lot of red and blue balls. If two balls are drawn at random, the probability of drawing two red balls is 5 times the probability of drawing two blue balls. Also, the probability of drawing one ball of each colour is six times the probability of drawing two blue balls. The number of balls in the bag is equal to

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**27.** Let $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ and f is differentiable everywhere on R except at two isolated points, say $x_1$ and $x_2$ Then the value of $x_1^2 + x_2^2$ is equal to

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**28.** The area bounded by $y = -x(x-3)^2$ and $y = -x$, in sq. units, is equal to units , is equal to

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**29.** If $x_1, x_2, x_3 \ldots\ldots$ are in G. P. of natural numbers such that the product of four terms $x_1x_2x_3x_4 = 64$ and $x_5 = 4^k$, then the value of k is equal to

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**30.** The coefficient of variation of a data is 57% and the the standard deviation of the data is 3.42, then the arithmetic mean of the data is

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