# MATHS

## BOOKS - NTA MOCK TESTS

## NTA TPC JEE MAIN TEST 63

**Mathematics**

**1.** Consider the polynomial $f(x) = 2x^4 - ax^3 + 2bx^2 + cx - d$, where $a, b, c, d \in R$ and $f(i) = f(3+i) = 0$then the value of b+d is

A. $-5$

B. $9$

C. 11

D. 7

**Answer: B**

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**2.** If the system of linear equations:

$x_1 + 2x_2 + 3x_3 = 6$

$x_1 + 3x_2 + 5x_2 = 9$

$2x_1 + 5x_2 + ax_3 = b$ is consistent and has infinite number of solutions, then:

A. a=8, b can be any real number

B. b= 15, a can be any real number

C. $a \in R - \{8\}$ and $b \in R - \{15\}$

D. $a = 8, b = 15$

**Answer: C**

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**3.** The number of arrangements of the word 'PARABOLA' under the condition that consonants and vowels occur alternately is

A. 48

B. 24

C. 192

D. 216

**Answer: C**

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**4.** Let $S = \frac{8}{5} + \frac{16}{65} + \frac{24}{325} + \ldots . + \frac{128}{2^{18}+1}$, then

A. $S = \frac{1988}{545}$

B. $S = \frac{545}{1088}$

C. $S = \frac{1056}{545}$

D. $S = \frac{545}{1056}$

**Answer: A**

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**5.** If $A = \{1, 2, 3, 4\}$, then a relation $R = \{(1, 1), (2, 2), (3, 3), (4, 4), \text{on}(2, 4), (1, 3), (1, 4), (1, 2)\}$ set A is

A. reflexive and symmetric only

B. an equivalence relation

C. reflexive only

D. reflexive and transitive only

**Answer: D**

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**6.** The eccentricity of an ellipse whose length of latus rectum is equal to distance between its foci, is

A. $2\sin 18^\circ$

B. $2\cos 36^\circ$

C. $\sin 18^\circ$

D. $\cos 36^\circ$

**Answer: A**

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**7.** A parabola having directrix $x + y + 2 = 0$touches a line $2x + y - 5 = 0$at $(2, 1)$. Then the length (in units) of semi latus rectum of the parabola is

A. $\frac{8}{\sqrt{2}}$

B. $\frac{9}{\sqrt{2}}$

C. $\frac{10}{\sqrt{2}}$

D. $\frac{11}{\sqrt{2}}$

**Answer: B**

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**8.** If line $\frac{x-1}{2} = \frac{y+\alpha}{\alpha} = \frac{z+\beta}{2}$ lies in plane $2x + y + z = 5$, then $\alpha + \beta$ is

A. $-3$

B. $4$

C. $6$

D. $-9$

**Answer: D**

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**9.** If A, B and C are three points position vectors a, b and c respectively, then perpendicular distance of A from the line joining B and C is

A. $\frac{|a \times b \times c|}{2(b \times c)}$

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

C. $\frac{|a \times b + b \times c + c \times a|}{|(b - c)|}$

D. None of these.

**Answer: C**

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**10.** If $\lim_{x \to \infty} \left( \frac{a^{1/x} + b}{c} \right)^x = d$ (non zero finite), then $(b+1)\log_a d$ is

A. 1

B. 0

C. 2

D. $-1$

**Answer: A**

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**11.** The general solution of differential equation, $\sin 2x\left(\frac{dy}{dx}-\sqrt{\tan x}\right)-y=0$, is (where C is the constant of integration)

A. $y\sqrt{\cot x}=\tan x+C$

B. $y\sqrt{\cot x}=x+C$

C. $y\sqrt{\tan x}=\cot x+C$

D. $y\sqrt{\tan x}=x+C$

**Answer: B**

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**12.** $\int e^{-x}(1-\tan x)\sec x dx$ (Where C is constant of integration)

A. $e^{-x}\sec x + C$

B. $e^{-x}\tan x + C$

C. $-e^{-x}\tan x + C$

D. $-e^{-x}\sec x + C$

**Answer: D**

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**13.** Consider the statement."If it is raining, then sky is not filled with clouds." Which among the following is true?

A. Contrapositive of the given statement is, "If sky is filled with clouds then it is raining."

B. Converse of the given statement is, "If sky is filled with clouds then it is raining."

C. If it is not raining then sky is filled with clouds, is the inverse of the given statement.

D. Both (a) and (c) are true

**Answer: C**

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**14.** The variance of first 30 natural numbers, is

A. 74.92

B. 37.98

C. 38.98

D. None of these

**Answer: A**

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**15.** The number of solutions of the equation $\sin^{-1}(\cos 3x) + \cos^{-1}(\sin 3x) = \frac{\pi}{2}$, x is/a $\in [-\pi, \pi]$

A. 2

B. 3

C. 5

D. 6

**Answer: D**

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**16.** The equation of tangent parallel to $y = x$ drawn to $\frac{x^2}{3} - \frac{y^2}{2} = 1$ is

A. $y = x \pm 1$

B. $y = x \pm 2$

C. $y + 3x = 2$

D. none of these

**Answer: A**

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**17.** If $\cos ecx = \frac{2}{\sqrt{3}}$ and $\cot x = \frac{-1}{\sqrt{3}}, x \in [0, 2\pi]$ then the value of $\cos x + \cos 2x + \cos 3x$ is equal to

A. 0

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

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

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

**Answer: A**

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**18.** Let $x_i$ represents the outcome on a fair die and $f_i$ be the corresponding frequency. The variance for random variable

di with following frequency distribution, is

| $x_i$ | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $f_i$ | 1 | 2 | 3 | 4 | 5 | 6 |

A. 2

B. 3

C. $\frac{28}{9}$

D. $\frac{20}{9}$

**Answer: D**

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**19.** A statue built on a 50 m high pedestal subtends $45^\circ$ at two points, $A_1$ and $A_2$,50 m apart on the ground. If the straight line joining $A_1$ and $A_2$ passes through the base of the pedestal, then what is the height of the statue (without the pedestal) (assume that the statue and pedestal are vertical)

A. $25\sqrt{2}$

B. $50$

C. $150$

D. $250$

**Answer: D**

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**20.** Area (in sq. units) between curves $y = x^2$ and $x = y^2$ is

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

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

C. $\frac{1}{\sqrt{3}}$

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

**Answer: B**

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**21.** Find the coefficient of $x^4$ in the expansion of $(1-9x+20x^2)^{-1}$.

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**22.** The number of triplets (a,b,c) of positive integers satisfying the equation $\begin{vmatrix} a^3+1 & a^2b & a^2c \\ ab^2 & b^3+1 & b^2c \\ ac^2 & bc^2 & c^3+1 \end{vmatrix} = 11$ is/are :

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**23.** The roots of the equation $x^2 + 2(a-3)x + 9 = 0$ lies between -6 and 1, also $2, g_1, g_2, g_3 \ldots . g_{10}$, [a] are in G.P. where (a] denotes the integral part of a, then the value of $\frac{g_2 g_0}{4}$ is

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**24.** The lengths of the tangents from point A(-3, 5) is 6 units and from point B(1, 2) is 5 units to a circle. Then the length of the tangent from point C (5, -1) to the same circle is:

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**25.** The lines $x + y = 0, x = 4y = 0$ and $2x - y = 0$ are the altitudes of a triangle. If one of the vertices has the coordinates $(-\lambda, \lambda)$ and the locus of the centroid of this triangle is $ax + by = 0$ (where a and b are positive integers and coprime to each other), then the value of $(a + 2b)$ is

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**26.** Let $f: R \to R$ be defined as $f(x) = (2x-37)^2 + \frac{4x}{3} + \cos x$ and $g = f^{-1}$, then find the value of $7g'(2\pi) + 3g''(2\pi)$.

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**27.** Let $f(x) = [x] + \sum_{i=1}^{2000} \frac{\{x+r\}}{2020}$, where [.] and {x} represent greatest integer function and fractional part respectively. Find the value of f(-1000).

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**28.** Let $f: [1, \infty) - [2, \infty)$ be differentiable function such that $f(1) = \frac{1}{3}$. If $t\int_1^x f(t)dt = 3xf(x) - x^3$ for all $x \geq 1$

then the value of f(2) is equal to

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**29.** The number of real solutions of the equation $2\sin x = x^2 - x\pi + \frac{\pi^2 + 8}{4}$ is/are

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**30.** If $y = 9x - 28$ is a tangent to the curve $y^2 = ax^3 + b$ at (4, 8), then a-b=

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