# MATHS

## BOOKS - NTA MOCK TESTS

## NTA TPC JEE MAIN TEST 36

**Mathematics**

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**1.** The coefficient of $x^5$ in $\left(1 + x + x^2 + x^3\right)^{11}$ is:

A. 2620

B. 2682

C. 28820

D. 2882

**Answer: D**

**2.** If $a = \cos\left(\dfrac{2\pi}{7}\right) + i\sin\left(\dfrac{2\pi}{7}\right)$, then the quadratic equation whose roots are $\alpha = a + a^2 + a^4$ and $\beta = a^3 + a^5 + a^6$ is:

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

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

C. $x^2 - x - 2 = = 0$

D. $x^2 + x + 2 = 0$

**Answer: D**

**3.** If AB =0, then for the matrices.

$$A = \begin{bmatrix} \cos^2 \theta & \cos \theta \sin \theta \\ \cos \theta \sin \theta & \sin^2 \theta \end{bmatrix}$$ and

$$B = \begin{bmatrix} \cos^2 \phi & \cos \phi \sin \phi \\ \cos \phi \sin \phi & \sin^2 \phi \end{bmatrix}, \theta - \phi \text{ is:}$$

A. an odd multiple of $\dfrac{\pi}{2}$

B. an odd multiple of $\pi$

C. an even multiple of $\dfrac{\pi}{2}$

D. 0

**Answer: A**

**4.** The value of the determinant.

$$\begin{vmatrix} 1 & a & a^2 \\ \cos(n-1)x & \cos nx & \cos(n+1)x \\ \sin(n-1)x & \sin nx & \sin(n+1)x \end{vmatrix}$$ is zero, if

A. $\sin x = 0$

B. $\cos x = 0$

C. $a = 0$

D. $\cos x = \dfrac{1+a^2}{2a}$

**Answer: A**

**5.** The value of $\displaystyle\sum_{r=1}^{5} \frac{{}^{n}C_r}{{}^{n}C_{r-1}} =$

A. $5(n-3)$

B. $5(n-2)$

C. $5n$

D. $5(2n-9)$

**Answer: B**

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**6.** Assume Rand S are (non-empty) relations in a set A. Which of the following relation given below is false:

A. If R and S are transitive, then $R \cup S$ is transitive.

B. If R and S are transitive, then $R \cap S$ is transitive.

C. If R and S are symmetric, then $R \cup S$ is symmetric

D. If R and S are reflexive, Then $R \cap S$ is reflexive.

**Answer: A**

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**7.** AB is any chord of the circle:

$x^2 + y^2 - 6x - 8y - 11 = 0$ which subtends an angle

of $\dfrac{\pi}{2}$ at (1,2). If locus of mid-point of AB is

$x^2 + y^2 - 2ax - 2by - c = 0$, then a + b + c is:

A. 8

B. 10

C. 6

D. 12

**Answer: A**

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**8.** The minimum area (sq. units) of triangle formed by the tangent to the $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ and coordinate axes is:

A. ab

B. $\dfrac{a^2 + b^2}{2}$

C. $\dfrac{a^2 + b^2}{2}$

D. $\dfrac{a^2 + ab + b^2}{3}$

**Answer: A**

**9.** If $l_1$ and $l_2$ are lengths of two perpendicular focal chord of parabola $y^2 = 16(x + 1)$, then harmonic mean of $l_1$ and $l_2$ is:

A. 4

B. 8

C. 16

D. 32

**Answer: D**

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**10.** The straight lines $3x - 4y + 7 = 0$ and $12x + 5y - 2 = 0$ has equation of the acute angle bisector as:

A. $99x - 27y - 81 = 0$

B. $11x - 3y + 9 = 0$

C. $21x + 77y - 101 = 0$

D. $21x + 77y + 101 = 0$

**Answer: B**

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**11.** A man is moving away from a tower 41.6m high at a rate of $2ms^{-1}$. If the eye level of the man is 1.6m above the ground, then the rate at which the angle of elevation of the top of the tower changes, when he is at a distance of 30 m from the foot of the tower, is:

A. $-\dfrac{4}{125}$ radian/s

B. $\dfrac{2}{25}$ radian/s

C. $-\dfrac{1}{625}$ radian/s

D. None of these

**Answer: A**

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**12.** A plane passes through $(1, 2, -2)$ and is perpendicular to two planes $x - 2y + 3z + 4 = 0$ and $2x - y - z + 7 = 0$. The distance of this plane from the point (1,1,3) is equal to:

A. $\dfrac{8}{83}$

B. $\dfrac{16}{83}$

C. $\dfrac{64}{\sqrt{83}}$

**13.** Let $f: R \to R$ and $f_n(x) = f(f_{n-1}(x)) \, \forall n \geq 2, n \in N$. Then the roots of the equation

$$f_3(x) f_2(x) f(x) - 25 f_2(x) f(x) + 175 f(x) = 375,$$

which also satisfy the equation f(x) = x will be:

A. 5 only

B. 15 only

C. 10 only

D. 5,15

**Answer: D**

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**14.** If $y = e^x + \sin x$, then $d^2x / dy^2$ is equal to:

A. $e^x - \sin x$

B. $-\left(e^x + \cos x\right)^{-2}$

C. $-\ -\left(e^x - \sin x\right)\left(e^x + \cos x\right)^{-2}$

D. $\left(\sin x - e^x\right)\left(\cos x + e^x\right)^{-3}$

**Answer: D**

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**15.** Let y = f(x) satisfies the differential equation $(\sin x)dy + (\cos x)ydx = e^x dx$ With $f(0) = 0$. Then the value of $\lim_{x \to 0} f(x)$ is:

A. 0

B. 1

C. $-1$

D. Does not exist

**Answer: B**

**16.** Let $f(y) = \int_0^1 e^{x-y^2}(x^3 - 2xy + 3x^2 - 2y)\,dx$,

then $\int_0^1 e^y f(y)\,dy$ is equal to:

A. 1

B. $e - 1$

C. 0

D. $e^2 - 2e$

**Answer: C**

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**17.** If p:l study and q : I fail

Then negation of T study or I fail' is:

A. I do not study and I do not fail

B. do not study or I do not fail

C. Either I study and I do not fail or I study, and I do

not fail

D. study and I do not fail

**Answer: A**

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**18.** The standard deviation of a variate x is $\sigma$. The standard deviation of the variable $\dfrac{ax + b}{c}$, $a, b, c$ are constants, is:

A. $\left(\dfrac{a}{c}\right)\sigma$

B. $\left|\dfrac{a}{c}\right|\sigma$

C. $\left(\dfrac{a^2}{c^2}\right)\sigma$

D. None

**Answer: B**

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**19.** $\dfrac{\sin\theta}{\cos\theta} + \dfrac{\sin 2\theta}{\cos^2\theta} + \dfrac{\sin 3\theta}{\cos^2\theta} + \text{..........} + \dfrac{\sin 6\theta}{\cos^6\theta}$ is equal to:

A. $\cot\theta + \dfrac{\cos 7\theta}{\sin\theta\cos^6\theta}$

B. $\cot\theta - \dfrac{\cos 7\theta}{\sin\theta.\cos^6\theta}$

C. $\dfrac{\cos 7\theta}{\sin \theta \cos^6 \theta - \cot \theta}$

D. $21 \tan \theta$

**Answer: B**

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**20.** Difference of maximum and minimum value of :

$f(x) = \sqrt{\cos^{-1}[x - 2]}$ is ([.] is G.I.F)

A. $\sqrt{\pi}$

B. $\dfrac{\sqrt{\pi}}{2}$

C. $\sqrt{\pi}\dfrac{\sqrt{2} - 1}{\sqrt{2}}$

D. $\pi$

**Answer: A**

21. If n is a factor of 72, such that xy = n then number of ordered pairs (x, y) are :- (where $x, y \neq N$)

22. Let a, p are the roots of the equation $ax^2 + bx + c = 0$ where $\beta = 4\alpha (\alpha > 0)$. If $3a2(c - b)$ and $S = \sum_{r=0}^{\infty} \beta(\alpha^r)$, then find the value of 3S.

**23.** If $\vec{a}$ and $\vec{b}$ are perpendicular vectors with $\left|\vec{a}\right| = 2, \left|\vec{b}\right| = 3$ and $\vec{c} \times \vec{a} = \vec{b}$, then the least value of $\left|\vec{c} - \vec{a}\right|$ is equal to:

**24.** Let $\alpha, \beta \in R$ be such that

$$\lim(x \to 0)\frac{x^2 \tan(ax)}{\beta x - \tan(2x)} = 1,$$ then the value of $5\beta + 3\alpha$ is:

**25.**

$$\lim_{n \to \infty} \frac{1}{\sqrt{n}\sqrt{n+1}} + \frac{1}{\sqrt{n}\sqrt{n+2}} + \ldots + \frac{1}{\sqrt{n}\sqrt{4n}}$$

is equal to:

**26.** The number of non-differentiability points of function f defined as $f(x) = \max. \left( ||x| - 2|, 1 \right)$ is equal to:

**27.** The area enclosed between the curves $y = ax^2$ and $x = ay^2 (a > 0)$ is 1 sq. unit. If the value of a is $\dfrac{3\sqrt{3}}{\lambda}$, then the value of $\lambda$ is:

**28.** The last two digits of $2015! + 3^{2015}$ is:

**29.** Find the minimum value of $k = \sin^6 x + \cos^6 x$

**30.** A card from a pack of 52 cards is lost. From the remaining cards of the pack two cards are drawn and found to be hearts. If the probability that lost card is hearts, is k, then the value of 100 k is: