



## MATHS

### BOOKS - NTA MOCK TESTS

### JEE MOCK TEST 6

#### Mathematics

1.  $\sin \alpha x + \cos \alpha x$  and  $|\cos x| + |\sin x|$  are periodic functions of same fundamental period, if  $\alpha$  equals

A. 0

B. 1

C. 2

D. 4

**Answer: D**



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2. Differential coefficient of  $\log_{10} x$  w.r.t  $\log_x 10$  is

A. 1

B.  $-(\log_{10} x)^2$

C.  $(\log_x 10)^2$

D.  $\frac{x^2}{100}$

Answer: B



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3. If  $A, B$  and  $C$  are the angles of a triangle and

$$\begin{vmatrix} 1 & 1 & 1 \\ 1 + \sin A & 1 + \sin B & 1 + \sin C \\ \sin A + \sin^2 A & \sin B + \sin^2 B & \sin C + \sin^2 C \end{vmatrix} = 0$$

then  $\Delta ABC$  must be .

A. right angled isosceles

B. isosceles

C. equilateral

D. scalene

**Answer: B**



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4. The contrapositive of the statement "If two triangles are identical, then they are similar" is

A. If two triangles are not similar, then they are not identical

B. If two triangles are not identical, then they are not similar

C. If two triangles are not identical, then they are similar

D. If two triangles are not similar, then they are identical

**Answer: A**



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5. If  $f(x) = a - (x - 3)^{8/9}$ , then the maximum value of  $f(x)$  is

A. 3

B.  $a - 3$

C.  $a$

D. none of these

**Answer: C**



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6. Write the value of  $\sin(\cot^{-1} x)$  .

A.  $\sqrt{1 + x^2}$

B.  $x$

C.  $\frac{1}{\sqrt{1 + x^2}}$

D.  $\sqrt{1 - x^2}$

**Answer: C**



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7. The area bounded by the curves

$$y = x^2 \text{ and } y = \frac{2}{(1 + x^2)} \text{ is}$$

A.  $\left(\pi - \frac{1}{3}\right)$  sq. units

B.  $\left(\pi - \frac{2}{3}\right)$  sq. units

C.  $\frac{(2\pi - 1)}{3}$  sq. units

D. none of these

**Answer: B**



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8. Evaluate:  $(\text{Lim})_{x \rightarrow 0} \frac{x^{6000} - (\sin x)^{6000}}{x^2(\sin x)^{6000}}$

A. 1000

B. 100

C. 1100

D. 1010

**Answer: A**



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9. If  $[x]$  stands for the greatest integer function, the

value of  $\int_4^{10} \frac{[x^2]}{[x^2 - 28x + 196] + [x^2]} dx$ , is

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



B. 6

C. 7

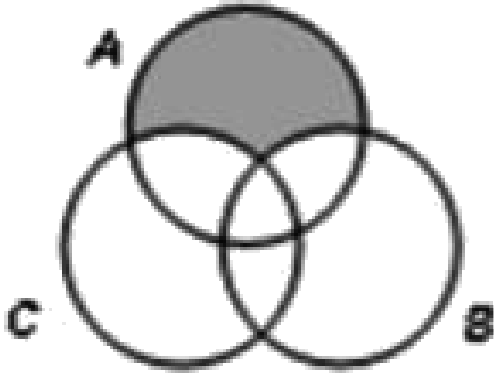
D. 3

**Answer: D**



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10. The shaded region in the give figure represents



A.  $A \cap (B \cup C)$

B.  $A \cup (B \cap C)$

C.  $A \cap (B - C)$

D.  $A - (B \cup C)$

**Answer: D**

11. If  $a \sin^2 x + b \cos^2 x = c$ ,  $b \sin^2 y + a \cos^2 y = d$

and  $a \tan x = b \tan y$  then

$$\frac{a^2}{b^2} = \dots\dots\dots \left( 0 < x, y < \frac{\pi}{2} \right)$$

A.  $\frac{(b - c)(d - b)}{(a - d)(a - b)}$

B.  $\frac{(a - d)(c - a)}{(b - c)(d - b)}$

C.  $\frac{(d - a)(c - a)}{(b - c)(d - b)}$

D.  $\frac{(b - c)(b - d)}{(a - c)(a - d)}$

**Answer: B**

12. Number of points from where perpendicular tangents can be drawn to the curve  $\frac{x^2}{16} - \frac{y^2}{25} = 1$  is

A. 1

B. 2

C. 0

D. infinite

**Answer: C**



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**13.** The sum of the first 20 terms common between the series  $3 + 7 + 11 + 15 + \dots$  and  $1 + 6 + 11 + 16 + \dots$  is

A. 4000

B. 4200

C. 4220

D. 4020

**Answer: D**



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14. Let 10 vertical poles standing at equal distances on a straight line, subtend the same angle of elevation  $\alpha$  at a point O on this line and all the poles are on the same side of O. If the height of the longest pole is  $h$  and the distance of foot the smallest pole from O is  $a$  then the distance between two consecutive poles, is

A.  $\frac{h \sin \alpha + a \cos \alpha}{9 \cos \alpha}$

B.  $\frac{h \cos \alpha - a \sin \alpha}{9 \sin \alpha}$

C.  $\frac{h \sin \alpha + a \cos \alpha}{9 \sin \alpha}$

D.  $\frac{h \cos \alpha - a \sin \alpha}{9 \cos \alpha}$

**Answer: B**



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15. Let  $\vec{u}$ ,  $\vec{v}$  and  $\vec{w}$  be vectors such that  $\vec{u} + \vec{v} + \vec{w} = 0$  if  $|\vec{u}| = 3$ ,  $|\vec{v}| = 4$  and  $|\vec{w}| = 5$  then  $\vec{u} \cdot \vec{v} + \vec{v} \cdot \vec{w} + \vec{w} \cdot \vec{u}$  is

A.  $-25$

B.  $-27$

C.  $28$

D.  $25$

**Answer: A**



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**16.** The total number of ways in which 5 balls of different colours can be distributed among 3 persons so that each person gets at least one ball is

A. 75

B. 150

C. 210

D. 243

**Answer: B**



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17. The order of the differential equation whose general solution is given by

$$y = (C_1 + C_2)\cos(x + C_3) - C_4e^{x+C_5}, \quad \text{where}$$

$C_1, C_2, C_3, C_4, C_5$ , are arbitrary constants, is

A. 5

B. 4

C. 3

D. 2

**Answer: C**



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18. In a competitive examination, an examinee either guesses or copies or knows the answer to multiple choice question with four choices. The probability that he makes a guess is  $\frac{1}{3}$  and the probability that he copies the answer is  $\frac{1}{6}$ . The probability that the answer is correct, given that he copies it, is  $\frac{1}{8}$ . Find the probability that he knows the answer to the question, given that he correctly answered

A.  $\frac{24}{31}$

B.  $\frac{17}{24}$

C.  $\frac{24}{29}$

D.

Answer: C



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19. The number of values of  $\theta \in \left[ -\frac{3\pi}{2}, \frac{4\pi}{3} \right]$  which satisfies the system of equations.

$$2 \sin^2 \theta + \sin^2 2\theta = 2 \text{ and}$$

$$\sin 2\theta + \cos 2\theta = \tan \theta \text{ is}$$

A. 2

B. 4

C. 6

D. 8

**Answer: C**



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**20.** If the three distinct lines

$$x + 2ay + a = 0, x + 3by + b = 0 \text{ and}$$

$$x + 4ay + a = 0 \text{ are concurrent, then the point } (a,b)$$

lies on a .

A. circle

B. straight line

C. parabola

D. hyperbola

**Answer: B**



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**21.** If the line  $y - 2 = 0$  is the directrix of the parabola  $x^2 - ky + 32 = 0$ ,  $k \neq 0$  and the parabola intersects the circle  $x^2 + y^2 = 8$  at two real distinct points, then the absolute value of  $k$  is .



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**22.** If  $z_1, z_2, z_3$  are complex numbers such that  $|z_1| = |z_2| = |z_3| = \left| \frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3} \right| = 1$ , Then find the value of  $|z_1 + z_2 + z_3|$  is :



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23. If the 4<sup>th</sup> term of  $\left\{ \sqrt{x^{\frac{1}{1+\log_{10} x}}} + \sqrt[12]{x} \right\}^6$  is equal to

200,  $x > 1$  and the logarithm is common logarithm,

then  $x$  is not divisible by



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24. If  $\int \frac{dx}{\sqrt{x} + \sqrt[3]{x}} = a\sqrt{x} + b(\sqrt[3]{x}) + c(\sqrt[6]{x}) + d$  In

being an arbitrary constant then the value of

$20a + b + c + d$  is



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25.

Given

$$f(x) = \begin{cases} x^2 \times e^{2(x-1)} & 0 \leq x \leq 1 \\ a \operatorname{sgn}(x+1)\cos(2x-2) + bx^2 & 1 < x \leq 2 \end{cases}$$

is differentiable at  $x = 1$ , then the value of  $|a - b|$  is



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