MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 3

Mathematics

1. The probability distribution of a random variable X is given as

X	-5	-4	-3	-2	-1	0	1	2	3	4	5
$P(X)$	p	$2p$	$3p$	$4p$	$5p$	$7p$	$8p$	$9p$	$10p$	$11p$	$12p$

Then, the value of p is

A. $\dfrac{1}{72}$

B. $\dfrac{3}{73}$

C. $\dfrac{5}{72}$

D. $\dfrac{1}{74}$

Answer: A

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2. The lengths of two adjacent sides of a cyclic quadrilateral are 2 units and 5 units and the angle between them is $60°$. If the area of the quadrilateral is $4\sqrt{3}$ sq. units, then the perimeter of the quadrilateral is

A. 12.5 units

B. 13 units

C. 13.2 units

D. 12 units

Answer: D

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3. If $f(x) = \cos(\log x)$, then $f(x)f(y) - \dfrac{1}{2}\left[f\left(\dfrac{x}{y} \right) + f(xy) \right] =$

A. -1

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

C. -2

D. 0

Answer: D

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4. The coefficient of the term independent of x in $\left[\sqrt{\left(\dfrac{x}{3}\right)} + \dfrac{\sqrt{3}}{x^2}\right]^{10}$ is

A. $\dfrac{5}{3}$

B. $\dfrac{4}{5}$

C. 6

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

Answer: A

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5. The area bounded by $y = xe^{|x|}$ and the lines $|x| = 1, y = 0$ is

A. 4 sq units

B. 6 sq units

C. 1 sq units

D. 2 sq units

Answer: D

6. Minimum distance between the curves $y^2 = x - 1$ and $x^2 = y - 1$ is equal to:

A. $\dfrac{3\sqrt{2}}{4}$ units

B. $\dfrac{5\sqrt{2}}{4}$ units

C. $\dfrac{7\sqrt{2}}{4}$ units

D. $\dfrac{\sqrt{2}}{4}$ units

Answer: A

7. The integral $\displaystyle\int_{-\frac{1}{2}}^{\frac{1}{2}} \left([x] + \log\left(\dfrac{1+x}{1-x}\right) \right) dx$ equals to ($[x]$ is the greatest integer $\le x$)

A. $-\dfrac{1}{2}$

B. 1

C. $2\ln\left(\dfrac{1}{2}\right)$

D. 0

Answer: A

8. How many words, with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if 4 letters are used at a time?

A. 360

B. 350

C. 400

D. 390

Answer: A

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9. If $f(x + y, x - y) = xy$, then the arithmetic mean of $f(x, y)$ and $f(y, x)$ is

A. x

B. y

C. 0

D. $\dfrac{x^2 - y^2}{2}$

Answer: C

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10. Find the real values of x and y satisfying the equation :
$$\dfrac{(1+i)x - 2i}{3+i} + \dfrac{(2-3i)y + i}{3-i} = i$$

A. $x = -1, y = 3$

B. $x = 3, y = -1$

C. $x = 0, y = 1$

D. $x = 1, y = 0$

Answer: B

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11. Tangent to a curve intercepts the y-axis at a point P. A line perpendicular to this tangent through P passes through another point (1,0). The differential equation of the curve is

A. $y\dfrac{dy}{dx} - x\left(\dfrac{dy}{dx}\right)^2 = 1$

B. $x\dfrac{d^2y}{dx^2} + \left(\dfrac{dy}{dx}\right)^2 = 1$

C. $y\dfrac{dx}{dy} + x = 1$

D. None of these

Answer: A

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12. If m is a positive integer and

$$\Delta_r = \begin{vmatrix} 2r-1 & {}^{m}C_r & 1 \\ m^2-1 & 2^m & m+1 \\ \sin^2(m^2) & \sin^2(m) & \sin^2(m+1) \end{vmatrix}$$

, then the value of $\displaystyle\sum_{r=0}^{m} \Delta_r$ is

A. 1

B. 3

C. 2

D. 0

Answer: D

13.   If

$$\alpha = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right) + \sin^{-1}\left(\frac{1}{3}\right), \beta = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) + \cos^{-1}\left(\frac{1}{3}\right)$$

then

A. $\alpha > \beta$

B. $\alpha = \beta$

C. $\alpha < \beta$

D. $\alpha + \beta = 2\pi$

Answer: C

14. The logically equivalent proposition of $p \leftrightarrow q$ is

A. $(p \wedge q) \vee (p \wedge q)$

B. $(p \rightarrow q) \wedge (q \rightarrow p)$

C. $(p \wedge q) \vee (q \rightarrow p)$

D. $(p \wedge q) \rightarrow (q \vee p)$

Answer: B

15. If $\log_{10}\left(\dfrac{x^3 - y^3}{x^3 + y^3}\right) = 2$, then $\dfrac{dy}{dx} =$

A. $\dfrac{x}{y}$

B. $-\dfrac{y}{x}$

C. $-\dfrac{x}{y}$

D. $\dfrac{y}{x}$

Answer: D

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16. If A is the set of even natural number less than 8 and B is the set of prime numbers less then 7, then the number of relations from A to B is

A. 2^9

B. 9^2

C. 3^2

D. 2^{9-1}

Answer: A

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17. For real x, the function $\dfrac{(x-a)(x-b)}{x-c}$ will assume all real values provided

A. $a > b > c$

B. $a < b < c$

C. $a > c > b$

D. $a \leq c \leq b$

Answer: D

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18. $OPQR$ is a square and M, N are the middle points of the sides PQ and QR respectively. Then the ratio of the area of the square to that of triangle OMN is

A. $4 : 1$

B. $2 : 1$

C. $8:3$

D. $7:3$

Answer: C

19. $\int \dfrac{\sin^4 x}{\cos^8 x} dx$

A. $\left(\dfrac{1 + \tan^5 x}{5} \right) + \dfrac{\tan^5 x}{7} + C$

B. $\dfrac{\tan^5 x}{5} + \dfrac{\tan^7 x}{7} + C$

C. $\dfrac{\tan^7 x}{5} + \dfrac{\tan^5 x}{7} + C$

D. None of these

Answer: B

20. If $x = 3$ is the chord of the contact of the circle $x^2 + y^2 = 81$, then the equation of the corresponding pair of tangents, is

A. $x^2 + 8y^2 + 54x + 729 = 0$

B. $x^2 - 8y^2 - 54x + 729 = 0$

C. $x^2 - 8y^2 - 54x - 729 = 0$

D. $x^2 - 8y^2 = 729$

Answer: B

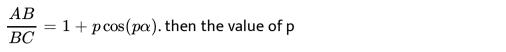▶ Watch Video Solution

21. The number of solutions, the equation $\sin^4 x + \cos^4 x = \sin x \cos x$ has, in $[\pi, 5\pi]$ is/are

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22. A tower subtends angles α, 2α, 3α respectively, at point A, B, and C all lying on a horizontal line through the foot of the tower. If $\dfrac{AB}{BC} = 1 + p\cos(p\alpha)$. then the value of p

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23. Let

$$y = \sin^{-1}(\sin 8) - \tan^{-1}(\tan 10) + \cos^{-1}(\cos 12) - \sec^{-1}(\sec 9) + \cot^{-1}($$

. If y simplifies to $a\pi + b$, then find $(a - b)$.

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24. Let α and β be two number where $\alpha < \beta$ The geometric mean of these numbers exceeds the smaller α by 12 and the arithmetic mean of the same number is smaller by 24 than the larger number β , then the value of $|\beta - \alpha|$ is

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25. The value of f(0), so that the function

$$f(x) = \frac{1 - \cos(1 - \cos x)}{x^4}$$ is continuous everywhere is k, then value of

10k is