MATHS

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 26

Mathematics

1. If a tower subtends equal angles at four points P, Q , R and S that lie in a plane containing the foot of the tower , the which fo the following statements is always true (here, the tower is perpendicular to the plane containing the points P, Q,R,S)

A. $\angle PQS = \angle PRS$

B. $\angle PQR + \angle PSR = 180^\circ$

C. $\angle PQS = 90^\circ \Rightarrow \angle PRS = 90^\circ$

D. $(PQ)(RS) + (PS)(RQ) = (PR)(QS)$

Answer: C

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2. The values of λ for which one root of the equation $x^2 + (1 - 2\lambda)x + (\lambda^2 - \lambda - 2) = 0$ is greater than 3 and the other smaller than 2 are given by

A. $2 < \lambda < 5$

B. $1 < \lambda < 4$

C. $1 < \lambda < 5$

D. $2 < \lambda < 4$

Answer: D

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3. Let a function $f:(2, \infty) \to [0, \infty)$ defined as $f(x) = \frac{|x-3|}{|x-2|}$, then f is

A. injective & surjective

B. not injective but surjective

C. injective but not surjective

D. neither injective nor surjective

Answer: B

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4. Let n be a positive integer and a complex number with unit modulus is a solution of the equation $Z^n + Z + 1 = 0$, then the value of n can be

A. 87

B. 97

C. 104

D. 222

Answer: C

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5. The value of $\lim_{x \to 0} \frac{e^{-\left(\frac{x^2}{2}\right)} - \cos x}{x^3 \tan x}$ is equal to

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

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

C. $\frac{1}{12}$

D. $\frac{1}{16}$

Answer: C

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6. The value of $\int \frac{(x-4)}{x^2\sqrt{x-2}}$ dx is equal to (where , C is the constant of integration)

A. $2x\sqrt{x-2}+C$

B. $-\frac{2}{x}\sqrt{x-2}+C$

C. $\frac{\sqrt{x-2}}{x}+C$

D. $\frac{x}{\sqrt{x-2}}+C$

Answer: B

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7. The equation of the curve passing through the point (1,1) and satisfying the differential equation $\frac{dy}{dx}=\frac{x+2y-3}{y-2x+1}$ is

A. $x^2-4xy-y^2+6x+2y-4=0$

B. $x^2+4xy-y^2-6x+2y+4=0$

C. $x^2 + 4xy - y^2 - 6x - 2y + 4 = 0$

D. $x^2 + 4xy + y^2 - 6x - 2y - 4 = 0$

Answer: C

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8. Five different games are to be distributed among 4 children randomly. The probability that each child get at least one game is

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

B. $\frac{15}{64}$

C. $\frac{21}{64}$

D. $\frac{17}{632}$

Answer: B

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9. Let the focus S of the parabola $y^2 = 8x$ lies on the focal chord PQ of the same parabola . If PS = 6 , then the square of the slope of the chord PQ is

A. $\frac{2}{\sqrt{5}}$

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

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

D. $\frac{9}{4}$

Answer: B

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10. If $p \rightarrow (q \vee r)$ is false, then the truth values of p,q,r are respectively

A. TFF

B. FFF

C. FTT

D. TTF

Answer: A

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11. $\frac{5}{3^2 7^2} + \frac{9}{7^2 11^2} + \frac{13}{11^2 15^2} + \dots \infty$

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

B. $\frac{1}{36}$

C. $\frac{1}{54}$

D. $\frac{1}{72}$

Answer: D

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12. If $13^{99} - 19^{93}$ is divided by 162, then the remainder is

A. 3

B. 6

C. 5

D. 0

Answer: D

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13. The $\int_0^{\pi/2} sgn\left(\sin^2 x - \sin x + \frac{1}{2}\right)$ dx is equal to ,

(where , sgn (x) denotes the sigum function of x)

A. 0

B. 1

C. π

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

Answer: D

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14. If $\overrightarrow{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}, \overrightarrow{a} . \overrightarrow{b} = 2$ and $\overrightarrow{a} \times \overrightarrow{b} = 2\hat{i} - \hat{k}$, then $\overrightarrow{b}$ is

A. $\left(\hat{i} - 2\hat{j} + \hat{k}\right)$

B. $\left(4\hat{i} - 4\hat{j} + 2\hat{k}\right)$

C. $\frac{1}{2}\left(3\hat{i} + 7\hat{j} + 9\hat{k}\right)$

D. $\frac{1}{29}\left(7\hat{i} - 4\hat{j} + 14\hat{k}\right)$

Answer: D

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15. Equation of the plane passing through the point of intersection of lines $\frac{x-1}{3}=\frac{y-2}{1}=\frac{z-3}{2} \& \frac{x-3}{1}=\frac{y-1}{2}=\frac{z-2}{3}$ and perpendicular to the line $\frac{x+5}{2}=\frac{y-3}{3}=\frac{z+1}{1}$ is

A. $2x+3y+z+7=0$

B. $2x-3y-z+22=0$

C. $2x+3y+z-22=0$

D. $2x+3y+z+13=0$

Answer: C

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16. The equation of the tangent to the parabola $y^2 = 4x$ whose slope is positive and which also touches $x^2 + y^2 = \frac{1}{2}$ is

A. y = x + 1

B. y = 2x + 1

C. x + y = 2

D. $y = 4x + \frac{1}{2}$

Answer: A

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17. If A is 2×2 matrix such that $A\begin{bmatrix} 1 \\ -1 \end{bmatrix} = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ and $A^2\begin{bmatrix} 1 \\ -1 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$, then trace of A is (where the trace of the matrix is the sum of all principal diagonal elements of the matrix)

A. 1

B. 0

C. 2

D. 5

Answer: A

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18. consider the planes $P_1 : 2x - y + z = 6$ and $P_2 : x + 2y - z = 4$ having normal $\vec{N}_1$ and $\vec{N}_2$ respectively . The distance of the origin from the plane passing through the point (1,1,1) and whose normal is perpendicular to N_1 and N_2 is

A. $\frac{7}{\sqrt{5}}$ units

B. $\sqrt{\frac{7}{5}}$ units

C. $\sqrt{\frac{3}{5}}$ units

D. $\frac{14}{\sqrt{35}}$ units

Answer: B

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19. Let

$$I_1 = \int_0^{\frac{\pi}{2}} \frac{dt}{1+t^6} \text{ and } I_2 = \int_0^{\frac{\pi}{2}} \frac{x\cos x\,dx}{1+(x\sin x+\cos x)^6},$$

then

A. $2I_1 = I_2$

B. $I_1 = 2I_2$

C. $I_1 = I_2$

D. $I_1 = I_2 = 0$

Answer: C

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20. A wire of length 28 cm is bent to form a circular sector , then the radius (in cm) of the circular sector such that the area of the circular sector is maximum is equal to

A. 5

B. 6

C. 7

D. 8

Answer: C

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21. Let $x^2 + y^2 = r^2$ and $xy = 1$ intersect at $A \& B$ in first quadrant, If $AB = \sqrt{14}$ then find the value of r.

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22. If $f(x) = \left\{\frac{a + b\cos x + c\sin x}{x^2}, , x > 0\right), (9, , x \geq 0)\}$ is continuous at x = 0 , then the value of $\frac{|a| + |b|}{5}$ is

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23. Let p and q be the length of two chords of a circle which subtend angles 36° and 60° respectively at the centre of the circle . Then , the angle (in radian) subtended by the chord of length p + q at the centre of the circle is (use $\pi = 3.1$)

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24. Let

$a_r = r^4C_r,\ b_r = (4-r)^4C_r,\ A_r = \begin{bmatrix} a_r & 2 \\ 3 & b_r \end{bmatrix}$ and $A = \sum_{r=0}^{4} A_r$

then the value of |A| is equal to

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25. The product of all the values of $|\lambda|$, such that the lines

$x + 2y - 3 = 0,\ 3x - y - 1 = 0$ and $\lambda x + y - 2 = 0$

cannot form a triangle, is equal to

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