MATHS

BOOKS - DISHA PUBLICATION MATHS (HINGLISH)

JEE MAIN - 2019 (HELD ON: 9TH APRIL 2019(MORNING SHIFT))

Mcqs

1. Slope of a line passing through $P(2,3)$ and intersecting the line, $x+y=7$ at a distance of 4 units from P, is

A. $\dfrac{1-\sqrt{5}}{1+\sqrt{5}}$

B. $\dfrac{1-\sqrt{7}}{1+\sqrt{7}}$

C. $\dfrac{\sqrt{7}-1}{\sqrt{7}+1}$

D. $\dfrac{\sqrt{5}-1}{\sqrt{5}+1}$

Answer: B

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2. If the standard deviation of the numbers -1, 0, 1, k is $\sqrt{5}$ where $k > 0$ is equal to

A. $2\sqrt{6}$

B. $2\sqrt{\dfrac{10}{3}}$

C. $4\sqrt{\frac{5}{3}}$

D. $\sqrt{6}$

Answer: A

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3. If f(x) is a non-zero polynomial of degree four, having loca extreme points at $x = -1, 0, 1$ then the set $S = \{x \in R : f(x) = f(0)\}$ contains exactly

A. four irrational numbers.

B. four rational numbers.

C. two irrational and two rational numbers.

D. two irrational and one rational number.

Answer: D

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4. The integral $\int \sec^{2/3} x \operatorname{cosec}^{4/3} x \, dx$ is equal to (here C is a constant of integration)

A. $-3\tan^{-1/3} x + C$

B. $-\frac{3}{4}\tan^{-4/3} x + C$

C. $-3\cot^{-1/3} x + C$

D. $3\tan^{-1/3} x + C$

(Here C is a constant of integration)

Answer: A

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5. Four persons can hit a target correctly with probabilities $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$ and $\frac{1}{8}$ respectively. If all hit at the target would be hit, is

A. $\frac{25}{192}$

B. $\frac{7}{32}$

C. $\frac{1}{192}$

D. $\frac{25}{32}$

Answer: D

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6. If the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-2}{4}$ meets the plane, $x+2y+3z=15$ at a point P, then the distance of P from the origin is

A. $\sqrt{5}/2$

B. $2\sqrt{5}$

C. $9/2$

D. $7/2$

Answer: C

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7. If the tangent to the curve, $y = x^3 + ax - b$ at the point $(1, -5)$ is perpendicular to the line, $-x + y + 4 = 0$, then which one of the following points lies on the curve ?

A. (-2,1)

B. (-2,2)

C. (2,-1)

D. (2, -2)

Answer: D

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8. The value of $\int_0^{n/2} \frac{\sin^3 x}{\sin x + \cos x}$ dx is

A. $\frac{\pi - 2}{8}$

B. $\frac{\pi - 1}{4}$

C. $\frac{\pi - 2}{4}$

D. $\frac{\pi - 1}{2}$

Answer: B

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9. The value of $\cos^2 10^\circ - \cos 10^\circ \cos 50^\circ + \cos^2 50^\circ$ is

A. $\frac{3}{4} + \cos 20^\circ$

B. $3/4$

C. $\frac{3}{2}(1+\cos 20^\circ)$

D. $3/2$

Answer: B

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10. If the line $y = mx + 7\sqrt{3}$ is normal to the hyperbola $\frac{x^2}{24} - \frac{y^2}{18} = 1$, then a value of m is :

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

B. $\frac{\sqrt{15}}{2}$

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

D. $\frac{3}{\sqrt{5}}$

Answer: C

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11. The solution of the differential equation $x\frac{dy}{dx}+2y=x^2(X\neq 0)$ with $y(1)=1$, is :

A. $y=\frac{4}{5}x^3+\frac{1}{5x^2}$

B. $y=\frac{x^3}{5}+\frac{1}{5x^2}$

C. $y=\frac{x^2}{4}+\frac{3}{4x^2}$

D. $y=\frac{3}{4}x^2+\frac{1}{4x^2}$

Answer: C

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12. For any two statements p and q, the negation of the expression $p \vee (\sim p \wedge q)$ is

A. $\sim p \Lambda \sim q$

B. $p \Lambda q$

C. $p \Leftrightarrow q$

D. $\sim p \nu \sim q$

Answer: A

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13. All the points in the set $S = \left\{ \frac{\alpha + i}{\alpha - i} : \alpha \in R \right\} \left(i = \sqrt{-1} \right) lie$ on a

A. straight line whose slope is 1

B. circle whose radius is 1.

C. circle whose radius is 2.

D. straight line whose slope is -1.

Answer: B

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14. If the fourth term in the binomial expansin of $\left(\frac{2}{x}+x^{\log_6 x}\right)^6 (x > 0)$ is 20×8^7, then the value of x is

A. 8^3

B. 8^2

C. 8

D. 8^{-2}

Answer: B

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15. If the function f defined on $\left(\frac{\pi}{6}, \frac{\pi}{3}\right)$ by

$$\begin{cases} \frac{\sqrt{2}\cos x - 1}{\cot x - 1}, & x \neq \frac{\pi}{4} \\ \mathrm{k}, & x = \frac{\pi}{4} \end{cases} \text{ is continuous,}$$

then k is equal to

A. 2

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

C. 1

D. $\frac{1}{\sqrt{2}}$

Answer: B

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16. If the function $f: R - \{1, -1\} \to A$ definded by $f(x) = \frac{x^2}{1 - x^2}$, is surjective, then A is equal to

A. R-{-1}

B. $[0, \infty)$

C. R-[-1,0)

D. R-(-1,0)

Answer: C

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17. A plane passing through the points (0, -1, 0) and (0, 0, 1) and making an angle $\frac{\pi}{4}$ with the plane $y - z + 5 = 0$

, also passes through the point

A. $(-\sqrt{2}, 1, -4)$

B. $(\sqrt{2}, -1, 4)$

C. $(-\sqrt{2}, -1, -4)$

D. $(\sqrt{2}, 1, 4)$

Answer: D

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18. Let the sum of the first n terms of a non-constant A.P., $a_1, a_2, a_3, \ldots$ be $50n + \frac{n(n-7)}{2}A$, where A is a constant. If d is the common difference of this A.P., then the ordered pair (d, a_{50}) is equal to

A. (50, 50 + 46A)

B. (50, 50+ 45A)

C. (A, 50 + 45A)

D. (A, 50 + 46A)

Answer: D

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19. Let $S = \{\theta \in [-2\pi, 2\pi] : 2\cos^2\theta + 3\sin\theta = 0\}$, then the sum of the equations elements of S is .

A. $\frac{13\pi}{6}$

B. $\frac{5\pi}{3}$

C. 2π

D. π

Answer: C

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20. If one root of the quadratic equation $X^2 + px + q = 0$ is 2-sqrt(3) $: whereP, Q \subset Q$.Then which of the following is true ?

A. $p^2 - 4q + 12 = 0$

B. $q^2 - 4p - 16 = 0$

C. $q^2 + 4p + 14 = 0$

D. $p^2 - 4q - 12 = 0$

Answer: D

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21. Let $f(x) = 15 - |x - 10|, x \in R$. Then, the set of all values of x, at which the function, $g(x) = f(f(x))$ is not differentiable, is

A. {5, 10, 15}

B. {10, 15}

C. {5, 10, 15, 20}

D. {10}

Answer: A

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22. Let S be the set of all values of x for which the tangent to the curve $y = f(x) = x^3 - x^2 - 2x$ at (x, y) is parallel to the line segment joining the points $(1, f(1))$ and $(-1, f(-1))$, then S is equal to

A. $\left\{\frac{1}{3}, 1\right\}$

B. $\left\{-\frac{1}{3}, -1\right\}$

C. $\left\{\frac{1}{3}, -1\right\}$

D. $\left\{-\frac{1}{3}, 1\right\}$

Answer: D

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23. If a tangent to the circle $x^2 + y^2 = 1$ intersects the coordinate axes at distinct points P and Q, then the locus of the mid-point of PQ is :

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

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

C. $x^2 + y^2 - 16x^2y^2 = 0$

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

Answer: A

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24. Let $\overrightarrow{\alpha} = 3\hat{i} + \hat{j}$ and $\beta = 2\hat{i} - \hat{j} + 3\hat{k}$. If $\overrightarrow{\beta} = \overrightarrow{\beta}_1 - \overrightarrow{\beta}_2$, where $\overrightarrow{\beta}_1$ is parallel to $\overrightarrow{\alpha}$ and $\overrightarrow{\beta}_2$ is perpendicular to $\overrightarrow{\alpha}$, then $\overrightarrow{\beta}_1 \times \overrightarrow{\beta}_2$ is equal to:

A. $-3\hat{i} + 9\hat{j} + 5\hat{k}$

B. $3\hat{i} - 9\hat{j} - 5\hat{k}$

C. $\frac{1}{2}\left(-3\hat{i} + 9\hat{j} + 5\hat{k}\right)$

D. $\frac{1}{2}\left(3\hat{i} - 9\hat{j} + 5\hat{k}\right)$

Answer: C

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25. The area (in sq units) of the region $A = \{(x, y) : x^2 \leq y \leq x + 2\}$ is

A. $\frac{10}{3}$

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

C. $\frac{31}{6}$

D. $\frac{13}{6}$

Answer: B

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26. If

$$\begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} \cdots \begin{bmatrix} 1 & n-1 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 78 \\ 0 & 1 \end{bmatrix}$$

, then the inverse of $\begin{bmatrix} 1 & n \\ 0 & 1 \end{bmatrix}$ is

A. $\begin{bmatrix} 1 & 0 \\ 12 & 1 \end{bmatrix}$

B. $\begin{bmatrix} 1 & -13 \\ 0 & 1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & -12 \\ 0 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 0 \\ 13 & 1 \end{bmatrix}$

Answer: B

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27. Let $\sum_{k=1}^{10} f(a+k) = 16\left(2^{10}-1\right)$, where the function f satisfies $f(x+y) = f(x)f(y)$ for all natural numbers x, y and f(1) = 2. Then, the natural number 'a' is

A. 2

B. 16

C. 4

D. 3

Answer: D

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28. A committee of 11 members is to be formed from 8 males and 5 m=females. If m is the number of ways the committee is formed with at least 6 males and n is the number of ways the committee is formed with atleast 3 females, then

A. m+ n = 68

B. m =n=78

C. n=m-8

D. m=n=68

Answer: B

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29. Let α and β be the roots of the equation $x^2 + x + 1 = 0$.

Then, for $y \neq 0$ in R.

$\begin{bmatrix} y+1 & \alpha & \beta \\ \alpha & y+\beta & 1 \\ \beta & 1 & y+\alpha \end{bmatrix}$ is

A. $y(y^2 - 1)$

B. $y(y^2 - 3)$

C. y^3

D. $y^3 - 1$

Answer: C

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30. One extremity of a focal chord of $y^2 = 16x$ is $A(1, 4)$. Then the length of the focal chord at A is

A. 20

B. 22

C. 24

D. 20

Answer: A

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