



Padalsalai's Telegram Groups!

(தலைப்பிற்கு கீழே உள்ள லிங்கை கிளிக் செய்து குழுவில் இணையவும்!)

- Padalsalai's NEWS - Group
https://t.me/joinchat/NIfCqVRBNj9hhV4wu6_NqA
- Padalsalai's Channel - Group
<https://t.me/padasalaichannel>
- Lesson Plan - Group
<https://t.me/joinchat/NIfCqVWwo5iL-21gpzrXLw>
- 12th Standard - Group
https://t.me/Padalsalai_12th
- 11th Standard - Group
https://t.me/Padalsalai_11th
- 10th Standard - Group
https://t.me/Padalsalai_10th
- 9th Standard - Group
https://t.me/Padalsalai_9th
- 6th to 8th Standard - Group
https://t.me/Padalsalai_6to8
- 1st to 5th Standard - Group
https://t.me/Padalsalai_1to5
- TET - Group
https://t.me/Padalsalai_TET
- PGTRB - Group
https://t.me/Padalsalai_PGTRB
- TNPSC - Group
https://t.me/Padalsalai_TNPSC

XII STANDARD MATHEMATICS

APPLICATIONS OF MATRICES AND DETERMINANTS

Choose the correct or the most suitable answer from the given four alternatives.

(1) If a matrix A is orthogonal then which of the following is/are true?

- | | | | |
|---------------------|-------------------|---------------------|---------------------|
| (i) $A^{-1}A^T = I$ | (ii) $AA^T = I$ | (iii) $A^T A^T = I$ | (iv) $A^{-1} = A^T$ |
| (1) (i) and (ii) | (2) (ii) and (iv) | (3) (iii) and (iv) | (4) (ii) and (iv) |

(2) If $\frac{1}{|A|} = (AB) = I$, $|A| \neq 0$ and I is the unit matrix, then the matrix B is the

- | | |
|--------------------|----------------------------|
| (1) inverse of A | (2) transpose of A |
| (3) adjoint of A | (4) cofactor matrix of A |

(3) If $A = \begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$, then $|A|(\text{adj } A)$ is

- | | | | |
|---|---|--|---|
| (1) $\begin{pmatrix} 4 & 2 \\ -3 & 1 \end{pmatrix}$ | (2) $\begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$ | (3) $\frac{1}{10} \begin{pmatrix} 4 & 2 \\ -3 & 1 \end{pmatrix}$ | (4) $100 \begin{pmatrix} 1 & -2 \\ 3 & 4 \end{pmatrix}$ |
|---|---|--|---|

(4) If A is a square matrix such that $A^3 = I$, then $A^{-1} =$

- | | | | |
|---------|-----------|-----------|-----------|
| (1) A | (2) A^2 | (3) A^3 | (4) A^4 |
|---------|-----------|-----------|-----------|

(5) If A is an orthogonal matrix then

- | | | | |
|-------------------|---------------|-------------------|-------------------|
| (1) $ A = \pm 2$ | (2) $ A = 0$ | (3) $ A = \pm 1$ | (4) $ A = \pm 3$ |
|-------------------|---------------|-------------------|-------------------|

(6) If $A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$, then $A^{-1} =$

- | | | | |
|---|---|---|---|
| (1) $\begin{bmatrix} \frac{1}{b} & 0 & 0 \\ 0 & \frac{1}{c} & 0 \\ 0 & 0 & \frac{1}{a} \end{bmatrix}$ | (2) $\begin{bmatrix} \frac{1}{a} & 0 & 0 \\ 0 & \frac{1}{b} & 0 \\ 0 & 0 & \frac{1}{c} \end{bmatrix}$ | (3) $\begin{bmatrix} 0 & 0 & \frac{1}{a} \\ 0 & \frac{1}{b} & 0 \\ \frac{1}{c} & 0 & 0 \end{bmatrix}$ | (4) $\begin{bmatrix} 0 & 0 & \frac{1}{b} \\ 0 & \frac{1}{c} & 0 \\ \frac{1}{a} & 0 & 0 \end{bmatrix}$ |
|---|---|---|---|

(7) If $A = \begin{bmatrix} 2 & 3 & 4 \end{bmatrix}$ then rank of AA^T is

- | | | | |
|-------|-------|-------|-------|
| (1) 1 | (2) 2 | (3) 3 | (4) 0 |
|-------|-------|-------|-------|

(8) If $\frac{a_1}{x} + \frac{b_1}{y} = d_1$, $\frac{a_2}{x} + \frac{b_2}{y} = d_2$

$\Delta_1 = \begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} a_1 & d_1 \\ a_2 & d_2 \end{vmatrix}$ and $\Delta_3 = \begin{vmatrix} d_1 & b_1 \\ d_2 & b_2 \end{vmatrix}$, then x and y are respectively

(1) $\frac{\Delta_1}{\Delta_2}$ and $\frac{\Delta_1}{\Delta_3}$ (2) $\frac{\Delta_2}{\Delta_3}$ and $\frac{\Delta_1}{\Delta_2}$ (3) $\frac{\Delta_3}{\Delta_1}$ and $\frac{\Delta_2}{\Delta_1}$ (4) $\frac{\Delta_2}{\Delta_1}$ and $\frac{\Delta_3}{\Delta_1}$

(9) If a, b, c are positive real numbers then the following system of equations in x, y and z ,

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{z^2}{c^2} = 1, \quad \frac{x^2}{a^2} - \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1, \quad -\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1 \text{ has}$$

- (1) infinitely many solutions (2) finitely many solutions
(3) no solution (4) unique solution

(10) If the system of equations $ax + y + z = 0$, $x + by + z = 0$, $x + y + cz = 0$, (where

$a \neq 1$, $b \neq 1$, $c \neq 1$) has a non-trivial solution, then the value of $\frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c} =$

- (1) -1 (2) 0 (3) 1 (4) 2

(11) If $|A| \neq 0$, then which of the following is not true?

- (1) $(A^2)^{-1} = (A^{-1})^2$ (2) $(A^T)^{-1} = (A^{-1})^T$
(3) $A^{-1} = |A|^{-1}$ (4) $(\text{adj } A)^T = (\text{adj } A^T)$

(12) If A is an invertible square matrix and k is a non-negative real number, then $(kA)^{-1} =$

- (1) kA^{-1} (2) $\frac{1}{k}k^{-1}$ (3) $-kA^{-1}$ (4) $-\frac{1}{k}A^{-1}$

(13) If $A = \begin{bmatrix} 3 & 4 & 5 \\ -6 & 2 & -3 \\ 8 & 1 & 7 \end{bmatrix}$ then $|A^{-1}| =$

- (1) 13 (2) $\frac{1}{13}$ (3) -13 (4) $-\frac{1}{13}$

(14) If A is a non-singular matrix and $A^2 - 2A + 2I = 0$ then $A^{-1} =$

- (1) $I - A$ (2) $\frac{1}{2}(I + A)$ (3) $I + A$ (4) $\frac{1}{2}(I - A)$

(15) If $A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$ and $A^2 + xI = yA$, then the values of x and y are respectively

- (1) 6, 4 (2) 8, 6 (3) (8, 8) (4) (5, 8)

XII STANDARD MATHEMATICS

Complex Numbers

Choose the correct or the most suitable answer from the given four alternatives.

(1) Which of the following is not true?

- (1) $i^4 = 1$ (2) $\frac{1}{i^3} - i = 0$ (3) $\frac{1}{i} + i^3 = 0$ (4) $\frac{1}{i^2} = i^2$

(2) Which of the following statement is not true?

- (1) $\frac{z}{\bar{z}}$ is real (2) $z + \bar{z}$ is real
(3) $z - \bar{z}$ is purely imaginary (4) $z\bar{z}$ is real

(3) If $z = \frac{3+4i}{2-3i}$, the complex number ω which satisfies the equation $z\omega = 1$ is

- (1) $\omega = \frac{6+17i}{25}$ (2) $\omega = \frac{-6-17i}{25}$ (3) $\omega = \frac{-6-17i}{5}$ (4) $\omega = \frac{6+17i}{5}$

(4) The set of points for which $|z - 2 + 3i| = 4$ is a circle with

- (1) centre $-2 + 3i$, radius 4 (2) centre $2 - 3i$, radius 2
(3) centre $2 - 3i$, radius 4 (4) centre $-2 + 3i$, radius 2

(5) The complex number $3\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right)$ is equal to

- (1) $\frac{-3\sqrt{3}}{2} + \frac{3}{2}i$ (2) $\frac{3}{2} - \frac{3\sqrt{3}}{2}i$ (3) $-\frac{3}{2} + \frac{3\sqrt{3}}{2}i$ (4) $\frac{3\sqrt{3}}{2} - \frac{3}{2}i$

(6) The modulus and principal argument of the complex number $z = -2(\cos\theta - i\sin\theta)$ (where $0 < \theta \leq \frac{\pi}{2}$) are, respectively,

- (1) $2, -\theta$ (2) $2, \pi - \theta$ (3) $-2, \theta$ (4) $2, -\pi + \theta$

(7) The value of $(\sqrt{3} - i)^6$ is

- (1) 2^6 (2) -2^6 (3) $i2^6$ (4) $-i2^6$

(8) If $x + iy = (-1 + i\sqrt{3})^{2019}$, then x is

- (1) 2^{2019} (2) -2^{2019} (3) -1 (4) 1

(9) If $\omega \neq 1$ is the cubic root of unity then $\frac{a+b\omega+c\omega^2}{a\omega^2+b+c\omega} + \frac{a\omega^2+b\omega+c}{a+b\omega^2+c\omega}$ is

- (1) 1 (2) -1 (3) ω (4) $-\omega$

- (10) If z_1, z_2 are two complex numbers such that $|z_1| = |z_2| = 1$, then the minimum value of $|z_1 + 1| + |z_2 + 1| + |z_1 z_2 + 1|$ is
- (1) -1 (2) -3 (3) 2 (4) -2

Padasalai

XII STANDARD MATHEMATICS

THEORY OF EQUATIONS

Choose the correct or the most suitable answer from the given four alternatives.

- (1) If α, β, γ are the roots of the equation $x^3 + ax^2 + bx + c = 0$. The value of $(1+\alpha)(1+\beta)(1+\gamma)$ is
 (1) $(1+b)-(a+c)$ (2) $(1-b)+(a-c)$ (3) $(1-b)-(a-c)$ (4) $(1+b)+(a+c)$
- (2) $2x^3 - x^2 - 2x + 2 = Q(x)(2x-1) + R(x)$ for all values of x . The value of $R(x)$ is
 (1) 1 (2) 0 (3) $\frac{1}{2}$ (4) $-\frac{1}{2}$
- (3) Roots of $x^3 + x^2 - 4x - 4 = 0$ is
 (1) 1, -1, 0 (2) 3, -3, 1 (3) 1, 2, 2 (4) 2, -2, -1
- (4) The value of x that satisfies $f(x) = 0$ is called the
 (1) root of an equation $f(x) = 0$ (2) root of a function $f(x)$
 (3) zero of an equation $f(x) = 0$ (4) none of the above
- (5) A monic polynomial which crosses the x -axis at $-4, 0$, and 2 ; lies below the x -axis between -4 and 0 ; lies above the x -axis between 0 and 2 is
 (1) $x^3 + 2x^2 - 8x$ (2) $x^3 - 2x^2 - 8x$ (3) $-x^3 - 2x^2 + 8x$ (4) $-x^3 + 2x^2 + 8x$
- (6) A monic polynomial touches the x -axis at 0 and crosses the x -axis at 3 ; lies above the x -axis between 0 and 3 .
 (1) $-x^3 - 3x^2$ (2) $x^3 + 3x^2$ (3) $x^3 - 3x^2$ (4) $-x^3 + 3x^2$
- (7) The list of all possible rational roots for $x^5 - 4x^2 + 6x + 5$
 (1) $\pm 1, \pm 5$ (2) $\pm 5, \pm \frac{1}{5}$ (3) $\pm 1, \pm \frac{1}{5}$ (4) $\pm \frac{1}{4}, \pm \frac{5}{4}, \pm 5$
- (8) The list of all possible rational roots for $7x^3 - x^2 + 3$
 (1) $\pm \frac{1}{7}, \pm \frac{3}{7}, \pm 1, \pm 3$ (2) $\pm \frac{1}{7}, \pm \frac{1}{3}, \pm 1, \pm 3, \pm 7$
 (3) $\pm \frac{1}{7}, \pm \frac{3}{7}, \pm 1, \pm 3, \pm 7$ (4) $\pm \frac{1}{3}, \pm \frac{7}{3}, \pm 1, \pm 7$
- (9) The list of all possible rational roots for $6x^4 + 3x^3 - 3x^2 + 3x - 5$
 (1) $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{5}{2}, \pm \frac{1}{3}, \pm \frac{5}{3}, \pm \frac{1}{6}, \pm \frac{5}{6}$ (2) $\pm 1, \pm 5, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{3}{5}, \pm \frac{6}{5}$
 (3) $\pm 1, \pm 5, \pm \frac{1}{2}, \pm \frac{5}{2}, \pm \frac{1}{3}, \pm \frac{5}{3}, \pm \frac{1}{6}, \pm \frac{5}{6}$ (4) $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{3}{5}, \pm \frac{6}{5}$

(10) The list of all possible rational roots for $3x^4 + 7x^3 - 3x^2 + 5x - 12$

- (1) $\pm 1, \pm 3, \pm \frac{1}{2}, \pm \frac{3}{2}, \pm \frac{1}{3}, \pm \frac{1}{4}, \pm \frac{3}{4}, \pm \frac{1}{6}, \pm \frac{1}{12}$
- (2) $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \frac{1}{2}, \pm \frac{3}{2}, \pm \frac{1}{3}, \pm \frac{1}{4}, \pm \frac{3}{4}, \pm \frac{1}{6}, \pm \frac{1}{12}$
- (3) $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}$
- (4) $\pm 1, \pm 2, \pm 3, \pm 6, \pm 12, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{3}{4}$

(11) Using Descartes Rule of Signs, the possible number of positive and negative real zeros of $P(x) = 6x^5 - 4x^2 + x + 4$

- (1) 3 or 1 positive zeros, 3 or 1 negative zeros
- (2) 2 or 0 positive zeros, 1 or 0 negative zeros
- (3) 2 or 0 positive zeros, 2 or 0 negative zeros
- (4) 2 or 0 positive zeros, 1 negative zero

(12) Using Descartes Rule of Signs, the possible number of positive and negative real zeros of $P(x) = 6x^8 - 9x^7 + x^6 - 3x + 18$

- (1) 4, 2 or 0 positive zeros, no negative zeros
- (2) 4 or 2 positive zeros, no negative zeros
- (3) 4 positive zeros, no negative zeros
- (4) 4, 2 or 0 positive zeros, 1 negative zero

(13) Using Rational root theorem, the zeros of the polynomial $3x^3 - x^2 - 9x + 3$ is

- (1) $-3, \sqrt{3}, -\sqrt{3}$
- (2) $3, \sqrt{3}, -\sqrt{3}$
- (3) $\frac{1}{3}, \sqrt{3}, -\sqrt{3}$
- (4) $-\frac{1}{3}, \sqrt{3}, -\sqrt{3}$

(14) Using Rational root theorem, the zeros of the polynomial $x^4 + 3x^3 - 5x^2 - 9x - 2$ is

- (1) $1, -2, -2 + \sqrt{3}, -2 - \sqrt{3}$
- (2) $-1, 3, -2 + \sqrt{5}, -2 - \sqrt{5}$
- (3) $-1, 2, -2 + \sqrt{3}, -2 - \sqrt{3}$
- (4) $-1, -2, -2 + \sqrt{5}, -2 - \sqrt{5}$

(15) Using Rational root theorem, the zeros of the polynomial $2x^4 - 17x^3 + 59x^2 - 83x + 39$ is

- (1) $1, -\frac{3}{2}, 2 + 3i, 2 - 3i$
- (2) $1, \frac{3}{2}, 3 + 2i, 3 - 2i$
- (3) $-1, \frac{3}{2}, 3 + 2i, 3 - 2i$
- (4) $-1, -\frac{3}{2}, 2 + 3i, 2 - 3i$

(16) If $x + x^2 + x^3 = 2 + 2^2 + 2^3$ then the roots of the equation are

$$(1) 2, -1 - \sqrt{6}i, -1 + \sqrt{6}i$$

$$(2) 2, -\frac{3}{2} - i\frac{\sqrt{15}}{2}, -\frac{3}{2} - i\frac{\sqrt{15}}{2}$$

$$(3) 2, -\frac{3}{2} + i\frac{\sqrt{19}}{2}, -\frac{3}{2} - i\frac{\sqrt{19}}{2}$$

$$(4) 2, -1 + \sqrt{6}i, -1 - \sqrt{6}i$$

(17) If a, b, c are the roots of $x^3 - px^2 + qx - r = 0$, find the value of $(a+b-c)(b+c-a)(c+a-b)$:

$$(1) p^3 - 8r$$

$$(2) 4pq - p^3$$

$$(3) 4pq - p^3 - 8r$$

$$(4) 4pq - 8r$$

(18) If $x = -1$ is a zero with multiplicity 2 of the polynomial $P(x) = x^4 + x^3 + x^2 + kx + k - 1$, then value of k is

$$(1) 3$$

$$(2) 2$$

$$(3) 1$$

$$(4) 0$$

(19) According to Descartes Rules of Signs, the number of possible positive and negative real zeros of the polynomial $P(x) = 5x^4 + x^3 + 3x^2 - 3x - 1$ are

(1) one positive and three negative zeros

(2) one positive and either three or one negative zeros

(3) one positive and one negative zeros

(4) one negative and either three or one positive zeros

(20) A polynomial $P(x)$ of lowest degree and real coefficient that has zeros 0 (of multiplicity 3), $2i$, and i is

$$(1) P(x) = x^7 + 9x^5 + 4x^3$$

$$(2) P(x) = x^7 + 5x^5 + 4x^3$$

$$(3) P(x) = x^7 + 5x^5 + 11x^3$$

$$(4) P(x) = x^5 - 3ix^4 - 2x^3$$

XII STANDARD MATHEMATICS

INVERSE TRIGONOMETRIC FUNCTIONS

Choose the correct or the most suitable answer from the given four alternatives.

(1) The principal value of $\sin\left(\cot^{-1}\left(\cot\frac{17\pi}{3}\right)\right)$ is equal to

- (1) $\frac{\sqrt{3}}{2}$ (2) $-\frac{\sqrt{3}}{2}$ (3) $\frac{1}{2}$ (4) $-\frac{1}{2}$

(2) The value of $\tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right)$ is

- (1) $\frac{4+\sqrt{7}}{3}$ (2) $\frac{4-\sqrt{7}}{3}$ (3) $\frac{4+\sqrt{7}}{\sqrt{3}}$ (4) $\frac{4-\sqrt{7}}{\sqrt{3}}$

(3) The range of the function $\sin(\sin^{-1}x + \cos^{-1}x)$, $|x| \leq 1$ is

- (1) $[-1,1]$ (2) $(-1,1)$ (3) $\{0\}$ (4) $\{1\}$

(4) If $4\sin^{-1}x + \cos^{-1}x = \pi$, then the value of x is

- (1) $-\frac{1}{2}$ (2) $\frac{1}{2}$ (3) $\frac{1}{\sqrt{2}}$ (4) $\frac{\sqrt{3}}{2}$

(5) The value of $\cos^{-1}(\cos 12) - \sin^{-1}(\sin 12)$ is

- (1) 0 (2) π (3) $8\pi - 24$ (4) $9\pi + 24$

(6) If $\theta = \sin^{-1}x + \cos^{-1}x - \tan^{-1}x$, $x \geq 0$, then the smallest interval in which θ lies is, given by

- (1) $\frac{\pi}{4} \leq \theta \leq \frac{\pi}{2}$ (2) $0 \leq \theta \leq \frac{\pi}{4}$ (3) $\frac{\pi}{2} \leq \theta \leq \frac{3\pi}{4}$ (4) $-\frac{\pi}{4} \leq \theta \leq 0$

(7) If $\cos^{-1}x = \tan^{-1}x$, then $\sin(\cos^{-1}x)$ is

- (1) $\frac{1}{x^2}$ (2) $\frac{1}{x}$ (3) x (4) x^2

(8) $\tan^{-1}\left(\frac{\cos x}{1 + \sin x}\right) =$

- (1) $\frac{\pi}{3} - \frac{x}{2}$ (2) $\frac{\pi}{4} - \frac{x}{2}$ (3) $\frac{\pi}{3} + \frac{x}{2}$ (4) $\frac{\pi}{4} + \frac{x}{2}$

(9) If $\cos^{-1}p + \cos^{-1}q + \cos^{-1}r = \pi$, then $p^2 + q^2 + r^2 + 2pqr =$

- (1) 0 (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{6}$

(10) If $x^2 + y^2 + z^2 = r^2$, then $\tan^{-1}\left(\frac{xy}{zr}\right) + \tan^{-1}\left(\frac{yz}{xr}\right) + \tan^{-1}\left(\frac{xz}{yr}\right) =$

(1) $\frac{\pi}{2}$

(2) $\frac{\pi}{4}$

(3) π

(4) 0

(11) If $a \leq \tan^{-1} x + \cot^{-1} x + \sin^{-1} x \leq b$, then the values of a and b is

(1) $a = 0, b = \frac{\pi}{4}$

(2) $a = \frac{\pi}{4}, b = \pi$

(3) $a = 0, b = \pi$

(4) $a = \frac{\pi}{2}, b = \pi$

(12) If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = 3\pi$, then $x^{1001} + y^{1002} + z^{1003} - 3$ is equal to

(1) 1

(2) 0

(3) -1

(4) 2

(13) If $A = \tan^{-1} x, x \in \mathbb{R}$, then the value of $\sin 2A$ is

(1) $\frac{2x}{1-x^2}$

(2) $\frac{2x}{\sqrt{1-x^2}}$

(3) $\frac{2x}{1+x^2}$

(4) $\frac{1-x^2}{1+x^2}$

(14) If $0 \leq x < \infty$, then $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ equals

(1) $2\tan^{-1} x$

(2) $-2\tan^{-1} x$

(3) $\pi - 2\tan^{-1} x$

(4) $\pi + 2\tan^{-1} x$

(15) If $\sin^{-1}\left(\frac{2x}{1+x^2}\right) + \cos^{-1}\left(\frac{1-x^2}{1+x^2}\right) = 4\tan^{-1} x$, then

(1) $x \in [1, \infty) \cup (-\infty, -1)$

(2) $x \in [-1, 1]$

(3) $x \in [1, \infty)$

(4) $x \in (-\infty, -1)$

(16) If $\sec^{-1} x = \operatorname{cosec}^{-1} y$, then $\cos^{-1} \frac{1}{x} + \cos^{-1} \frac{1}{y}$ is

(1) 0

(2) $\frac{\pi}{4}$

(3) $\frac{\pi}{2}$

(4) π

(17) The equation $\sin^{-1} x - \cos^{-1} x = \cos^{-1} \frac{\sqrt{3}}{2}$ has

(1) no solution

(2) unique solution

(3) infinite number of solutions

(4) finite number of solutions.

(18) The complete set of solutions $\sin^{-1}(\sin 5) > x^2 - 4x$ is

(1) $|x-2| < \sqrt{9-2\pi}$

(2) $|x-2| > \sqrt{9-2\pi}$

(3) $|x| < \sqrt{9-2\pi}$

(4) $|x| > \sqrt{9-2\pi}$

(19) The value of $\tan^{-1}(\tan(-6))$ is

(1) $\pi - 6$

(2) $2\pi - 6$

(3) $\pi + 6$

(4) $2\pi + 6$

(20) If x satisfies the equation $x^2 - x - 2 > 0$, then a value exists for

(1) $\sin^{-1} x$

(2) $\sec^{-1} x$

(3) $\cos^{-1} x$

(4) none of these

Padasalai

XII STANDARD MATHEMATICS

TWO DIMENSIONAL ANALYTICAL GEOMETRY-II

Choose the correct or the most suitable answer from the given four alternatives.

- (1) The vertices of the ellipse $\frac{(x-1)^2}{9} + \frac{(y-2)^2}{18} = 1$ are
- (1) (3, 4) and (-3, 4) (2) (4, 3) and (-4, 3)
 (3) (5, 2) and (-3, 2) (4) (1, 6) and (1, -2)
- (2) The line PP^1 is a focal chord of the parabola $y^2 = 8x$ and if the coordinates of P are (18, 12) then the coordinates of P^1 is
- (1) $\left(\frac{2}{9}, \frac{-4}{3}\right)$ (2) $\left(\frac{-2}{9}, \frac{-4}{3}\right)$ (3) $\left(\frac{-2}{9}, \frac{-4}{3}\right)$ (4) $\frac{2}{3}, \frac{-4}{9}$
- (3) The equations $4y^2 - 50x = 25x^2 + 16y + 109$ represents
- (1) a parabola (2) an ellipse (3) a circle (4) a hyperbola
- (4) The ellipse $x^2 + 4y^2 = 4$ is inscribed in a rectangle aligned with coordinate axes which in turn is inscribed in another ellipse through the point (4, 0). Then the equation of the ellipse is
- (1) $x^2 + 16y^2 = 16$ (2) $x^2 + 12y^2 = 16$ (3) $4x^2 + 48y^2 = 48$ (4) $4x^2 + 64y^2 = 48$
- (5) The eccentricity of an ellipse, with its centre at the origin is $\frac{1}{2}$. If one of the directrices is $x = 4$, then the equation of the ellipse is
- (1) $x^2 + 4y^2 = 1$ (2) $3x^2 + 4y^2 = 12$ (3) $4x^2 + 3y^2 = 1$ (4) $4x^2 + 3y^2 = 1$
- (6) The locus of a point $P(\alpha, \beta)$ moving under the condition that the line $y = \alpha x + \beta$ is a tangent to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is
- (1) an ellipse (2) a circle (3) a parabola (4) a hyperbola
- (7) For the hyperbola $\frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1$. Which of the following remains constant when α reverses
- (1) eccentricity (2) directrix
 (3) abscissae of vertices (4) abscissae of foci
- (8) A focus of an ellipse is at the origin. The directrix is the line $x = 4$ and the eccentricity is $\frac{1}{2}$. Then the length of the semi-major axis is

(1) $\frac{8}{3}$

(2) $\frac{2}{3}$

(3) $\frac{4}{3}$

(4) $\frac{5}{3}$

(9) The radius of the auxiliary circle of the conic $9x^2 + 16y^2 = 144$ is

(1) $\sqrt{7}$

(2) 4

(3) 3

(4) 5

(10) Find the equation of the circle whose diameter is the chord $x + y = 1$ of the circle $x^2 + y^2 = 4$.

(1) $x^2 + y^2 - x - y - 3 = 0$

(2) $x^2 + y^2 + x + y - 3 = 0$

(3) $x^2 + y^2 + x - y - 3 = 0$

(4) $x^2 + y^2 - x + y - 3 = 0$

(11) If $x + y = k$ is normal to $y^2 = 12x$, then k is

(1) 3

(2) 9

(3) -9

(4) -3

(12) The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and having its centre at

(0, 3) is

(1) 3

(2) 4

(3) 5

(4) $\sqrt{7}$

(13) The locus of the point of intersection of two perpendicular tangents to the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ is

(1) $x^2 + y^2 = 9$

(2) $x^2 + y^2 = 16$

(3) $x^2 + y^2 = 25$

(4) $x^2 + y^2 = 4$

(14) The number of tangents that can be drawn from the point (4, 3) to the hyperbola $\frac{x^2}{4} - \frac{y^2}{3} = 1$ is

(1) 2

(2) 3

(3) 4

(4) 1

(15) If the line $y = 3x + \lambda$ touches the hyperbola $9x^2 - 5y^2 = 45$, then the value of λ is

(1) ± 3

(2) ± 2

(3) ± 6

(4) $\pm\sqrt{5}$

XII STANDARD MATHEMATICS

APPLICATIONS OF VECTOR ALGEBRA

Choose the correct or the most suitable answer from the given four alternatives.

(1) If $\vec{a}$ is a vector perpendicular to both $\vec{b}$ and $\vec{c}$, then

- (1) $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ (2) $\vec{a} \times (\vec{b} \times \vec{c}) = \vec{0}$
 (3) $\vec{a} \cdot (\vec{b} \times \vec{c}) = \vec{0}$ (4) $\vec{a} \cdot (\vec{b} + \vec{c}) = \vec{0}$

(2) If $\vec{a}, \vec{b}, \vec{c}$ are any three vectors such that $(\vec{a} + \vec{b}) \times \vec{c} = (\vec{a} - \vec{b}) \times \vec{c}$, then $(\vec{a} \cdot \vec{b}) \cdot \vec{c}$ is

- (1) $\vec{0}$ (2) $\vec{a}$ (3) $\vec{b}$ (4) $\vec{c}$

(3) If $\vec{a} = \hat{i} + \hat{j} + \hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} - 4\hat{k}$ and $\vec{c} = 2\hat{i} + 3\hat{j} - \hat{k}$, then $(\vec{a} \cdot \vec{b}) \times (\vec{a} \cdot \vec{c})$ is equal to

- (1) - 36 (2) 64 (3) - 64 (4) 36

(4) The vector $\vec{a} \cdot (\vec{b} \times \vec{c})$ is coplanar with the vectors

- (1) $\vec{a}, \vec{c}$ (2) $\vec{a}, \vec{b}$ (3) $\vec{b}, \vec{c}$ (4) $\vec{a}, \vec{b}, \vec{c}$

(5) A particle is acted on by a force of magnitude 5 units in the direction $2\hat{i} - 2\hat{j} + \hat{k}$ and is displaced from $(2, 3, 4)$ to $(6, 4, 8)$, then the work done by the force is

- (1) $\frac{50}{7}$ (2) $\frac{50}{3}$ (3) $\frac{25}{3}$ (4) $\frac{25}{7}$

(6) The torque of the force $\vec{F} = 3\hat{i} + 2\hat{j} - 4\hat{k}$ about the point $(2, -1, 3)$ acting through a point $(1, -1, 2)$ is

- (1) $2\hat{i} - 7\hat{j} - 2\hat{k}$ (2) $2\hat{i} + 7\hat{j} - 2\hat{k}$
 (3) $-2\hat{i} - \hat{j} + 2\hat{k}$ (4) $-2\hat{i} - 7\hat{j} + 2\hat{k}$

(7) A vector perpendicular to $2\hat{i} + \hat{j} + \hat{k}$ and coplanar with $\hat{i} + 2\hat{j} + \hat{k}$ and $\hat{i} + \hat{j} + 2\hat{k}$ is

- (1) $5(\hat{j} - \hat{k})$ (2) $5(\hat{j} + \hat{k})$ (3) $\hat{i} + 7\hat{j} - \hat{k}$ (4) $\hat{i} + 7\hat{j} + \hat{k}$

(8) If the straight line $\frac{x-3}{4} = \frac{y-4}{7} = \frac{z+3}{-13}$ lies in the plane $5x - y + z = p$, then the value of p is

- (1) 2 (2) - 3 (3) 8 (4) 9

(9) If the lines $\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-1}{4}$ and $\frac{x-3}{1} = \frac{y-k}{2} = z$ intersect, then the value of k is

- (1) $\frac{9}{2}$ (2) $-\frac{2}{9}$ (3) $\frac{3}{2}$ (4) $-\frac{2}{3}$

(10) The equation of plane through the intersection of the planes $x + 2y + 3z - 4 = 0$ and $4x + 3y + 2z + 1 = 0$, and passing through the origin is

- (1) $7x + 4y + z = 0$ (2) $17x + 14y + 11z = 0$
(3) $7x + y + 4z = 0$ (4) $17x + 14y + z = 0$

(11) If the planes $\vec{r} \times (3\hat{i} - 2\hat{j} + 2\hat{k}) = 17$ and $\vec{r} \times (4\hat{i} + 3\hat{j} - m\hat{k}) = 25$ are perpendicular, then the value of m is

- (1) 3 (2) -3 (3) 9 (4) -9

(12) The non parametric form of the vector equation of the plane passing through $(3, 4, 5)$ and parallel to the plane $x + 2y + 4z = 5$ is

- (1) $\vec{r} \times (\hat{i} + 2\hat{j} + 4\hat{k}) = 24$ (2) $\vec{r} \times (\hat{i} + 2\hat{j} + 4\hat{k}) = 31$
(3) $\vec{r} \times (\hat{i} + 2\hat{j} + 4\hat{k}) = 42$ (4) $\vec{r} \times (\hat{i} + 2\hat{j} + 4\hat{k}) = 13$

(13) The equation of the straight line passing through $(4, -4, 7)$ and parallel to z -axis is

- (1) $\frac{x-4}{1} = \frac{y+4}{1} = \frac{z-7}{0}$ (2) $\frac{x-4}{0} = \frac{y+4}{1} = \frac{z-7}{1}$
(3) $\frac{x-4}{1} = \frac{y+4}{0} = \frac{z-7}{0}$ (4) $\frac{x-4}{0} = \frac{y+4}{0} = \frac{z-7}{1}$

(14) The angle between the planes $\vec{r} \times (2\hat{i} - \hat{j} + \hat{k}) = 16$ and $\vec{r} \times (\hat{i} + \hat{j} + 2\hat{k}) = 19$ is

- (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) $\frac{\pi}{3}$

(15) The direction cosines of the line $x = y = z$ are

- (1) $\frac{1}{3}, \frac{1}{3}, \frac{1}{3}$ (2) 1, 1, 1 (3) $\sqrt{3}, \sqrt{3}, \sqrt{3}$ (4) $\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}$

(16) The point of intersection of the line $\frac{x-1}{1} = \frac{y+3}{3} = \frac{z-2}{2}$ with the plane $3x - 2y + z = 11$ is

- (1) $(1, -3, 2)$ (2) $(-1, 3, 2)$ (3) $(0, 6, 0)$ (4) $(0, -6, 0)$

(17) The coordinates of ΔABC , where A, B, C are the points of intersection of the plane $6x + 3y + 2z = 36$ with the coordinate axes, is

- (1) $(2, 4, 6)$ (2) $(4, 6, 2)$ (3) $(6, 4, 2)$ (4) $(6, 2, 4)$

(18) Distance of the point $(2, 3, 4)$ from the plane $3x - 6y + 2z + 11 = 0$ is

(1) 0

(2) 1

(3) 2

(4) 3

(19) If the line $\vec{r} = (a_1\hat{i} + a_2\hat{j} + a_3\hat{k}) + t(l\hat{i} + m\hat{j} + n\hat{k})$ is parallel to the plane

$$\vec{r} \times (a\hat{i} + b\hat{j} + c\hat{k}) = d, \text{ then}$$

(1) $\frac{a}{l} + \frac{b}{m} + \frac{c}{n} = 0$

(2) $\frac{a}{l} = \frac{b}{m} = \frac{c}{n}$

(3) $al + bm + cn = 0$

(4) $ax_1 + by_1 + cz_1 = d$

(20) The angle between the straight lines $\vec{r} = (\hat{i} + 2\hat{j} + 3\hat{k}) + s(2\hat{i} + 5\hat{j} + 4\hat{k})$ and $\vec{r} = (\hat{i} - 2\hat{j} + 3\hat{k}) + t(\hat{i} + 2\hat{j} - 3\hat{k})$ is

(1) $\frac{p}{6}$

(2) $\frac{p}{4}$

(3) $\frac{p}{2}$

(4) $\frac{p}{3}$

(21) The equation of the straight line passing through $(4, 5, 6)$ and perpendicular to the plane

$$\vec{r} \times (\hat{i} + 3\hat{j} - 5\hat{k}) = 10 \text{ is}$$

(1) $\vec{r} = (4\hat{i} + 5\hat{j} + 6\hat{k}) + t(\hat{i} + 3\hat{j} - 5\hat{k})$

(2) $\vec{r} = (\hat{i} + 3\hat{j} - 5\hat{k}) + t(4\hat{i} + 5\hat{j} + 6\hat{k})$

(3) $\vec{r} = (4\hat{i} - 5\hat{j} + 6\hat{k}) + t(\hat{i} - 3\hat{j} + 5\hat{k})$

(4) $\vec{r} = (\hat{i} - 3\hat{j} + 5\hat{k}) + t(4\hat{i} + 5\hat{j} + 6\hat{k})$

12 STD

Chapter 7

MATHS

- A stone is thrown vertically upwards from the top of a tower 64 ft high according to the law $s = 48t - 16t^2$. The greatest height attained by the stone above the ground is
a. 100 ft b. 64 ft c. 36ft d. 32ft
- The volume of a sphere is increasing at the rate of 1200 cm/sec. The rate of increase in its surface area when the radius is 10cm is
a. 120 sq.cm / sec b. 240 sq.com / sec c. 300 sq.cm / sec d. 400 sq.cm / sec
- A man of 2m height walks at a uniform speed of 6km/hr away from a lamp post of 6m height. The rate at which the length of his shadow increases is
a. 3 km / hr b. 2km / hr c. 3 / 2 km / hr d. 1 km / hr
- The point on the curve $y^2 = x$ where the tangent makes an angle $\frac{\pi}{4}$ with x - axis
a. (1,1) b. $\left(\frac{1}{4}, \frac{1}{2}\right)$ c. $\left(\frac{1}{2}, \frac{1}{4}\right)$ d. (4,2)
- The curve $x^2 - xy + y^2 = 27$ has tangents parallel to x - axis at
a. (-3,-6) and (3,-6) b. (3,6) and (-3,-6) c. (-3,6) and (-3,-6) d. (3,-6) and (-3,6)
- The normal to a curve $y = f(x)$ is parallel to the x - axis if
a. $\frac{dx}{dy} = 0$ b. $\frac{dy}{dx} = 0$ c. $\frac{dx}{dy} = 1$ d. $\frac{dy}{dx} = 1$
- Let $f(x) = \sqrt{x+4}$ the values of c that satisfies the mean value theorem for the function on the interval $[0,5]$
a. 2 b. 2.25 c. 2.5 d. 2.75
- The series $\sum_{n=0}^{\infty} (-1)^n \frac{x^{2n}}{(2n)!} 4^n$ is a Maclaurin series expansion for the function
a. $\cos x$ b. $\cos 2x$ c. $\sin x$ d. $\sin 2x$
- In which of the following intervals the function $y(x) = x^3 - 3x^2 - 9x + 5$ is always decreasing?
a. (-1,3) b. (-3,3) c. (-4,4) d. (-2,2)
- The function $f(x) = \frac{x}{3} + \frac{3}{x}$ decreases in the interval
a. (-3,3) b. $(-\infty, 3)$ c. $(3, \infty)$ d. (-9,9)
- The maximum value of $\frac{\log x}{x}$ is
a. 1 b. $\frac{2}{3}$ c. e d. $\frac{1}{e}$
- The maximum area of a rectangle that can be inscribed in a circle of radius 2 units is
a. 8π sq.units b. 4π sq.units c. 8 sq.units d. 4 sq.units
- The maximum value of xy subject to $x+y=16$ is
a. 8 b. 16 c. 32 d. 64
- $\lim_{x \rightarrow -2} \frac{\sin \pi x}{x^2 - 4} =$
a. $-\frac{\pi}{4}$ b. $+\frac{\pi}{4}$ c. $-\frac{\pi}{2}$ d. $+\frac{\pi}{2}$
- For the function $y = e^x - x$ at $x=0$ is
a. Concave up b. concave down
c. an inflection point d. The function is not differentiable

12 STD

Chapter 8

MATHS

- If $y = (x^2 - 5)^3$, $x = 1$ $dx = 0.02$ then $dy =$
a) 21,6 b) 2,16 c) 7,6 d) 0,72
- If $y = x + \cos x$ and $x = \frac{5}{6} dx = 0.02$ then dy is
a) 0.1 b) 0.01 c) 0.001 d) 0.025
- If $f(x,y) = x \cos xy$ find f_x at $\left(2, \frac{5}{4}\right)$
a) $\frac{\pi}{2}$ b) $-\frac{\pi}{2}$ c) $\frac{\pi}{4}$ d) $-\frac{\pi}{4}$
- If $u = \tan^{-1}\left(\frac{x^3 + y^3}{x - y}\right)$ and $f = \tan u$ then the degree of the homogenous function f is
a) 3 b) 1 c) 2 d) 0
- If $u = \log\left(\frac{x^2 + y^2}{xy}\right)$ and $e^u = f$ then the degree of f is
a) 0 b) 1 c) 2 d) 4
- If $u = y^x$ then $\frac{\partial u}{\partial y}$ is equal to
a) $u \log y$ b) $u \log x$ c) xy^{x-1} d) yx^{y-1}
- If $f(x, y) = x^2y + y^2x + xy + 5$ for all $\forall x, y \in \mathbb{R}^2$ then $\frac{\partial f}{\partial x}(-1, 2)$ is
a) 2 b) 0 c) 4 d) -4
- An harmonic function u is defined as $u(x, y) = e^{-2x} \sin 2y$ then $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$ is
a) u b) $-u$ c) 0 d) e^u
- If $w(x, y) = y^3 - 3x^2y + x^3$, $x, y \in \mathbb{R}$ then the linear approximation of w at $(1, -1)$ is
a) $4-3x$ b) $4x-3$ c) 0 d) -3
- If $x = r \cos \theta$, $y = r \sin \theta$ then $\frac{\partial r}{\partial y}$ is equal to
a) $\cos \theta$ b) $\sin \theta$ c) $\tan \theta$ d) $\operatorname{cosec} \theta$
- If $u = \frac{1}{\sqrt{x^2 + y^2}}$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is equal to
a) $\frac{1}{2}u$ b) u c) $\frac{3}{2}u$ d) u^{-1}
- If $u = \log\left(\frac{x^2 + y^2}{xy}\right)$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$ is equal to
a) 0 b) u c) $2u$ d) u^{-1}
- Given $u = e^{x^3} + y^3$ then $\frac{\partial u}{\partial y}$ is equal to a) $3u$ b) u c) $3x^2u$ d) $3y^2u$
- If $u = ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy$ and $\sum \frac{\partial^2 u}{\partial x^2} = 0$ then
a) $a = 0$ b) $a + b + c = 0$ c) $b = 0$ d) $c = 0$
- Linear approximation of $\tan x$ at $x = 0$ is a) $-x$ b) x c) 0 d) $\frac{\pi}{4}$

Applications of Integration

- If $\int_0^a 3x^2 dx = 8$, then the value of a is
a) 1 b) 3 c) 4 d) 2
- The value of $\int_0^1 x^2 e^{x^3} dx$ is
a) $\frac{1}{3}(1-3)$ b) $\frac{1}{2}(1-e)$ c) $\frac{1}{3}(e-1)$ d) $\frac{1}{2}(e-1)$
- If $\int_0^a \sqrt{x} dx = 4a \int_0^{\frac{\pi}{4}} \sin 2x dx$ then a is a) 3 b) 4 c) 9 d) 12
- The value of $\int_0^{\frac{\pi}{2}} \frac{\sin 8x \log(\cot x)}{\cos 2x} dx$ is a) $\frac{\pi}{2}$ b) 0 c) $\frac{\pi}{8}$ d) π
- The value of $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right) dx$ is a) 0 b) $\frac{\pi}{4}$ c) π d) $\frac{\pi}{2}$
- The area of the region bounded by the curve $y = x^2$ and the line $y = 4$ is
a) $\frac{10}{3}$ b) $\frac{32}{3}$ c) $\frac{20}{3}$ d) $\frac{25}{3}$
- The value of $\int_0^{\frac{\pi}{2}} \frac{\sin x}{1 + \cos^2 x} dx$ is a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) π d) 2π
- $\int_0^a xf(x)dx = \frac{a}{2} \int_0^a f(x)dx$ if
a) $f(2a-x) = f(x)$ b) $f(2a-x) = -f(x)$ c) $f(a-x) = f(x)$ d) $f(a-x) = -f(x)$
- The area of the region bounded by the line $x-y=1$ and x -axis $x=-2$ and $x=0$ is
a) 4 b) 3 c) 5 d) 7
- The value of $\int_0^{\frac{\pi}{4}} \cos^8 2x$ a) $\frac{35\pi}{512}$ b) $\frac{15\pi}{512}$ c) $\frac{5\pi}{512}$ d) $\frac{45\pi}{512}$
- The value of $\int_0^{\infty} x^8 e^{\frac{-x}{3}} dx$ is a) $3^9 < 9$ b) $3^9 < 8$ c) $3^8 < 9$ d) $3^8 < 8$
- The volume of the solid generated by revolving the region bounded by the curve $y = x^3$, about y -axis and between the lines $x=0$ and $y=1$ is
a) $\frac{3\pi}{5}$ b) $\frac{2\pi}{5}$ c) $\frac{\pi}{5}$ d) $\frac{4\pi}{5}$
- The volume of the solid generated when the region enclosed by $y = \sqrt{x}$, $y=2$ and $x=0$ is revolved about the y -axis is
a) $\frac{32\pi}{5}$ b) $\frac{22\pi}{5}$ c) $12\frac{\pi}{5}$ d) $\frac{42\pi}{5}$
- The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x \sin x dx$ is a) 0 b) 2 c) 4 d) 5
- The value of $\int_0^1 x^2 e^x dx$ is a) $e-1$ b) $e-3$ c) $e-2$ d) $e-4$

- The degree of the differential equation $\frac{d^2 y}{dx^2} - y^{\frac{1}{2}} - 8 = 0$ is (a) 6 (b) 4 (c) 3 (d) 2
- The solution of the differential equation $\frac{dy}{dx} + \sin^2 y = 0$ is (a) $y = \cot x + c$ (b) $x = \cot y + c$ (c) $y + \cos y = c$ (d) $x + \cos x = c$
- $y = Ae^{mx} + Be^{-mx}$ is a solution of the differential equation (a) $\frac{dy}{dx} + my = 0$ (b) $\frac{dy}{dx} - my = 0$ (c) $\frac{d^2 y}{dx^2} + m^2 y = 0$ (d) $\frac{d^2 y}{dx^2} - m^2 y = 0$
- The integrating factor of the differential equation $\frac{dy}{dx} + y \cot x = 4x + x^2 \cot x$ is (a) $\log \cos x$ (b) $\log \sin x$ (c) $\cos x$ (d) $\sin x$
- The differential equation $y \frac{dy}{dx} + x = C$ represents the family of (a) parabolas (b) circles (c) ellipses (d) hyperbolas
- The solution of $\frac{dy}{dx} = \frac{y^{\frac{1}{3}}}{x^{\frac{2}{3}}}$ is (a) $y^{\frac{2}{3}} - x^{\frac{2}{3}} = C$ (b) $y^{\frac{1}{3}} - x^{\frac{1}{3}} = C$ (c) $x^{\frac{1}{3}} + y^{\frac{1}{3}} = C$ (d) $x^{\frac{2}{3}} + y^{\frac{2}{3}} = C$
- The integrating factor of the differential equation $(x + y + 1) \frac{dy}{dx} = 1$ is (a) e^x (b) e^{-x} (c) e^y (d) e^{-y}
- Consider the following statements : I. The general solution of $\frac{dy}{dx} = j(x) + x$ is of the form $y = y(x) + C$, where C is an arbitrary constant. II. The degree of $\frac{dy}{dx} = j(x) + x$ is 1. Which of the above is/are true? (a) only I (b) only II (c) both I and II (d) neither I nor II
- The degree of the differential equation $\frac{d^2 y}{dx^2} + e^{\frac{dy}{dx}} = 0$ is (a) 2 (b) 1 (c) 3 (d) not defined
- The differential equation of the family of curves $y = A(x + B)^2$, where A and B are arbitrary constants is (a) $yy'' = (y')^2$ (b) $2yy'' = (y')^2$ (c) $2yy'' = y' + y$ (d) $2yy'' = y' - y$
- The differential equation of the family of curves $y = A \cos ax + B \sin ax$, where A and B are arbitrary constants is (a) $y'' + a^2 y = 0$ (b) $y'' - a^2 y = 0$ (c) $y'' + ay = 0$ (d) $y'' - ay = 0$
- The order and degree of the differential equation $y = x \frac{dy}{dx} + \frac{dx}{dy}$ are respectively (a) 1, 4 (b) 4, 1 (c) 1, 1 (d) 2, 1
- The slope of a curve at any point is the reciprocal of twice the ordinate at the point and it passes through the point (4,3). The equation of the curve is (a) $x^2 = y - 5$ (b) $x^2 = y + 5$ (c) $y^2 = x + 5$ (d) $y^2 = x - 5$
- The solution of the differential equation $\frac{dy}{dx} = x + y, y(0) = 0$ is (a) $y = e^x + x - 1$ (b) $y = e^x - x - 1$ (c) $y = e^{-x} + x + 1$ (d) $y = e^{-x} - x - 1$
- The equation of the curve passing through (1, 1) and satisfying the differential equation $\frac{dy}{dx} = \frac{2y}{x}, x > 0, y > 0$ is (a) $y = 2x$ (b) $x = 2y$ (c) $y = x^2$ (d) $y^2 = x$

- 1) A random variable X has the following probability distribution

X	-2	-1	0	1
$P(X = x_i)$	$\frac{1-a}{4}$	$\frac{1+2a}{4}$	$\frac{1-2a}{4}$	$\frac{1+a}{4}$

- (1) 'a' can have any real value (2) $\frac{1}{4} \leq a \leq \frac{1}{3}$ (3) $-\frac{1}{2} \leq a \leq \frac{1}{2}$ (4) $-1 \leq a \leq 1$

- 2) A random variable X has the following probability distribution

X	2	5	6	7
$P(X)$	$\frac{1}{10}$	x	$\frac{3}{10}$	$\frac{4}{10}$

Find the mean and variance of X . (1) 5.4, 2 (2) 5.8, 2.16 (3) 5.8, 2 (4) none

- 3) A box contains 10 tickets. 2 of the tickets carry a price of `8 each, 5 of the tickets carry a price of `4 each, and 3 of the tickets carry a price of `2 each. If one ticket is drawn, what is the expected value of the price? (1) 3.4 (2) 2.8 (3) 3.1 (4) 4.2

- 4) When a coin is tossed thrice, the probability distribution of X when X assumes values of getting no head, one head, two heads, three heads is formed. Variance on X is (1) $\frac{3}{4}$ (2) $\frac{3}{2}$ (3) 1 (4) 2

- 5) A random variable has its range = $\{0, 1, 2\}$ and the probabilities are given by $P(X = 0) = 3k^2$,

$P(X = 1) = 4k - 10k^2$, $P(X = 2) = 5k - 1$, where k is a constant. Find k . (1) 1 (2) 2 (3) 3 (4) $\frac{2}{7}$

- 6) A random variable has its range = $\{0, 1, 2\}$ and the probabilities are given by $P(X = 0) = 3k^2$, $P(X = 1) = 4k - 10k^2$, $P(X = 2) = 5k - 1$, where k is a constant. Find $P(0 < x < 3)$.

- (1) $\frac{1}{9}$ (2) $\frac{1}{2}$ (3) $\frac{8}{9}$ (4) 1

- 7) A random variable X takes the values of 0, 1, 2. Its mean is 1.2. If $P(X = 0) = 0.3$, then $P(X = 1)$ is (1) 0.3 (2) 0.5 (3) 0.2 (4) 1

- 8) If the sum of the mean and the variance of the binomial distribution for 5 trials is 1.8, find the binomial distribution.

(1) $\frac{28}{25} \frac{2}{5} \frac{2}{5} \frac{2}{5} \frac{2}{5}$

(2) $\frac{28}{25} \frac{4}{5} \frac{2}{5} \frac{2}{5} \frac{2}{5}$

(3) $\frac{28}{25} \frac{2}{5} \frac{2}{5} \frac{2}{5} \frac{2}{5}$

(4) $\frac{28}{25} \frac{2}{5} \frac{2}{5} \frac{2}{5} \frac{2}{5}$

- 9) If the mean and variance of a binomial distribution are $\frac{15}{4}$ and $\frac{15}{16}$. The number of trials is

- (1) 5 (2) 4 (3) 16 (4) 20

- 10) The probability of a success in a Bernoulli experiment is 0.40. The experiment is repeated 50 times. The mean of the binomial distribution of the number of successes is (1) 12 (2) 20 (3) 30 (4) 35

- 11) If X is a random variable in which distribution given below

X	-2	-1	0	1	2	3
$P(X)$	0.1	c	0.2	$2c$	0.3	c

The value of c and variance are (1) 0.1, 2.16 (2) 0.01, 2.16 (3) 1, 2.16 (4) None of these

- 12) If the mean and variance of a binomial variable X are respectively $\frac{35}{6}$ and $\frac{35}{36}$, then the probability of

- $X > 6$ is (1) $\frac{1}{2}$ (2) $\frac{5^7}{6^7}$ (3) $\frac{1}{7^6}$ (4) 0

- 13) In a binomial distribution the probability of getting success is $\frac{1}{4}$ and the standard deviation is 3. Then its mean is (1) 6 (2) 8 (3) 10 (4) 12
- 14) Suppose X follows a binomial distribution with parameters n and p , where $0 < p < 1$. If $\frac{P(X = r)}{P(X = n - r)}$ is independent of n for every r , then p is (1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$

Padasalai

12 STD

Chapter 12

MATHS

1. Identify the open statement

- (1) x is a real number (2) Wish you a happy Pongal
(3) Good night to all (4) Can you bring a book?

2. Which one of the following is not a statement in logic?

- (1) 7 is a prime (2) π is irrational
(3) 9 is an odd number (4) Social Science is interesting

3. Let $p = A$ has passed the examination $q = A$ is sad. Then the statement : "It is not true that A passes therefore A is sad" in a symbolic form is

- (1) $\neg p \rightarrow q$ (2) $\neg p \rightarrow \neg q$ (3) $\neg(p \rightarrow \neg q)$ (4) $\neg(p \rightarrow q)$

4. The converse of the statement: "If it is raining then it is cool" is

- (1) If it is cool then it is raining (2) If it is not cool then it is raining
(3) If it is not cool then it is not raining (4) If it is not raining then it is not cool

5. Which one of the following is logically equivalent to $\neg p \vee \neg q$?

- (1) $\neg p \wedge \neg q$ (2) $\neg(p \wedge q)$ (3) $\neg(p \vee q)$ (4) $p \vee q$

6. The proposition $p \rightarrow \neg(p \wedge q)$ is a

- (1) tautology (2) contradiction (3) contingency (4) either (1) or (2)

7. Let $A = \{20, 30, 40, 50, 60\}$. Which one of the following is not true?

- (1) $x \in A$ such that $x + 30 = 80$ (2) $x \in A$ such that $x + 20 < 50$
(3) $x \in A$ such that $x + 20 < 90$ (4) $\forall x \in A$ such that $x + 60 \geq 90$

8. Let R be the relation over the set $\mathbb{N} \times \mathbb{N}$ and be defined by

$(a, b)R(c, d) \leftrightarrow a + d = b + c$. Then the relation R is

- (1) Reflective only (2) Symmetry only
(3) Transitive only (4) an equivalence relation

9. Which one of the following define on R^2 is not an equivalence relation?

- (1) $(x, y) \in R \times R \leftrightarrow x \geq y$ (2) $(x, y) \in R \times R \leftrightarrow x = y$
(3) $(x, y) \in R \times R \leftrightarrow x - y$ is a multiple of 3 (4) $(x, y) \in R \times R \leftrightarrow |x - y|$ is even

10. If $A = \{1, 2, 3\}$ then the number of equivalence relations containing (1,2) is

- (1) 1 (2) 2 (3) 3 (4) 4