

Practical No 01 - Locus

1. Given $A \equiv (-15, 0)$ and $B \equiv (15, 0)$. Find the equation of the locus of the point P such that $l(PA) - l(PB) = 24$ units.
2. If the origin is shifted to the point $(-3, 1)$, axes remaining parallel, obtain the new equation of the locus whose old equation is $x^2 + 3y^2 + 6x + 10 = 0$.

Practical No. 02 - Logarithms

1. Calculate $\frac{12.49 \times 0.6872}{(4.232)^2}$ using log tables.
2. Calculate $\frac{23.8 \times (7.3)^2}{\sqrt{0.82}}$ using log tables.

Practical No. 03 - Applications of Determinants

1. If the area of ΔABC is $33/2$ Sq. units, where $A \equiv (3, -5)$, $B \equiv (-2, k)$ and $C \equiv (1, 4)$, find the value of k.
2. Solve by Cramer's Rule :
$$\left. \begin{array}{l} \sin x + \cos y + \tan z = 3 \\ 2\sin x - \cos y + 3\tan z = 4 \\ 3\sin x + 4\cos y - 2\tan z = 5 \end{array} \right\} \text{ where } 0 \leq x, y, z \leq 90^\circ$$

Practical No. 04 - Complex Numbers

1. Find the square roots of $-2i$ in the form $a + bi$.
2. If ω is a complex cube root of unity, then find the value of $(1 + \omega - \omega^2)^6$

Practical No. 05 - Algebra of Matrices

1. If $A = \begin{bmatrix} 1 & -4 \\ -2 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 6 \\ 3 & -2 \end{bmatrix}$ and $C = \begin{bmatrix} 4 & -5 \\ 2 & 1 \end{bmatrix}$, verify that $A(B + C) = AB + AC$
2. If $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 4 \\ 5 & 7 \end{bmatrix}$, find AB and BA . Is $AB = BA$? Give your conclusion.

Practical No. 06 - Special Series

1. Evaluate : $\sum_{r=1}^n (6r^2 - 2r + 6)$
2. Find the sum $1.2.3 + 2.3.4 + 3.4.5 + \dots$ to n terms using sigma notation.

Practical No. 07 - Applications of Vectors

1. Show that the points with position vectors $\vec{a} = 4\vec{i} + \vec{j} + 3\vec{k}$, $\vec{b} = \vec{i} + 3\vec{j} + 2\vec{k}$, $\vec{c} = 2\vec{i} + 7\vec{k}$ are the vertices of a right angled triangle.

2. Find a unit vector perpendicular to both the vectors $2\bar{i} - \bar{j} + 3\bar{k}$ and $3\bar{i} + \bar{j} - 4\bar{k}$.

Practical No. 08 - Limits

1. Evaluate : $\lim_{x \rightarrow a} \frac{\sin x - \sin a}{x - a}$
2. Evaluate : $\lim_{x \rightarrow 0} \frac{10^x - 2^x - 5^x + 1}{x \sin 2x}$

Practical No. 09 - Family of Lines

1. Find the co-ordinates of the point on $x + y + 3 = 0$, whose distance from the line $x + 2y + 2 = 0$ is $\sqrt{5}$.
2. Find the equation of the line passing through the point of intersection of $x - y = 5$ and $2x - y = 8$ and parallel to the line $x + 3y = a$.

Practical No. 10 - Permutations and Combination

1. Six boys and two girls are to be seated on chairs in a row for a photograph. Find the number of arrangements possible if (a) the two girls always sit next to each other. (b) the two girls occupy seats at the two ends of the row.
2. In how many ways can a team of 3 boys and two girls be selected from 6 boys and 5 girls ?

Practical No. 11 - Circle

1. Find the equation of the circle having centre at the point (3, 1) and touching the line $8x - 15y + 25 = 0$.
2. Find the equation of the circle passing through the points (-2, 6), (5, -1) and (-3, 3).

Practical No. 12 - Binomial Theorem

1. Find the values of (i) $(\sqrt{3} + 1)^4 - (\sqrt{3} - 1)^4$ (ii) $(2 + \sqrt{5})^5 - (2 - \sqrt{5})^5$
2. Find the 3rd term of $\left(2x - \frac{y}{2}\right)^{12}$

Practical No. 13 - Applications of Conics - 1

1. Find the lengths of the axes and eccentricity for the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$
2. Find the equation of the parabola having vertex at the origin, X-axis as the axis and which passes through (2, -4).

Practical No. 14 - Mathematical Induction

1. Using the method of induction prove that $(3^{2n} + 7)$ is divisible by 8.

2. Prove that $1 + 3 + 5 + \dots + (2n - 1) = n^2$ using the method of induction.

Practical No. 15 - Applications of Conics - 2

- Find the co-ordinates of the foci and the equations of the directrices for the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$
- Find the length of the latus rectum and the co-ordinates of the foci for the hyperbola $9x^2 - y^2 = 36$.

Practical No. 16 - Differentiation

- By the first principle find the derivative of $\log(x + 7)$ w.r.t x .
- Find the derivative of $\frac{x^4 e^x}{\sin x + 1}$ w.r.t x .

Practical No. 17 - Linear Equations

- Draw the graph and find the common solution set of the following inequalities
 $4x + 3y \leq 12$, $3x + 5y \leq 15$, $x, y \geq 0$.
- Find the common region determined by $3x + 2y \leq 6$, $x + y \leq 2$, $x, y \geq 0$

Practical No. 18 - Integration

- Evaluate : $\int \frac{15}{\sqrt{2x+11} + \sqrt{2x-4}} dx$
- Evaluate : $\int \sqrt{1 - \sin x} dx$

Practical No. 19 - Probability

- In a group of students, there are 3 boys and 4 girls. Four students are selected at random from the group. Find the probability that either 3 boys and 1 girl or 3 girls and 1 boy are selected.
- Three coins are tossed what is the probability of getting three heads given that atleast two coins show heads ?

Practical No. 20 - Measures of Dispersion

- Calculate quartile deviation from the following distribution.of wages (in Rs) of workers.

Wages in Rs	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No. of worker	22	38	46	35	20

- Calculate mean deviation from the median for the data : 23, 41, 29, 53, 38.

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