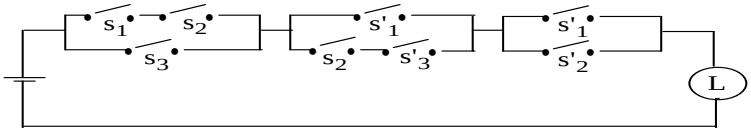
Practical No. 01 - Applications of Logic

1. Construct the circuit for $[(\sim p \wedge q) \vee (p \wedge q \wedge r) \vee (p \wedge \sim q)] \vee (\sim r)$

2. Represent the following switching circuit in symbolic form and hence construct its switching table



Practical No. 02 - Inverse of a Matrix by Adjoint Method

1, Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 1 \\ 3 & 0 & 1 \\ 0 & 2 & 1 \end{bmatrix}$ using the method of adjoint. Hence solve the system of equations $x + 2y + z = 7$, $3x + z = -5$, $2y + z = 9$

2. Find the inverse of the matrix $\begin{bmatrix} 2 & -1 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & -4 \end{bmatrix}$ using the method of adjoint. Hence solve the system of equations $2x - y + z = 1$, $x + 2y + 3z = 8$, $3x + y - 4z = 1$

Practical No. 03 - Inverse of a Matrix by Elementary Transformation

1. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{bmatrix}$ by elementary row transformations. Hence solve the system of equations $x + 2y + z = 4$, $-x + 2z = 1$, $2x + y - 3z = 0$.

2. Find the inverse of the matrix $\begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}$ by elementary row transformations. Hence solve the system of equations $7x - 3y - 3z = 7$, $x - y = 2$, $x - z = 0$.

Practical No. 04 - Solutions of Triangle.

1. In Δ ABC, if $b = 10$, $c = 12$ and $\sin\left(\frac{A}{2}\right) = \frac{1}{2\sqrt{10}}$, find a.

2. In ΔABC, if $\angle A = 30^\circ$ and $b : c = 2 : \sqrt{3}$, find $\angle B$.

Practical No. 05 - Inverse Trigonometric Functions.

1. Prove that $\cos^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{33}{65}\right)$

2. Prove that $\tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \tan^{-1}\left(\frac{11}{23}\right)$

Practical No. 06 - Geometrical Applications Of Vectors.

1. Prove by vector method that the perpendicular bisectors of a triangle are concurrent.

2. Prove by vector method that the segment joining the mid-points of two sides of a triangle is half of the third side and parallel to it. [Use vector method]

Practical No. 07 - Three Dimensional Geometry (dr's ans dc's)

1. Find k if Δ ABC is right angled at B, where $A \equiv (5, 6, 4)$, $B \equiv (4, 4, 1)$, $C \equiv (8, 2, k)$.

2. Find the acute angle between the lines, one having directions ratios 2, 3, 6 and the other having direction ratios 1, - 2, 2.

Practical No. 08 - Applications of scalar triple product of vectors.

1. Find x if the points A(3, 2, -1), B(5, 4, 2), C(6, 3, 5), D(1, 0, x) are coplanar.

2, Find the volume of the parallelopiped with the coterminus edges given by $\bar{a} = \bar{i} - 2\bar{j} - \bar{k}$, $\bar{b} = 3\bar{i} + 2\bar{j} + \bar{k}$, $\bar{c} = \bar{i} + \bar{j} + 5\bar{k}$.

Practical No. 09 - Three Dimentional Geometry - Line.

1. Find the equation of the line passing through the point (0, 1, 2) and peprendicular to the lines with direction ratios 1, -2, -4 and 3, 2, 5.

2. Find the equation of the line passing through (2, 2, 3) and parallel to the vector $2\bar{i} - \bar{j} + 5\bar{k}$.

Practical No, 10 - Three Dimentional Geometry - Plane.

1. Find the equation of the plane passing through (0, -1, 0), (2, 1, -1) and (1, 1, 1).

2. Find the equation of the plane passing through the point (3, 4, 2) and parallel to the vectors $\bar{a} = 4\bar{i} + 5\bar{j} + 3\bar{k}$ and $\bar{b} = 2\bar{i} + 3\bar{j} + 2\bar{k}$

Practical No. 11 - Formations and Solutions of LPP

1. Two types of foods A and B are available. Each contains vitamins A_1 and B_1. The daily requirement of a person are 4 decigrams of A_1 and 12 decigrams of B_1. Food packet A contains 2 decigrams of vitamin A_1 and 4 decigrams of vitamin B_1. Food packet B contains 1 decigram of vitamin A_1 and 4 decigrams of vitamin B_1. Food packets cost Rs 15 and Rs 10 for A and B respectively. Formulate the LPP which will minimize the cost and solve it graphically.

2. A carpenter makes chairs and tables. He sells them at a profit of Rs.20 per chair and Rs 30 per table. Both the products are processed on 3 machines M_1, M_2 and M_3 The time required for each product in hours and the total time available in hours for each machine are given below :

Machines	Chair	Table	Available time (hours)
M_1	3	3	36
M_2	5	2	50
M_3	2	6	60

Formulate the above problem as an LPP, so as to maximize the profit and solve it graphically.

Practical No. 12 - Applications Of Derivatives (Geometric applications)(DS)

1. Find the equations of the tangent and normal to the curve $\sqrt{x} - \sqrt{y} = 1$ at P (9, 4) .

2. Find the coordinates of the points on the curve $y = x - \frac{4}{x}$ where the tangent is parallel to $y = 2x$.

Practical No. 13 - Applications of Derivatives - Rate, Measure(DS)

1. The displacement s of a particle at time t is given by $s = 160t - 16t^2$. Show that the velocities at $t = 1$ and $t = 9$ are equal in magnitude but opposite in direction. Also prove that the displacement is 400 when the velocity is zero.

2, A soap bubble of spherical shape expands at the rate of 3 cc per sec. Find the rate at which its diameter increases when the radius is 5 cms.

Practical No. 14 - Applications of Derivatives - Maxima and Minima(DS)

1. Divide the number 64 into two parts so that their product is maximum.

2. A rod 108 meters long is bent to form a rectangle. Find its dimensions if its area is maximum.

Practical No. 15 - Applications of Derivatives - Rolle's Theorem, LMVT

1. Verify Rolle's Theorem for the function $f(x) = x^2 - x - 12$, $x \in [-2, 3]$

2. Verify Langrange's Mean Value Theorem for the function $f(x) = 2x^2 - 7x + 3$, $x \in [1, 4]$

Practical No. 16 - Applications of Definite Integrals - Limit of Sum(DS)

1. Express $\int_1^3 (4x + 5)\, dx$ as a limit of a sum and hence evaluate it.

2. Express $\int_1^2 e^x\, dx$ as a limit of a sum and hence evaluate it.

Practical No. 17 - Applications Of Definite Integral - Area (DS)

1. Find the area under the curve $y = 2x + \sin x$ between $y = 0$, $x = 0$ and $x = \pi/2$

2. Find the area enclosed between $ay = x^2$, the x-axis and the ordinate $x = 2a$..

Practical No. 18 - Applications of Differential Equations(DS)

1. Bacteria multiply at the rate proportional to the number of bacteria present. If the original number N doubles in 3 hours, show that the number will be 4N in 6 hours.

2. An ice ball melts at the rate which is proportional to the amount of ice present at that instant. If half the quantity of ice melts in 20 minutes, show that one eighth of the original amount of ice will be left after one hour.

Practical No. 19 - Expected value, Variance and SD of Random Variable (DS)

1. Find E(X), V(X) and S.D. for the random variable X whose probability mass function is given by

x	1	2	3	4
P(x)	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{4}$

2. If $f(x) = \begin{cases} \frac{x^2}{5} & -3 < x < 3 \\ 0, & \text{otherwise} \end{cases}$ is a probability distribution function, find $P(x < 1)$ and $P(|x| < 1)$

Practical No. 20 - Binomial Distribution

1, A fair coin is tossed 7 times. Find the probability that it shows heads
(1) exactly 5 times (2) atleast once.

2, The probability of hitting a target is 2/3 . If 7 bullets are fired , find the probability that the target will be hit exactly three times .