

## **PRACTICAL - 7**

# Practical: Computing, Displaying, and Plotting the Binomial Distribution in SciLab

## Aim:

To compute, display, and plot the binomial distribution for given values of  $n$  (number of trials) and  $p$  (probability of success) in SciLab.

## Materials Required:

- SciLab software for performing binomial probability calculations and graph plotting.
- Basic understanding of probability distributions and statistical analysis.

## Theory (In Detail):

The binomial distribution is a discrete probability distribution that models the number of successes in a fixed number of independent trials, each with the same probability of success. It is widely used in statistical experiments involving binary outcomes (success or failure).

1. **Definition:** The binomial distribution gives the probability of obtaining exactly  $k$  successes in  $n$  independent trials, where each trial has a probability  $p$  of success and  $(1 - p)$  of failure.
2. **Probability Mass Function (PMF):** The probability of getting exactly  $k$  successes in  $n$  trials is given by the formula:

$$P(X = k) = \binom{n}{k} * (p^k) * ((1 - p)^{(n - k)})$$

where  $\binom{n}{k} = \frac{n!}{k!(n-k)!}$

Here,

- $n$  = number of trials
- $k$  = number of successes
- $p$  = probability of success
- $(1 - p)$  = probability of failure

3. **Graphical Representation:** The binomial distribution is plotted as a bar graph, showing the probability of different values of  $k$ . For large values of  $n$ , the binomial distribution approximates the normal distribution.

## Applications:

- Quality control and reliability testing in manufacturing.
- Predicting the probability of success in repeated experiments.
- Risk assessment in insurance and finance.
- Modeling biological experiments involving genetic probabilities.

## Result:

The binomial distribution was successfully computed, displayed, and plotted for given values of  $n$  and  $p$  using SciLab. The graph provided a visual understanding of the probability distribution.