experiment and let E be an event that occurs with some E_i*. Then,*

$$P\left(\frac{E_i}{E}\right) = \frac{P\left(\frac{E}{E_i}\right).P(E_i)}{\sum_{i=1}^{n} P(E/E_i).P(E_i)}\ ;\ \ i = 1,2,3,\ldots,n$$

Probability Distribution

(1) *If a random variable X takes the values* $x_1, x_2, \ldots, x_n$ *with respective probabilities* $p_1, p_2, \ldots, p_n$ *then the probability distribution of X is given by*

X	x_1	x_2	x_3	...	...	x_n
$P(X)$	p_1	p_2	p_3	...	...	p_n

The above probability distribution of X is defined only when

(i) *Each* $p_i \geq 0$; (ii) $\sum_{i=1}^{n} p_i = 1.$

(2) *The mean of X, denoted by* μ*, is defined as*

$$\mu = E(X) = \sum_{i=1}^{n} p_i\, x_i$$

(3) *The variance, denoted by* σ^2*, is defined as*

$$\sigma^2 = \left(\sum x_i^{\,2}\, p_i - \mu^2\right)$$

(4) *The S.D. is given by* $\sigma = \sqrt{Variance}$.

Binomial Distribution

(1) **Bernoulli's Theorem**

Let there be n independent trials in an experiment and let the random variable X denote the number of successes in these trials. Let the probability of getting a success in a single trial be p and that of getting a failure be q so that $p + q = 1$*. Then,*

$$P(X = r) = {}^{n}_{r}C.p^r.q^{n-r}$$

The probability distribution of X may be expressed as

X	0	1	...	...	...	r
$P(X)$	q^n	npq^{n-1}	...	...	...	${}^{n}_{r}C.p^r.q^{n-r}$

This distribution is called a binomial distribution .

(2) **Condition for the Applicability of a Binomial Distribution**

- *The experiment is performed for a finite and fixed number of trials.*
- *Each trial must give either a success or a failure.*
- *The probability of a success in each trial is the same.*

(3) *The mean of binomial distribution is given by* $\mu = np$.

(4) *The variance of binomial distribution is given by* $\sigma^2 = npq$.