This of the algebraic equation to the curve.

This shape of the curve is important as it is found that in nature the distribution of many of the characters follow this trend. So, a general functional form of this curve has been derived. This form should naturally be based on characteristic values of the population.

These characteristic values are the parameters of the algebraic equation to the curve. The algebraic equation for the curve has been derived by considering the nature of the variable, viz., discrete or continuous and the probability of occurrence of this random variable.

These considerations gave the way to different probability distribution, the fundamental three probability distributions known as ‘ Normal’, ‘ Binomial’ and ‘ Poisson’.

Binomial distribution:

This probability distribution has been formulated by James Bernoulli. This is the distribution of a discrete random variable.

A random variable X is defined as follows: X is said to be a random variable if takes values x1, x2 ……. xn with probabilities p1, p2,….. pn respectively such that p1+p2+……+pn = 1. As the name of the distribution itself indicates, this distribution is for the variable or event which can be in two alternative forms. These can be considered as success and failure of the event. For instance, in tossing a coin we can consider the coin showing up the face E1 as success and the showing up of the face E2 as failure. Here the probability of success, P (E1) and the probability of failure, P (E2) are both equal to 1/2.

But if we consider the throwing of a die which is unbiassed, considering the appearance of ace (the face numbered one) at the top and the appearance of any other face at the top as failure, the probability of success P (F1) = 1/6, and the probability of failure, P (?) = P (F2) + P (F3) + P (F4) + P (F5) + P (F6) = 5/6. Similarly, if the male birth is considered success, P (M) = 1/2, then the female birth is the alternative form (failure) with the probability P (F) = 1/2.

Normal distribution:

This is the most important distribution in biometry because; most of the characters in agriculture, biology and genetics follow this distribution. The algebraic form of this distribution was first derived in 1733 by De Moivre (1667-1754) but this was later rediscovered and developed by Gauss (1809) and by Leplace (1812).

For these reasons the normal distribution is also called the De Moivre, Gaussian or Leplace distribution. Further, it is also known as Gaussian law of error because Gauss found that the errors of observations on any character follow the normal distribution. The term ‘ normal’ is not used to mean the normal trend of any character nor it stands for the norm of the character whose distribution is under consideration. In fact, the normal distribution is the distribution of random variable which varies continuously. The shape of the curve of the normal distribution is unimodal, symmetrical and the ends of the curve tail off asymptotically to the base.

Graphically, the total arc under the curve is unity. The algebraic equation to the curve is P (X) = 1/? v2? e – (x – μ)2 / 2? 2; μ = Mean, ? = S. D.

When the total number of observations (total frequency) on a character is N, if the distribution follows normal, then, the frequency with which Xi of the character X occurs is, F (Xi) = N/? v2? – e – (Xi – μ)2 /2? 2 Where μ and ? are called parameters.

Poisson distribution:

This is the distribution of a discrete (discontinuous) random variable whose probability of occurrence is very small but the mean and variance of the distribution are equal and finite. Thus, the Poisson distribution is the distribution of a rare event with a finite mean and variance. The equality of mean and variance is an important property of Poisson distribution. The Poisson distribution is named after its inventor French mathematician S. D.

Poisson, who described it in (1837). If X follows a Poisson distribution, the probability that X takes the value Xi is P (Xi) = mXie-m / Xi Here, m is the only parameter that is estimated by the mean of the distribution.