Incomplete Block Design (IBD).

A block is said to be incomplete if the number of plots is less than the number of treatments to be compared. Reduction in size of blocks or incomplete blocks is required to achieve homogeneity within blocks so that experimental error may be reduced, particularly when the number of treatments is large.

Defn:

Incomplete Block Design is a design with t treatments and b blocks each of size k such that each treatment is replicated r times and each pair of treatments occurs once and only once in the same blocks. By size of blocks, we mean the number of plots in the block t, r, b and k are termed as parameters of the incomplete block design.

Types of IBD :-

IBD can be divided into two main groups viz.,

(a) Lattice design and

(b) Incomplete block designs.

This division of IBD into two mains groups is made only for the sake of convenience in describing the designs.

(a) Lattice designs

These designs forms complete replications. In such type of designs we can establish a correspondence between the treatments and the treatment combinations of a factorial set. It helps in devising and simplifying the analysis of the design.

For example, an experiment consisting of a treatments conducted in Lattice design may be considered as 3^2 factorial experiments with two factors, say A and B each at 3 levels, (viz., 0, 1 and 2). The 9 treatment combinations can be represented as

00, 01, 02, 10, 11, 12, 20, 21, 22

(the first numerals in each treatment combination denotes the level of the first factor and the second

numerals in each treatment combination denotes the level of the second factor).

Although these 9 treatment combinations are not a factorial arrangement of factor A and B in real sense, yet these can be treated so far devising the design and its analysis. To differentiate it from factorial arrangement, this type of arrangement is termed as quasi-factorial.

Classification of Lattice design :-

The lattice design can be classified as one-restrictional, two restrictional, more than two restrictional lattice designs according as the number of restrictions on randomization of treatments within a replication is one, two, more than two respectively.

Classification of one-restrictional lattice design are as follows

(i) 2-dimensional or square lattice design, if the number of treatments is k^2 and block size ie., number of plots per block is k.

(ii) 3-dimensional or cubic lattice design, if the number of treatments is k^3 and block size is k.

(iii) 4-dimensional, 5-dimensional lattices according as the number of treatments is k^4, k^5 and block size is k, k respectively and so on.

Classification of 1-restrictional and 2-dimensional lattice design is further classified as

(i) Balanced lattice design, if all the treatment combinations are confounded in each different replications

(ii) Partially balanced lattice design, if all the treatments are not confounded.

Classification of Balanced lattice design (BLD)

A balanced lattice design is classified as

(i) Simple lattice or double lattice design if only 2 treatments say A and B are confounded, one each in 2 replications of k blocks each.

(ii) Triple lattice design if 3 treatments say A, B and AB are confounded, one each in 3 replications.

III^{rly} we can have quadruple lattice, quintuple lattice and so on.