Summary

The Ph. D. research work divided into seven chapters fills the gap between theoretical procedure and actual implementation, by contributing new algorithms of construction, new models and analysis, and, the novel characterization of some popularly used crossover designs. Practically, it may not be convenient to use the number of sequences, or periods, that are required by a standard design. Outcome of this thesis would solve this problem to a certain extent. A few unavailable crossover designs are constructed through the newly defined terraces and computer search algorithms. Three types of minimal balanced crossover designs can now be constructed by two easy steps, a terrace is defined and then the group elements are added to it. Three types of crossover designs, obtained through computer search algorithm are available for comparison of two active treatments under all possible carryover assumptions. The 5M, 5M active, and 5M active balanced algorithms constructs and evaluates respectively, the classes of two treatment designs, two treatments with placebo designs and, active balanced uniform on period designs. Each class is determined by the three parameters. Some new optimal and/or efficient crossover designs are found for each type. A class of multi-period crossover designs are characterized to possess the equineighbour property. An easy and multi purpose analysis of this class is presented to suit some practical requirements. The analysis not only permit the estimation of

higher-order carryover with equal variance, but also allow the interim estimation of treatment effects, as well as the estimation under missing observations that could occur in three possible ways. An important feature has been brought out that, the comparison of two active treatments with help of placebo makes it possible to test carryover effects prior to analysis. This would assist experimenters to make the right analysis of their experiments. This thesis suggests two studies must be taken up in future; further properties of crossover designs and algorithm need to the created for fast construction of optimal and/or efficient crossover designs in case of factorial treatments, with flexible number of periods and subjects.