



## CHAPTER I

## INTRODUCTION

A Room Square of side  $r$  is an arrangement of  $r + 1$  objects into an  $r \times r$  square in such a way that

- (1) each cell of square may be empty or contain two distinct objects,
- (2) each unordered pair of objects must occur exactly once in the square,
- (3) each object occurs exactly once in every row and every column.

Historically, Room Squares were first introduced by T.G. Room in 1955. He constructed Room Square of side 7 and had shown that Room Squares of sides 3 and 5 can not exist. He also showed that Room Square of side 1 was obvious.

In this study we shall prove that we can construct a Room Square of side  $r$  if and only if  $r$  is odd and  $r \neq 3, 5$ . Direct construction of Room Square of certain sides are also provided.