Journal of Applied & Computational Mathematics
ISSN: 2168-9679
Basu and Ghosh, J Appl Computat Math 2013, 2:2
DOI: 10.4172/2168-9679.1000125
Research Article Open Access

On n-dimensional Uniform t-$(v, k, \lambda)_n$ Designs

Manjusri Basu* and Debabrata Kumar Ghosh

Department of Mathematics, University of Kalyani, Kalyani, West Bengal-741235, India

Abstract

In this paper, we define a new unifom t-$(v, k, \lambda)_n$ design on n-dimension. We illustrate with examples this design for n=2 and n=3. For n=1, we show that this is a t-(v, k, λ) design. We consider the cases of symmetric and Steiner system of uniform t-$(v, k, \lambda)_n$ design.

Keywords: t-(v, k, λ) design; Symmetric design; Steiner design

Introduction

A t-(v, k, λ) design is an ordered pair (X, B) where X is a v-set of points and B, called block set of b blocks such that each point lies on exactly r blocks, each block contains k points of X with the property that every t-subset of X is contained in exactly λ blocks where $t \le k \le v$ [1,2].

The necessary conditions for holding a t-(v, k, λ) design are as follows:

1. $vr=bk$
2. $b\binom{k}{t}=\lambda\binom{v}{t}$

Corollary 1: For any t-(v, k, λ) design if $i \le t$ then number of blocks containing a given i-subset of the points is a constant $\lambda_i=\left\{\lambda\binom{v-i}{t-i}/\binom{k-i}{t-i}\right\}$

Corollary 2: Any t-(v, k, λ) design holds $(v-v_1)$-$(v, v - v_2, \binom{v_1}{v_1-v_2})$ design, where $1 \le v_2 \le v_1 < v$.

Definition 1: A t-(v, k, λ) design is said to be a symmetric design if v=b.

Definition 2: A t-(v, k, λ) design is defined as a Steiner system if λ=1 and denoted by $S(t, k, v)$.

In this paper, we define an n-dimensional t-(v, k, λ)n design. We describe this design with illustrative examples for n=2 and n=3. We also show that it is a t-(v, k, λ) design for n=1.

n-dimensional Uniform Design

Definition 3: Let $X=\{X_1, X_2, \ldots, X_i, \ldots, X_n\}$, where $X_i=\{x_{i1}, x_{i2}, \ldots, x_{ip}, \ldots, x_{iv}\}$ be an n-dimensional set, where $X_i=\{x_{i1}, x_{i2}, \ldots, x_{ip}, \ldots, x_{iv}\}$ of cardinality v and $\{x_{1l}, x_{2m}, \ldots, x_{ip}, \ldots, x_{nu}\}$ is defined a node of X where $1\le l, m, \ldots, p, \ldots, u \le v$ so that the total number of nodes of X is v. We define X is an n-dimension of order v. Let $B=\{B_1, B_2, \ldots, B_j, \ldots, B_b\}$ of cardinality b, called block set, of order k $(\le v)$ the block $B_j \subseteq X\ \forall\ j$, B_j contains total k^n nodes in which every element of B_j contains k^{n-1} nodes and occurs in exactly r blocks. Also let $T=\{T_1, T_2, \ldots, T_i, \ldots, T_n\}$ is an n-dimension of order t where $T_i \subseteq X_i\ \forall\ i$ and $t \le k \le v$, each element of T_i contains t^{n-1} nodes and T_i contains total t^n nodes such that every T_i occurs in exactly λ blocks. Then the ordered pair (X, B) is defined to be an n-dimensional uniform design and is denoted by t-$(v, k, \lambda)_n$ design.

The necessary conditions for holding t-$(v, k, \lambda)_n$ design are as follows:

1. $vr = b^{\frac{1}{n}}k$
2. $b^{\frac{1}{n}}\binom{k}{t}=\lambda^{\frac{1}{n}}\binom{v}{t}$

Corollary 3: If t-$(v, k, \lambda)_n$ design is a t-design, $i \le t$, then number of blocks containing a given i-subset of the points is a constant $\lambda_i=\left\{\lambda\binom{v-i}{t-i}/\binom{k-i}{t-i}\right\}^n$

Corollary 4: Any t-$(v, k, \lambda)_n$ design holds $(v - v_1)$-$(v, v - v_2, \binom{v_1}{v_1-v_2}^n)$ design, where $1 \le v_2 \le v_1 < v$.

It shows that t-$(v, k, \lambda)_n$ design holds all the necessary conditions and the corollaries of t-(v, k, λ) design for n=1.

Definition 4: A t-$(v, k, \lambda)_n$ design is said to be a symmetric design if $b^{\frac{1}{n}}=v$.

Definition 5: A t-$(v, k, \lambda)_n$ design is defined as a Steiner system if λ=1 and denoted by $S(t, k, v)_n$.

Theorem 1: If t=k, then t-$(v, k, \lambda)_n$ design is Steiner.

Example 1: Let $X=\{X_1, X_2\}$ Where $X_1=\{1, 2, 3, 4, 5\}$, $X_2=\{a, b, c, d, e\}$ i.e., X is 2-dimensional of order 5 i.e., n=2, v=5. We write a node of X as (i, j) where $i \in X_1$ and $j \in X_2$. Therefore we have the following nodes:

	a	b	c	d	e
1	(1,a)	(1,b)	(1,c)	(1,d)	(1,e)
2	(2,a)	(2,b)	(2,c)	(2,d)	(2,e)
3	(3,a)	(3,b)	(3,c)	(3,d)	(3,e)
4	(4,a)	(4,b)	(4,c)	(4,d)	(5,e)
5	(5,a)	(5,b)	(5,c)	(5,d)	(5,e)

1. Now we construct the block set B of order 4 and are given below:

***Corresponding author:** Manjusri Basu, Department of Mathematics, University of Kalyani, Kalyani, West Bengal-741235, India, E-mail: manjusri_basu@yahoo.com

Received January 18, 2013; **Accepted** March 25, 2013; **Published** March 29, 2013

Citation: Basu M, Ghosh DK (2013) On n-dimensional Uniform t-$(v, k, \lambda)_n$ Designs. J Appl Computat Math 2: 125. doi:10.4172/2168-9679.1000125

(1, a) (1, b) (1, c) (1, d)	(1, a) (1, b) (1, c) (1, e)
(2, a) (2, b) (2, c) (2, d)	(2, a) (2, b) (2, c) (2, e)
(3, a) (3, b) (3, c) (3, d)	(3, a) (3, b) (3, c) (3, e)
(4, a) (4, b) (4, c) (4, d)	(4, a) (4, b) (4, c) (4, e)

(1, a) (1, b) (1, d) (1, e)	(1, a) (1, c) (1, d) (1, e)	(1, b) (1, c) (1, d) (1, e)
(2, a) (2, b) (2, d) (2, e)	(2, a) (2, c) (2, d) (2, e)	(2, b) (2, c) (2, d) (2, e)
(3, a) (3, b) (3, d) (3, e)	(3, a) (3, c) (3, d) (3, e)	(3, b) (3, c) (3, d) (3, e)
(4, a) (4, b) (4, d) (4, e)	(4, a) (4, c) (4, d) (4, e)	(4, b) (4, c) (4, d) (4, e)

(1, a) (1, b) (1, c) (1, d)	(1, a) (1, b) (1, c) (1, e)
(2, a) (2, b) (2, c) (2, d)	(2, a) (2, b) (2, c) (2, e)
(3, a) (3, b) (3, c) (3, d)	(3, a) (3, b) (3, c) (3, e)
(5, a) (5, b) (5, c) (5, d)	(5, a) (5, b) (5, c) (5, e)

(1, a) (1, b) (1, d) (1, e)	(1, a) (1, c) (1, d) (1, e)	(1, b) (1, c) (1, d) (1, e)
(2, a) (2, b) (2, d) (2, e)	(2, a) (2, c) (2, d) (2, e)	(2, b) (2, c) (2, d) (2, e)
(3, a) (3, b) (3, d) (3, e)	(3, a) (3, c) (3, d) (3, e)	(3, b) (3, c) (3, d) (3, e)
(5, a) (5, b) (5, d) (5, e)	(5, a) (5, c) (5, d) (5, e)	(5, b) (5, c) (5, d) (5, e)

(1, a) (1, b) (1, c) (1, d)	(1, a) (1, b) (1, c) (1, e)
(2, a) (2, b) (2, c) (2, d)	(2, a) (2, b) (2, c) (2, e)
(4, a) (4, b) (4, c) (4, d)	(4, a) (4, b) (4, c) (4, e)
(5, a) (5, b) (5, c) (5, d)	(5, a) (5, b) (5, c) (5, e)

(1, a) (1, b) (1, d) (1, e)	(1, a) (1, c) (1, d) (1, e)	(1, b) (1, c) (1, d) (1, e)
(2, a) (2, b) (2, d) (2, e)	(2, a) (2, c) (2, d) (2, e)	(2, b) (2, c) (2, d) (2, e)
(4, a) (4, b) (4, d) (4, e)	(4, a) (4, c) (4, d) (4, e)	(4, b) (4, c) (4, d) (4, e)
(5, a) (5, b) (5, d) (5, e)	(5, a) (5, c) (5, d) (5, e)	(5, b) (5, c) (5, d) (5, e)

(1, a) (1, b) (1, c) (1, d)	(1, a) (1, b) (1, c) (1, e)
(3, a) (3, b) (3, c) (3, d)	(3, a) (3, b) (3, c) (3, e)
(4, a) (4, b) (4, c) (4, d)	(4, a) (4, b) (4, c) (4, e)
(5, a) (5, b) (5, c) (5, d)	(5, a) (5, b) (5, c) (5, e)

(1, a) (1, b) (1, d) (1, e)	(1, a) (1, c) (1, d) (1, e)	(1, b) (1, c) (1, d) (1, e)
(3, a) (3, b) (3, d) (3, e)	(3, a) (3, c) (3, d) (3, e)	(3, b) (3, c) (3, d) (3, e)
(4, a) (4, b) (4, d) (4, e)	(4, a) (4, c) (4, d) (4, e)	(4, b) (4, c) (4, d) (4, e)
(5, a) (5, b) (5, d) (5, e)	(5, a) (5, c) (5, d) (5, e)	(5, b) (5, c) (5, d) (5, e)

(2, a) (2, b) (2, c) (2, d)	(2, a) (2, b) (2, c) (2, e)
(3, a) (3, b) (3, c) (3, d)	(3, a) (3, b) (3, c) (3, e)
(4, a) (4, b) (4, c) (4, d)	(4, a) (4, b) (4, c) (4, e)
(5, a) (5, b) (5, c) (5, d)	(5, a) (5, b) (5, c) (5, e)

(2, a) (2, b) (2, d) (2, e)	(2, a) (2, c) (2, d) (2, e)	(2, b) (2, c) (2, d) (2, e)
(3, a) (3, b) (3, d) (3, e)	(3, a) (3, c) (3, d) (3, e)	(3, b) (3, c) (3, d) (3, e)
(4, a) (4, b) (4, d) (4, e)	(4, a) (4, c) (4, d) (4, e)	(4, b) (4, c) (4, d) (4, e)
(5, a) (5, b) (5, d) (5, e)	(5, a) (5, c) (5, d) (5, e)	(5, b) (5, c) (5, d) (5, e)

Each row or column of B_j, $1 \le j \le 25$ is called the element of B_j. Therefore, we have v=5, k=4, b=25 and r=4. Hence it holds 4-$(5, 4, 1)_2$, 3-$(5, 4, 4)_2$, 2-$(5, 4, 9)_2$, 1-$(5, 4, 16)_2$ designs. Also it satisfies all the necessary conditions and the corollaries of the n-dimensional Uniform t-$(v, k, \lambda)_n$ Design.

2. Now we construct the block set B of order 3 and are given below:

(1, a) (1, b) (1, c)	(1, a) (1, b) (1, d)	(1, a) (1, b) (1, e)	(1, a) (1, c) (1, d)	(1, b) (1, c) (1, e)
(2, a) (2, b) (2, c)	(2, a) (2, b) (2, d)	(2, a) (2, b) (2, e)	(2, a) (2, c) (2, d)	(2, b) (2, c) (2, e)
(3, a) (3, b) (3, c)	(3, a) (3, b) (3, d)	(3, a) (3, b) (3, e)	(3, a) (3, c) (3, d)	(3, b) (3, c) (3, e)
(1, a) (1, d) (1, e)	(1, b) (1, c) (1, d)	(1, b) (1, c) (1, e)	(1, b) (1, d) (1, e)	(1, c) (1, d) (1, e)
(2, a) (2, d) (2, e)	(2, b) (2, c) (2, d)	(2, b) (2, c) (2, e)	(2, b) (2, d) (2, e)	(2, c) (2, d) (2, e)
(3, a) (3, d) (3, e)	(3, b) (3, c) (3, d)	(3, b) (3, c) (3, e)	(3, b) (3, d) (3, e)	(3, c) (3, d) (3, e)
(1, a) (1, b) (1, c)	(1, a) (1, b) (1, d)	(1, a) (1, b) (1, e)	(1, a) (1, c) (1, d)	(1, b) (1, c) (1, e)
(2, a) (2, b) (2, c)	(2, a) (2, b) (2, d)	(2, a) (2, b) (2, e)	(2, a) (2, c) (2, d)	(2, b) (2, c) (2, e)
(4, a) (4, b) (4, c)	(4, a) (4, b) (4, d)	(4, a) (4, b) (4, e)	(4, a) (4, c) (4, d)	(4, b) (4, c) (4, e)
(1, a) (1, d) (1, e)	(1, b) (1, c) (1, d)	(1, b) (1, c) (1, e)	(1, b) (1, d) (1, e)	(1, c) (1, d) (1, e)
(2, a) (2, d) (2, e)	(2, b) (2, c) (2, d)	(2, b) (2, c) (2, e)	(2, b) (2, d) (2, e)	(2, c) (2, d) (2, e)
(4, a) (4, d) (4, e)	(4, b) (4, c) (4, d)	(4, b) (4, c) (4, e)	(4, b) (4, d) (4, e)	(4, c) (4, d) (4, e)
(1, a) (1, b) (1, c)	(1, a) (1, b) (1, d)	(1, a) (1, b) (1, e)	(1, a) (1, c) (1, d)	(1, b) (1, c) (1, e)
(2, a) (2, b) (2, c)	(2, a) (2, b) (2, d)	(2, a) (2, b) (2, e)	(2, a) (2, c) (2, d)	(2, b) (2, c) (2, e)
(5, a) (5, b) (5, c)	(5, a) (5, b) (5, d)	(5, a) (5, b) (5, e)	(5, a) (5, c) (5, d)	(5, b) (5, c) (5, e)
(1, a) (1, d) (1, e)	(1, b) (1, c) (1, d)	(1, b) (1, c) (1, e)	(1, b) (1, d) (1, e)	(1, c) (1, d) (1, e)
(2, a) (2, d) (2, e)	(5, b) (5, c) (5, d)	(2, b) (2, c) (2, e)	(2, b) (2, d) (2, e)	(2, c) (2, d) (2, e)
(5, a) (5, d) (5, e)	(5, b) (5, c) (5, d)	(5, b) (5, c) (5, e)	(5, b) (5, d) (5, e)	(5, c) (5, d) (5, e)
(1, a) (1, b) (1, c)	(1, a) (1, b) (1, d)	(1, a) (1, b) (1, e)	(1, a) (1, c) (1, d)	(1, b) (1, c) (1, e)
(3, a) (3, b) (3, c)	(3, a) (3, b) (3, d)	(3, a) (3, b) (3, e)	(3, a) (3, c) (3, d)	(3, b) (3, c) (3, e)
(4, a) (4, b) (4, c)	(4, a) (4, b) (4, d)	(4, a) (4, b) (4, e)	(4, a) (4, c) (4, d)	(4, b) (4, c) (4, e)
(1, a) (1, d) (1, e)	(1, b) (1, c) (1, d)	(1, b) (1, c) (1, e)	(1, b) (1, d) (1, e)	(1, c) (1, d) (1, e)
(3, a) (3, d) (3, e)	(3, b) (3, c) (3, d)	(3, b) (3, c) (3, e)	(3, b) (3, d) (3, e)	(3, c) (3, d) (3, e)
(4, a) (4, d) (4, e)	(4, b) (4, c) (4, d)	(4, b) (4, c) (4, e)	(4, b) (4, d) (4, e)	(4, c) (4, d) (4, e)
(1, a) (1, b) (1, c)	(1, a) (1, b) (1, d)	(1, a) (1, b) (1, e)	(1, a) (1, c) (1, d)	(1, b) (1, c) (1, e)
(3, a) (3, b) (3, c)	(3, a) (3, b) (3, d)	(3, a) (3, b) (3, e)	(3, a) (3, c) (3, d)	(3, b) (3, c) (3, e)
(5, a) (5, b) (5, c)	(5, a) (5, b) (5, d)	(5, a) (5, b) (5, e)	(5, a) (5, c) (5, d)	(5, b) (5, c) (5, e)
(1, a) (1, d) (1, e)	(1, b) (1, c) (1, e)	(1, b) (1, d) (1, e)	(1, b) (1, c) (1, d)	(1, c) (1, d) (1, e)
(3, a) (3, d) (3, e)	(3, b) (3, c) (3, e)	(3, b) (3, d) (3, e)	(3, b) (3, c) (3, d)	(3, c) (3, d) (3, e)
(5, a) (5, d) (5, e)	(5, b) (5, c) (5, e)	(5, b) (5, d) (5, e)	(5, b) (5, c) (5, d)	(5, c) (5, d) (5, e)
(1, a) (1, b) (1, c)	(1, a) (1, b) (1, d)	(1, a) (1, b) (1, e)	(1, a) (1, c) (1, d)	(1, b) (1, c) (1, e)
(4, a) (4, b) (4, c)	(4, a) (4, b) (4, d)	(4, a) (4, b) (4, e)	(4, a) (4, c) (4, d)	(4, b) (4, c) (4, e)
(5, a) (5, b) (5, c)	(5, a) (5, b) (5, d)	(5, a) (5, b) (5, e)	(5, a) (5, c) (5, d)	(5, b) (5, c) (5, e)

(1, a) (1, d) (1, e)	(1, b) (1, c) (1, d)	(1, b) (1, c) (1, e)	(1, b) (1, d) (1, e)	(1, c) (1, d) (1, e)
(4, a) (4, d) (4, e)	(4, b) (4, c) (4, d)	(4, b) (4, c) (4, e)	(4, b) (4, d) (4, e)	(4, c) (4, d) (4, e)
(5, a) (5, d) (5, e)	(5, b) (5, c) (5, d)	(5, b) (5, c) (5, e)	(5, b) (5, d) (5, e)	(5, c) (5, d) (5, e)
(2, a) (2, b) (2, c)	(2, a) (2, b) (2, d)	(2, a) (2, b) (2, e)	(2, a) (2, c) (2, d)	(2, b) (2, c) (2, e)
(3, a) (3, b) (3, c)	(3, a) (3, b) (3, d)	(3, a) (3, b) (3, e)	(3, a) (3, c) (3, d)	(3, b) (3, c) (3, e)
(4, a) (4, b) (4, c)	(4, a) (4, b) (4, d)	(4, a) (4, b) (4, e)	(4, a) (4, c) (4, d)	(4, b) (4, c) (4, e)
(2, a) (2, d) (2, e)	(2, b) (2, c) (2, d)	(2, b) (2, c) (2, e)	(2, b) (2, d) (2, e)	(2, c) (2, d) (2, e)
(3, a) (3, d) (3, e)	(3, b) (3, c) (3, d)	(3, b) (3, c) (3, e)	(3, b) (3, d) (3, e)	(3, c) (3, d) (3, e)
(4, a) (4, d) (4, e)	(4, b) (4, c) (4, d)	(4, b) (4, c) (4, e)	(4, b) (4, d) (4, e)	(4, c) (4, d) (4, e)
(2, a) (2, b) (2, c)	(2, a) (2, b) (2, d)	(2, a) (2, b) (2, e)	(2, a) (2, c) (2, d)	(2, b) (2, c) (2, e)
(3, a) (3, b) (3, c)	(3, a) (3, b) (3, d)	(3, a) (3, b) (3, e)	(3, a) (3, c) (3, d)	(3, b) (3, c) (3, e)
(5, a) (5, b) (5, c)	(5, a) (5, b) (5, d)	(5, a) (5, b) (5, e)	(5, a) (5, c) (5, d)	(5, b) (5, c) (5, e)
(2, a) (2, d) (2, e)	(2, b) (2, c) (2, d)	(2, b) (2, c) (2, e)	(2, b) (2, d) (2, e)	(2, c) (2, d) (2, e)
(3, a) (3, d) (3, e)	(3, b) (3, c) (3, d)	(3, b) (3, c) (3, e)	(3, b) (3, d) (3, e)	(3, c) (3, d) (3, e)
(5, a) (5, d) (5, e)	(5, b) (5, c) (5, d)	(5, b) (5, c) (5, e)	(5, b) (5, d) (5, e)	(5, c) (5, d) (5, e)
(2, a) (2, b) (2, c)	(2, a) (2, b) (2, d)	(2, a) (2, b) (2, e)	(2, a) (2, c) (2, d)	(2, b) (2, c) (2, e)
(4, a) (4, b) (4, c)	(4, a) (4, b) (4, d)	(4, a) (4, b) (4, e)	(4, a) (4, c) (4, d)	(4, b) (4, c) (4, e)
(5, a) (5, b) (5, c)	(5, a) (5, b) (5, d)	(5, a) (5, b) (5, e)	(5, a) (5, c) (5, d)	(5, b) (5, c) (5, e)
(2, a) (2, d) (2, e)	(2, b) (2, c) (2, d)	(2, b) (2, c) (2, e)	(2, b) (2, d) (2, e)	(2, c) (2, d) (2, e)
(4, a) (4, d) (4, e)	(4, b) (4, c) (4, d)	(4, b) (4, c) (4, e)	(4, b) (4, d) (4, e)	(4, c) (4, d) (4, e)
(5, a) (5, d) (5, e)	(5, b) (5, c) (5, d)	(5, b) (5, c) (5, e)	(5, b) (5, d) (5, e)	(5, c) (5, d) (5, e)
(3, a) (3, b) (3, c)	(3, a) (3, b) (3, d)	(3, a) (3, b) (3, e)	(3, a) (3, c) (3, d)	(3, b) (3, c) (3, e)
(4, a) (4, b) (4, c)	(4, a) (4, b) (4, d)	(4, a) (4, b) (4, e)	(4, a) (4, c) (4, d)	(4, b) (4, c) (4, e)
(5, a) (5, b) (5, c)	(5, a) (5, b) (5, d)	(5, a) (5, b) (5, e)	(5, a) (5, c) (5, d)	(5, b) (5, c) (5, e)
(3, a) (3, d) (3, e)	(3, b) (3, c) (3, d)	(3, b) (3, c) (3, e)	(3, b) (3, d) (3, e)	(3, c) (3, d) (3, e)
(4, a) (4, d) (4, e)	(4, b) (4, c) (4, d)	(4, b) (4, c) (4, e)	(4, b) (4, d) (4, e)	(4, c) (4, d) (4, e)
(5, a) (5, d) (5, e)	(5, b) (5, c) (5, d)	(5, b) (5, c) (5, e)	(5, b) (5, d) (5, e)	(5, c) (5, d) (5, e)

Each row or column of B_j, $1 \le j$ 100 is called the element of B_j. Therefore, we have v=5, k=3, b=100, r=6. Hence it holds 3-$(5, 3, 1)_2$, 2-$(5, 3, 9)_2$, 1-$(5, 3, 36)_2$ designs. Also it satisfies all the necessary conditions and the corollaries of the n-dimensional Uniform t-$(v, k, \lambda)_n$ Design.

Example 2: Let $X=\{X_1, X_2, X_3\}$ Where $X_1=\{1, 2, 3\}$, $X_2=\{1, 2, 3\}$, $X_3=\{1, 2, 3\}$ i.e., X is 3-dimensional of order 3. We write $\{X_1, X_2, X_3\}$ as (i, j, l) where $i \in X_1, j \in X_2$ and $l \in X_3$. Therefore we have the following nodes (Figure 1).

3. Now we construct the block set B of order 2 and are given in figure 2.

Each plane of B_j, $1 \le j \le 27$ is called the element of B_j. Therefore, we have v=3, k=2, b=27, r=2. Hence it holds 2-$(3, 2, 1)_3$, 1-$(3, 2, 8)_3$ designs. Also it satisfies necessary conditions and the corollaries of the n-dimensional Uniform t-$(v, k, \lambda)_n$ Design.

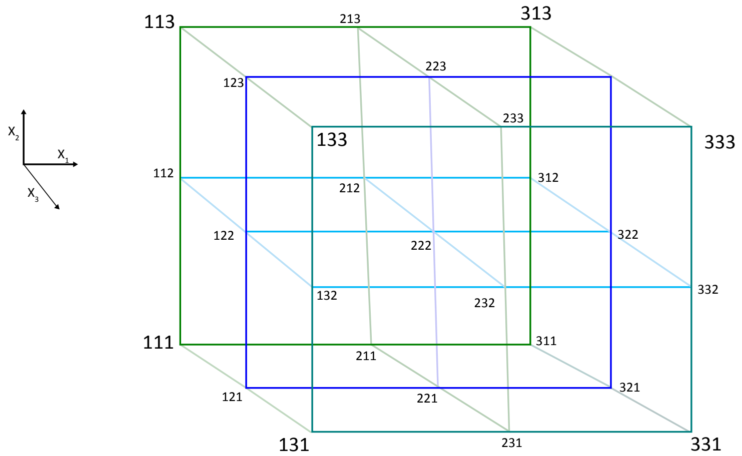

Figure 1: Cube of length 3.

Conclusion

In this paper, we introduce a new design on n-dimension. The existing one dimensional t-(v, k, λ) design has many applications in code authentication, optical orthogonal codes, erasure codes and information dispersal, group testing and superimposed codes software testing, game scheduling, disc layout and interconnection network, threshold and ramp schemes etc. But in practical, code authentication (Fibonacci coding/decoding) where Fibonacci coding is defined by:

$$Q_1 = \begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix} = \begin{pmatrix} F_1 & F_2 \\ F_1 & F_0 \end{pmatrix}$$

Game scheduling (multi-criterion), multi drop networks, software (multi-purposes) testing, threshold and ramp schemes etc. are in more than one dimension. Hence the n-dimensional design has more applications in real world problems disk layout and striping, partial match queries of files etc.

Acknowledgement

The authors would like to thank the anonymous reviewers for their careful reading of the paper and also for their thoughtful, constructive comments and suggestions that greatly improve the content and presentation of the paper. The second author thanks UGC-JRF for financial support of his research work.

References

1. Colbourn CJ, Dinitz JH (1996) The Handbook of Combinatorial Designs, CRC press, USA.
2. Stinson DR (2003) Combinatorial Designs: Constructions and Analysis. Springer, New York, USA.

Citation: Basu M, Ghosh DK (2013) On *n*-dimensional Uniform *t*-$(v, k, \lambda)_n$ Designs. J Appl Computat Math 2: 125. doi:10.4172/2168-9679.1000125

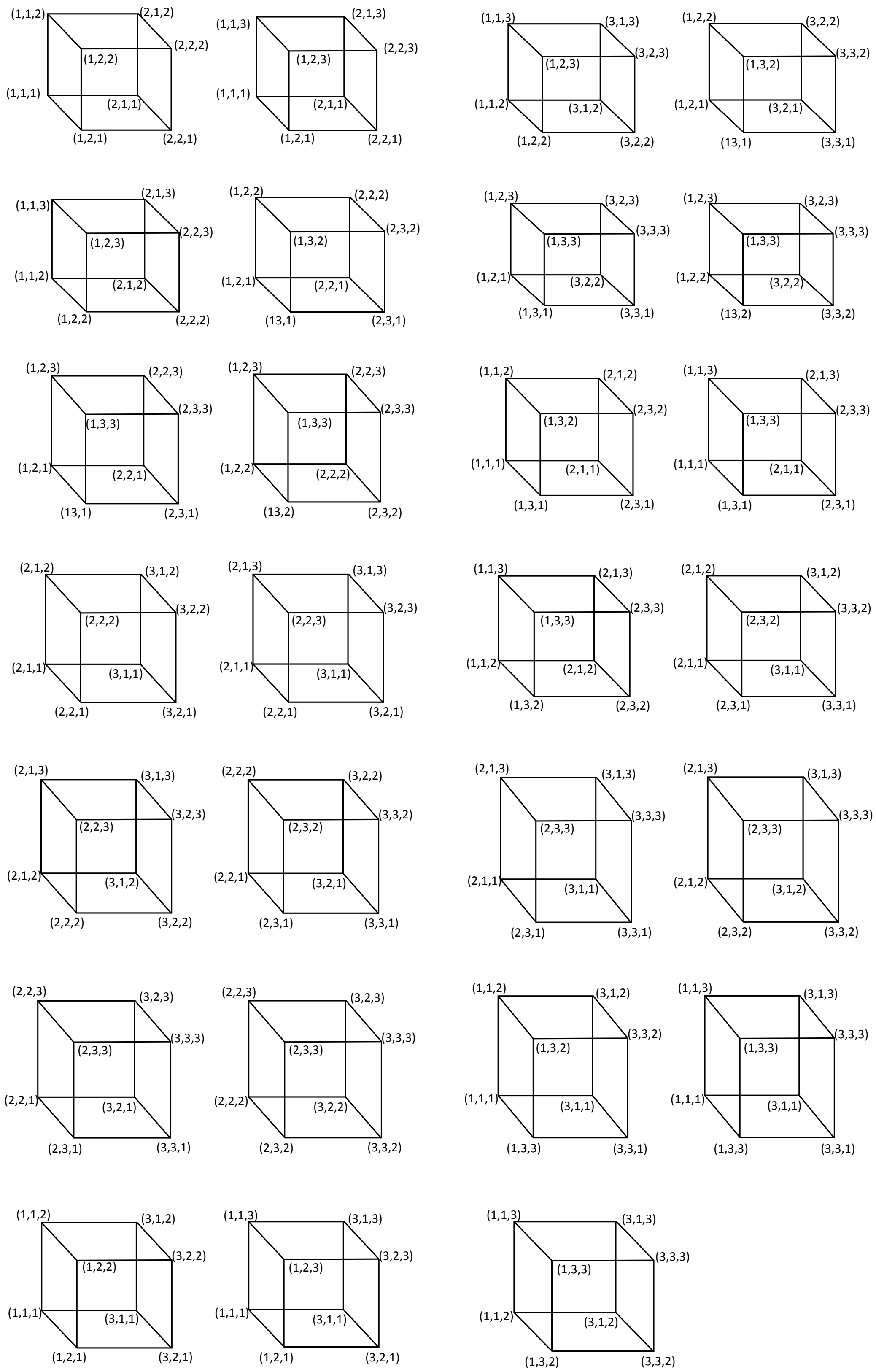

Figure 2: Block set B of order 2.