EAC

DE LA SALLE UNIVERSITY

ON REGULAR AND 2-SCORED 2-ORTHOGONAL TOURNAMENTS

A Thesis
Presented to
The Graduate School
of the College of Science
De La Salle University

In Partial Fulfillment
of the Requirements for the Degree of
Master of Science in Mathematics

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September 9, 1994

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LIST OF NOTATIONS

$\mathbb{R}$	= set of real numbers
v_i	= ith vertex of V
V	= vertex set of a digraph G
A	= arc set of a digraph G
$[v_i, v_j]$	= undirected arc joining v_i and v_j
(v_i, v_j)	= directed arc joining v_i to v_j
$d(v_j)$	= degree of a vertex v_j
$id(v_j)$	= in-degree of a vertex v_j
$od(v_j)$	= out-degree of a vertex v_j
a_{ij} | $A(i,j)$	= an ith row, jth column element of matrix A
A(G)	= adjacency matrix of graph G
A^t	= transpose of matrix A
I	= identity matrix
J	= all-one matrix
j	= all-one row vector
Σ	= summation
$\forall$	= for all
$\in$	= element of
$\Rightarrow$	= implies
A(i)	= ith row vector of A
A^c	= complement of A

$s(A(i))$ = score of $A(i)$

$(A(i), A(j))$ = intersection number of $A(i)$ and $A(j)$

$\mathbb{Z}$ = set of integers

$\mathbb{Z}^+$ = set of positive integers

$\leq$ = less than or equal

$<$ = less than

$>$ = greater than

$\equiv$ = congruent

$\neq$ = not equal

$\subseteq$ = subset

${}_nC_r$ = combination of n elements taking r at a time

ABSTRACT

Let v be a positive integer such that v ≡ 3 (modulo 8). Let A be a tournament of order v, then, A is 2-orthogonal if the product AA^t equals I where the multiplication is modulo 2, A^t is the transpose of A and I is the identity matrix.

This study presents two main theorems; the first shows the existence of regular 2-orthogonal tournaments of order v while the second shows the existence of 2-scored 2-orthogonal tournaments.

Aside from these two theorems, this paper also includes other theorems necessary in the study of 2-orthogonal tournaments relative to its score set. It presents all the proofs to the theorems and propositions as given in Noboru Ito's paper entitled "On 2-Orthogonal Tournaments" which will appear in the Proceedings 22nd Annual Meeting, Iranian Mathematical Society.