


**CHARACTERIZATION OF CAYLEY DIGRAPHS
OF FINITE TRANSFORMATION SEMIGROUPS
WITH RESTRICTED RANGE AND THEIR
VERTEX TRANSITIVITY**

The seal of Chiang Mai University is a circular emblem. It features an elephant in the center, facing left, with a sunburst or flame-like symbol above its head. The Thai text "มหาวิทยาลัย เชียงใหม่" (Mahavithayalai Chiang Mai) is written in a circle around the elephant. Below the elephant, the English text "CHIANG MAI UNIVERSITY 1964" is inscribed. The seal is rendered in a light gray, semi-transparent style.


CHUNYA TISKLANG

**DOCTOR OF PHILOSOPHY
IN MATHEMATICS**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

**GRADUATE SCHOOL
CHIANG MAI UNIVERSITY
JULY 2017**

**CHARACTERIZATION OF CAYLEY DIGRAPHS
OF FINITE TRANSFORMATION SEMIGROUPS
WITH RESTRICTED RANGE AND THEIR
VERTEX TRANSITIVITY**

The seal of Chiang Mai University is a circular emblem. It features a central figure of an elephant standing and facing left. Above the elephant's head is a stylized sunburst or flame-like symbol. The entire emblem is enclosed within a circular border. The Thai text "มหาวิทยาลัยเชียงใหม่" (Mahavithayalai Chiang Mai) is written along the top arc of the border, and "CHIANG MAI UNIVERSITY 1964" is written along the bottom arc. There are decorative floral motifs on the left and right sides of the border.

CHUNYA TISKLANG

**A THESIS SUBMITTED TO CHIANG MAI UNIVERSITY IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN MATHEMATICS**

**GRADUATE SCHOOL, CHIANG MAI UNIVERSITY
JULY 2017**

CHARACTERIZATION OF CAYLEY DIGRAPHS
OF FINITE TRANSFORMATION SEMIGROUPS
WITH RESTRICTED RANGE AND THEIR
VERTEX TRANSITIVITY

CHUNYA TISKLANG

THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN MATHEMATICS

Examination Committee:

Thanin S. Chairman
(Assoc. Prof. Thanin Sitthiwirattham)

C. Promsakon. Member
(Asst. Prof. Dr. Chanon Promsakon)

Sayan Panma Member
(Asst. Prof. Dr. Sayan Panma)

Thanasak Member
(Asst. Prof. Dr. Thanasak Mouktonglang)

Preeyanuch Honyam Member
(Dr. Preeyanuch Honyam)

Advisory Committee:

Sayan Panma Advisor
(Asst. Prof. Dr. Sayan Panma)

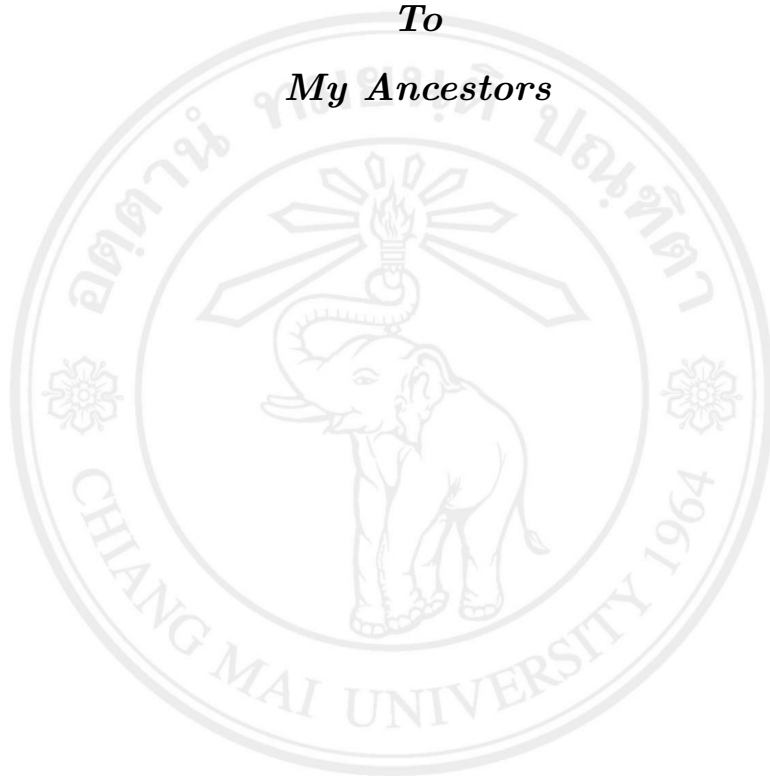
Thanasak Co-advisor
(Asst. Prof. Dr. Thanasak Mouktonglang)

Pradthana Jaipong Co-advisor
(Asst. Prof. Dr. Pradthana Jaipong)

20 July 2017

Copyright © by Chiang Mai University

*To
My Ancestors*



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

ACKNOWLEDGEMENT

I would like to express my thanks to my advisor, Asst. Prof. Dr. Sayan Panma with his enthusiasm, his inspiration, and great efforts to explain thing clearly and simply. In addition, he suggests and verifies about writing papers and thesis.

I am grateful to Udon Thani Rajabhat University that allowed me to study and provided scholarships for the first period. Also, I appreciate Thai Government Scholarship in the Area of Science and Technology for financial support.

Moreover, I would like to express my spacial thanks to my friends: Nuttawoot Nupo and Wanchai Tapanyo, who read and read over my papers and my thesis.

Finally and most importantly, I acknowledge to my family for their love and encouragement.

Chunya Tisklang

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved