

ACKNOWLEDGEMENT

The authors are particularly grateful to the Kittibandit Scholarship at Suranaree University of Technology, for which I am sincerely grateful.

I appreciate my advisor, Assoc. Prof. Dr. Keerati Chayakulkheeree, whose guidance, insightful feedback, and constant encouragement have been instrumental in the completion of this work. Beyond academic advice, I am deeply grateful for the valuable life skills and practical wisdom I have gained from him in my daily life. His mentorship has not only shaped my research abilities but also inspired me to develop discipline, perseverance, and a positive attitude in facing challenges both in my studies and in everyday living. I also extend my sincere thanks to the committee members: Assoc. Prof. Dr. Somchat Jiriwibhakorn, Assoc. Prof. Dr. Keerati Chayakulkheeree, Asst. Prof. Dr. Nitikorn Junhuathon, Prof. Dr. Thanatchai Kulworawanichpong, and Asst. Prof. Dr. Tosaphol Ratniyomchai, for their valuable advice, suggestions, and support throughout the thesis evaluation process.

Special appreciation is given to my parents for their enduring support, both emotionally and financially. Their belief in me has been a cornerstone of my academic journey. I am deeply grateful for everything they have done for me.

Furthermore, I would like to acknowledge all my lecturers at the School of Electrical Engineering for providing me with foundational knowledge and academic mentorship during my studies. I am also grateful to my friends, my family, and seniors, whose collaboration, encouragement, and assistance greatly contributed to this work.

Lastly, I would like to thank the faculty members and administrative staff at Suranaree University of Technology for their support and kind assistance throughout my academic life.

Nisachon Thabcha