Acknowledgement

The work presented in this thesis would not have been possible without the guidance and encouragement of several individuals both from engineering and non-engineering domain. Hence, I would like to take this opportunity to express my sincere gratitude to all of them who have always been with me and for me, although sometimes they are hidden in the shadows throughout this wonderful journey.

First and foremost, I must thank God for blessing and guidance throughout this research period.

I feel great pleasure and honor to express my profound sense of reverence to my supervisor Dr. Partha Pratim Sahu for his venerable guidance, persistent help and providing me an excellent atmosphere during the course of this research. I am extremely grateful to him for the massive effort he put into the completion of my Ph. D. research work. I endorse special thanks to him for his extraordinary efforts in helping me in solving the trickiest problems faced during my research work.

I would like to thank Prof. Manabendra Bhuyan (Sir) and Prof. Nityananda Sarmah (Sir) for their valuable insights and suggestions as my Ph. D. committee members to better my thesis work.

I am grateful to Prof. Jiten Ch. Dutta (Sir) for providing me much inspiration to perform better in this research work and be successful.

I cannot visualize my current position without the love, care and support from my only loving brother, Ajoy Rajkhowa. I owe my gratitude to him for striving hard and because of whom my research has been the one that I will cherish forever. It is impossible to describe his support in words. If I have to mention one thing about him, among many, then I would proudly declare that while struggling for completion of this doctoral research work during this entire period, he has taught me to lead a life by standing alone.
I express my heartfelt gratefulness to my husband Bidyut Deka for affording his countless hours in providing me the guidance, support and courage over the years during this research period. My life has been changed into a better direction in a way that I could not have dreamed of two years before. Without you, this thesis would have never been completed. Your positive attitude at all levels of my life has given me the strength to carry on. Thank you so much.

I owe my deep gratitude to my mother-in-law Mrs. Makani Deka and father-in-law Mr. Barun Ch. Deka. Their prayers and words of encouragement meant to me so much. It is impossible to describe their support in words. A special sensation of gratitude to my sisters-in-law Archana Deka for her endless love and support towards the completion of my doctoral research. Thanks to my brother-in-law Pranjal Deka and sister-in-law Daijee Talukdar Deka for their best wishes.

I am beholden to a very precious group of people for their constant support throughout my stay at Department of Electronics & Communication Engineering. I would like to express my heartiest acknowledgment to the following:

Mr. Anukul Baishya (Sir), for boosting my morale throughout the course of research and also for his parent-like support and the home feeling whenever I was in need during my stay in Tezpur.

All the faculty members, Department of Electronics & Communication Engineering, Tezpur University for the support and advice during the course of my research period.

The office staff, Department of Electronics & Communication Engineering, Tezpur University for their hospitality.

All the technicians, Department of Electronics & Communication Engineering, Tezpur University, who helped to make my work possible.
Especially, my deep gratitude goes to Montu Mali and Mitharam Handique, Tezpur University for sharing their technical ideas in hardware implementation of my experimental set up at Department of Electronics & Communication Engineering, Tezpur University.

My friends Anup, Madhurjya, Nimisha, Pranjal, Shashikala, Nilima, Hemanga, Bijay, Mahipal Singh, Kuntola, Rashmee, Abdul, Champak, Lachit, Papia, Aditi who have helped me stay sane through these difficult years.

My sincere thanks to all my family members for always encouraging me to achieve the best. Their support and care helped me surmount setbacks and stay focused on my research work.

I am grateful to my paternal grand father, late Kanak Chandra Dutta who laid seeds of enthusiasm and passion in my pursuit of knowledge.

I would like to remember and thank my only aunty late Jyoti Dutta for her prayers. Though she is not here anymore with us, but I strongly believe that her prayers played very important role in my life.

I would like to acknowledge the help and supports for the fabrication part that was carried out at the CEN, IISc under INUP at IISc which have been sponsored by DIT, MCIT, Government of India.

I would like to acknowledge the Indian Oil Corporation (IOC), Assam Oil Division (AOD), Digboi for providing me pure petroleum products for part of my research work carried out in this thesis.

I extend my thankfulness to Dr. P. Chattopadhayay, Scientist ‘D’, and Mr. Amit Agnihotri (Senior Technical Staff) Pharmaceutical Technology Division, Defence
Research Laboratory (DRL), Tezpur, Assam (India) for their kind cooperation during the experimental part of my research work at DRL, Tezpur.

Thanks to Mr. Anuj Baruah, Laboratory Technician, Tezpur University Health Centre for his valuable help in the diagnosis of blood samples.

Last but not the least; I appreciate the financial support from Department of Electronics & Communication Engineering, Tezpur University, Tezpur that funded parts of the research discussed in this thesis.

Thank you, Lord, for always being there for me.

Aradhana Dutta