ACKNOWLEDGEMENT

I take this opportunity to express my deep sense of gratitude to my supervisor **Dr. Arnab Sarkar** and co-supervisor **Dr. Jyoti Prasad Chakraborty** for his continuous guidance and whole-hearted cooperation in carrying out this work. His meticulous and valuable review and constructive criticism of the manuscript have greatly improved the quality of work. Sir, for your faith in me and the desire to live up to your expectations, has constantly pushed me to work harder.

My grateful appreciation also goes to **Dr. Jahar Sarkar** and **Professor M.K. Mondal** for serving on my research programme committee (RPC). Thank you all for sparing your valuable time and assisting me throughout my research and completion of this thesis. I wish to extend my sincere thanks to **Prof. A. P. Harsha**, Head, Department of Mechanical Engineering for providing me the necessary resources to enable me to complete this research work. During my stay at IIT (BHU) Varanasi, I have met many people who have made this period of my life memorable and very pleasant. Among them, I would like to sincerely acknowledge the assistance and motivation provided by Prof. P. Ghosh, Dr. R. R. Sahoo, Dr. Laltu Chandra, Dr. S.S. Mondal, Dr. O. P. Singh and Dr. Amitesh Kumar. I want to thank my colleagues at IIT (BHU) Varanasi, especially to Mr. Rishikesh Kumar Singh, Mr. Praveen Kumar Singh, Mr. Alok Singh Verma, Mr. Sumit Kumar Singh and Mr. Vivek Kumar for encouraging me to finish this work. Finally, I would like to thank my parents and family for providing moral and economical support whenever I needed.