ACKNOWLEDGEMENT

This thesis represents the whole journey in achieving the Degree of Ph.D. The thesis trails the completion of work, support and encouragement of numerous people including my Family, friends, colleagues and other institutes. Finally the thesis has reached towards the gratitude of work imparted by numerous people.

At the very first stage I would like to thank my Research Guide, Dr. Bimlesh Kumar, Principal, J.T. Mahajan College of Engineering Faizpur, whose generous ideas and support during the past few years have been extremely valuable. He has taught me many valuable skills for my future research career and has provided useful guidance for completing this thesis.

I am grateful to the College of Engineering Pune for giving the permission to use their equipment and Lab for Experimentation. I take this opportunity to sincerely acknowledge Dr. D.W.Pande (Professor in Mechanical Engineering and Dean R&D) and Dr. C.Y. Patil (Head Instrumentation Engineering) College of Engineering Pune. For their key role that buttressed me to perform my work comfortably.

It’s my fortune to gratefully acknowledge the support of some special individuals. Dr. M.M.Patil and Dr. K.B.Waghulde of Mechanical Engineering Department, J.T.Mahajan College of Engineering Faizpur for providing computing support and research lab during my thesis preparation.

My special acknowledgements go to all those people who were with me constantly, Dr. R.P. Singh Principal, Shri Sant Gadge Baba College of Engineering and Technology, Bhusawal for their constant moral support and encouragement. I would like to thank Prof. A. V. Patil, Prof. I.D.Paul, Prof. Pushkar Fegade Prof. J.S.Chaudhari and Prof. R.V.Bhortake, for being there with me for successfully completing of this thesis and all my friends for their moral support, help and multiple suggestions for my research.

I expand my thanks to my parents, wife, my daughters and nephews Arpita, Ruchita Rudra and Arya for their sincere encouragement and inspiration throughout my research work and lifting me uphill in this phase of life.

Barjibhe Rahul Bhalchandrappa