ACKNOWLEDGEMENTS

At the outset I place my gratitude humbly at the lotus feet of the LORD OF LORDS, the source of all wisdom and knowledge for having guided me with requisite knowledge and strength to carry on this work and complete it.

I am grateful to Dr. A. S. Kiran Kumar, Chairman, ISRO and Shri. P. Kunhikrishnan, Director, Satish Dhawan Space Centre SHAR, Sriharikota for having permitted me to register for Ph.D. in SV University Tirupati and to pursue research work, while working in SDSC SHAR.

I wish to express my heart felt gratitude to Dr. G. Krishnaiah, Professor & Former Head, Department of Mechanical Engineering, SVU College of Engineering Tirupati for his valuable guidance help and encouragement during the course of this work. His readiness to spare his valuable time whenever I approach for discussions has infused inspiration and confidence in me to carry out this investigation.

I extend my deep sense of gratitude to Dr. S. Sankaran, Dy. General Manager, SMP &ETF, Satish Dhawan Space Centre SHAR, for his invaluable guidance, intellectual support and for providing congenial and stimulating academic environment. With his meticulous planning Dr. S. Sankaran, has streamlined my vague ideas during each and every phase of this research work.

I am thankful to Prof. T. Sundararajan, Head of Department of Mechanical Engineering, IIT Madras for his valuable suggestion and support during the course of this work.

I express my sincere thanks to Shri. V. Seshagiri Rao, Former Deputy Director, VALF for encouraging me to carry out this work.

I express my sincere thanks to Prof. G. Bhanodaya Reddy, Head, Department of Mechanical Engineering, and Prof. G. Padmanabham, Vice Principal and Chairman BOS (PG), Prof. P. Mallikarjuna, Principal SVU College of Engineering, Tirupati, for their continuous advice and encouragement during the course of this work.

I am grateful to Prof. V. Diwakar Reddy, Department of Mechanical Engineering Tirupati for his valuable support and guidance.

I am indebted to my father Shri. K. Ramasamy and my mother Smt. K. R. Gnanam, for their affection and encouragement throughout my career. I express my appreciation to my wife Smt. V. Deepa, My son V. Ajith Kumar and my
Daughter V. Atchara for their cooperation and encouragement during the course of this work.

I am highly thankful to my beloved colleagues Shri. B.V. Srikanth, Shri. R. Ram Kumar, Shri. S. Ramesh Subramaniam, Shri. G. Venkatesh, Shri T. S. Mani Engineers, G Vijaya Kumar, Data Entry operator of Satish Dhawan Space Centre, for their valuable help in every aspect of preparation of the thesis.

I thank all my friends and colleagues who were helpful to me during the course of my work and to complete the work.

I am also thankful to M/s. Vinay Graphics, Tirupati for their cooperation extended in preparation of this Thesis.

Place: TIRUPATI
Date: 17.06.2016

R.VENKATRAMAN