ACKNOWLEDGEMENT

First and foremost, I record my sincere gratitude and respect towards my research supervisors Dr. Pankaj Kumar Sharma, Associate Professor, Dept.of Mechanical Engineering, University of Petroleum & Energy Studies (UPES), Dehradun and Dr. Mukesh Saxena, Professor & Pro-Vice Chancellor, University of Technology & Management, Shillong, Meghalaya for their enormous help, support and guidance during the study.

In addition, I also express my sincere thanks to all whose have gave a possibility to utilize the University equipment and laboratories to finish this research. Further, I am extending my thanks to Ministry of New and Renewable Energy, New Delhi for their financial support in continuing the research at UPES, Dehradun.

I would like to honestly thankful to Dr. Kamal Bansal, Dean-College of Engineering, UPES, Dehradun, who enormously supported and guided during the establishment of the Engine Research Laboratory (ERL), as per NFPA, Class I, Division 2, Group B Standards, to till date at various stages of research at UPES.

My heartfelt and sincere thanks to my colleague Prof. Narayan Khatri, who supported me to develop the test set up of the laboratory and helped in executing the experiments and many more.

My Big thanks to Dr. Rajanish Garg, who is role model of research for his valuable suggestions and motivational guidance. My special thanks to Dr. P.K. Sahoo, Associate Professor, Dr. Suresh Kumar, Professor & Head of the Deapartment-Mechanical Engineering, Dr. Sanket Goel, VP- Research, Dr. A.K. Tiwari, Sr. Principal Scientist- CAER, Dr. Shrihari Campus Director, Mr. Utpal Ghosh, Pro- Vice Chancellor, Dr. Parag Diwan, Vice- Chancellor and Dr. S.J Chopra, Chancellor of UPES for their continuous support in successful completing the research.

My additional thanks to Mr. Vasist, Mr. Neeraj Kapoor, Mr. Ravinder Sharma, Mr. Shashank and their team for their uninterrupted financial support from UPES.

Mr. Uspal Singh, Project Manager (constructions) is highly acknowledged for providing the support and time to time requirements of civil works and common utilities.

Further, I am extending my thanks to Mr. Keshavan Mr. Rawat, Mr. Navneet, Mr. Ranjit of workshop, who continuously extended their helping hands in successful completion of test set up.

My special thanks to Mr. Subrahmanyan Raavi, Air Products –USA, who guided me in developing the Engine Research Laboratory (ERL) as per NFPA standards.

I would like to thank the suppliers, Field Marshal -Rajkkot, Dynomerk Controls-Pune, AVL – Gurgaon & Austria, Legion Brothers- Bangalore, Ambetronics-Mumbai, Eureka flow- Pune, Uttarnchal Vanopaj Sahkari Sharam Savid-Dehardun, INox Air Products- New Delhi, Gupta Gas Agencies- Dehradun, Nine Project Pvt. Ltd. (HILTI) and many more....

I am extending my thanks to Prof. G.G. Shastry and Prof. Shyam Pandey all other colleagues of Mechanical Engineering and Prof. Anand Pathak of Communication Department for their help in writing the thesis.

My additional thanks to Mr. Jeevan, Mr. Satendar, Mr. Kapil, Mr. Pappu and Mr. Sonu who supplied tea at every tired moment.

Further, I would like to thank, Mr. Darwan, Mr. Manoj, Mr. Giri, Mr. Nirmal Singh, Mr. Shyam are the security guards helped us to open and close the laboratory on late nights and holidays with always smiling.

I am especially indebted to my parents for their love, sacrifice and support in completing this research.

Pasupuleti Subrahmanya Ranjit