ACKNOWLEDGEMENT

I would like to acknowledge my indebtedness and render my warmest thanks to my Ph.D. guide, **Dr. Vandana J. Rao**, Associate Professor, Metallurgical and Materials Engineering Department, Faculty of Technology and Engineering, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat (INDIA) who made this work possible for me. Her friendly guidance, encouragement and expert advice have been invaluable throughout all stages of the work.

I would wish to express my gratitude to **Dr. B. J. Chauhan**, Associate Professor and Head of the Department, Metallurgical and Materials Engineering Department, Faculty of Technology and Engineering, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat (INDIA) for helping in all aspects related to present research work.

I would like to express my deepest appreciation to my department research committee (DRC) members Dr. P. T. Deota, Dr. S. K. Dutta, Dr, V. V. Mathane, Dr. S. N. Soman and Dr. S. D. Kahar for their valuable support and guidance during my work. I would also like to thank Dr. Purvesh K. Nanavati, Dr. Ela Zha and Dr. Hemant K Patel for their support during my thesis work.

I am deeply indebted to Research and Consultancy Cell, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat (INDIA) for the financial assistance during the research and investigation.

With immense pleasure I am cordially thankful to Mr. Dharmesh Lodhari, all technical and non-technical staff members as well as administrative staff of the department for their amiable help especially during my Ph.D. research work.

My thanks are extended to my parents, my wife Nisha, my son Arav and my daughter Anshika. Without their encouragement and moral support this great task could never be completed.

Finally, I would like to thank Almighty God Lord Krishna for divine grace and blessings for letting me through all the difficulties during the completion of my Ph.D. work.

Place: Vadodara

111111

Date: 17 05 2023

(Hemantkumar Narendrabhai Panchal)