

ACKNOWLEDGEMENTS

Through words are seldom sufficient to express gratitude and feelings, it somehow gives me an opportunity to acknowledge those who helped me during the course of my study.

I express my deep sense of gratitude and indebtedness towards my guides Dr. Devendra Mohan, Professor, Department of Civil Engineering and Dr. Ram Prasad, Professor, Department of Chemical Engineering & Technology, Indian Institute of Technology (Banaras Hindu University) Varanasi, for providing his unwavering support, encouragement and consummate feedback throughout the course of this study and in the participation of this thesis. Without his illustrious guidance this thesis would not have seen the light of the day.

I would like to thank Prof. Prabhat Kumar Singh (Head), Department of Civil Engineering, Indian Institute of Technology (Banaras Hindu University) Varanasi, for encouraging me and provide me all facilities to carry out my research work.

I would also like to express my sincere thanks to RPEC member's Prof. Shyam Bihari Dwivedi, Department of Civil Engineering, and Prof. Anil Kumar, Department of Ceramic Engineering, Indian Institute of Technology (Banaras Hindu University) Varanasi, for their stimulating help and criticism which incited me to widen my research from various perspectives, valuable inputs, suggestions and affectionate attitude.

I wish to express deep regards to all the teachers and Research Associates of Department of Civil Engineering, Indian Institute of Technology (Banaras Hindu University) Varanasi, for their kind support at all moments during the progress of my research.

With a deep sense of gratitude I express my sincere thanks to Central Instrument Facility Centre (CIFIC) - Indian Institute of Technology (Banaras Hindu University)

Varanasi, for their help in carrying out sample analysis. I am grateful to Mr. Lal Bahadur Ram, Laboratory Assistant, Department of Chemical Engineering & Technology, Indian Institute of Technology (Banaras Hindu University) Varanasi, for the assistance extended by him time to time during this research work. I am also grateful to all Laboratory staff Mr. Hira lal, Mr. Sankar Ram, Mr. Paras, and all supporting staffs of Department of Civil Engineering, Indian Institute of Technology (Banaras Hindu University) Varanasi, for the assistance help in this research work.

I am grateful to all the office staff and authorities of Department of Civil Engineering, Indian Institute of Technology (Banaras Hindu University) Varanasi, for their kind help during the period of my stay to complete the thesis work.

I am thankful to my fellow friends Mr. Subhashish Dey, Mrs. Pratichi Singh, Miss. Suverna Trivedi, Mr. Arnab Pandey, Mr. Satya Prakash Murya, Mrs. Anupama Mishra, Mr. Deepak Yadav and juniors for the thought-provoking discussions, for their support, cooperation and sincere help in many ways.

My parents have been my best mentors, preparing me for life in its various aspects. There are no words to express my gratitude for all the selfless efforts they made. I would like to thanks my sisters specially Mrs. Brundabati Dhal and all brothers Mr. Tarani Sen Dhal, Late. Hiralal Dhal, Mr. Pradeep Kumar Dhal for their love, moral support, encouragement and motivation to get me through my Ph.D.

Finally, I bow with reverence and gratitude to thank the Almighty who has enriched me with such an excellent opportunity and infused the power in my mind to fulfill the work assigned to me.

Date:

Place:

(Ganesh Chandra Dhal)