ACKNOWLEDGMENT

The author wishes to express his deep sense of gratitude, indebtedness and sincere thanks to Prof. P.PURUSHOTHAMA RAJ for his motivation, invaluable suggestions, and personal supervision of the work. The author sincerely appreciates his deep understanding, keen interest, untiring enthusiasm and the constant care he took in bringing out this thesis. He also acknowledges the cordial and affectionate treatment towards him.

Suggestions and encouragement given by Dr. D.GOVIDARAJULU and Dr.T.SUNDARA RAJAN during various stages of the thesis are thankfully acknowledged. Facilities and suggestions offered by Mr. V.L.NARASIMHA in typing the manuscript are greatly appreciated. The author wishes to express his gratitude to the Head of Civil Engineering Department, Pondicherry Engineering College for granting permission to utilise the laboratory facilities, and Principal, Pondicherry Engineering College for having permitted to utilise library and other facilities.

The author appreciates the assistance given by Mr. M.GUNALAN and Mr.M.PONNASAMY, staff of Concrete Laboratory of Pondicherry Engineering College in conducting the experiments. The author is thankful to Mr.R.GOVINDARAJAN and Mr. LSENTHIL KUMAR for their help in typing the manuscript neatly. The friendly advice and encouragement received from his colleagues are also acknowledged. Assistance received from Mr.S.KANAGSABAPATHY in the preparation of drawings for this work is appreciated and acknowledged.

The author wishes to express his whole hearted thankfulness to the Librarian, PEC and his staff members for having equipped the library with literatures useful for research. Sincere thanks are also due Mr. SHANMUGAM, the then Deputy General
Manager, CARD, NLC, Neyveli for having extended his laboratory facilities. Dr. THAYUMANAVAN and Dr. DEVADASS MANOHARAN, Professors, Anna University are also thanked for having spent their valuable time to give useful suggestions in this work.

The understanding and patience shown by the authors' wife Mrs. KALPANA DEVI is recorded with a deep sense of gratitude. The encouragement shown by his relatives particularly his father-in-law is acknowledged. The author records his gratitude to his parents for all their hardships to bring him to the stage what he is today.

The author wishes to emboss his indebtedness to late Prof. K. JAYARAMAN, Department of Civil Engineering, Coimbatore Institute of Technology who stood as his teacher, friend, philosopher and mentor. TO HIM THIS THESIS IS HUMBLY DEDICATED.

s kothandaraman