Pursuing PhD. project is both painful and enjoyable experience. It is just like climbing a high peak, step by step, accompanied with bitterness, hardship, frustration, encouragement, trust and with so many people's help. First of all, I bow with reference to thank the **ALMIGHTY** who has enriched me with such a golden opportunity and infused the power in my mind to fulfill the task assigned to me and for never ever leaving me alone during the time of trials and suffering and molding me into what I am today.

It is indeed my proud privilege to express my deep sense of gratitude and indebtedness to my revered supervisor, **Dr. Pradeep Srivastava**, for his immense help, co-operation and valuable guidance that he has extended to me for the successful completion of this investigation. I am grateful to him for his constant encouragement, sustained interest and parental care throughout the research period. I am proud to have a teacher like him always encouraging, standing besides supporting, no matter what adversity is on the stand.

I pay my sincere thanks to **Prof. Mira Debnath (Das)**, previous Co-ordinator and **Prof S.K. Srivastava**, current Coordinator, School of Biochemical Engineering, Indian Institute of Technology (B.H.U.) for providing me necessary support required to complete my work.

It is a profound privilege to be a student of School of Biochemical Engineering. I would like to thank other faculty members of the school **Prof. Subir Kundu,** and **Dr. Abha Mishra** who helped me a lot in overcoming the bottlenecks I encountered during my studies, with their valuable advices.

I am heartily grateful to **Dr. Ram Babu Gundla** Senior scientist in **GVK Biocampus** Hyderabad for providing me software facility and subject guidance.

From the depth of my heart I would like to express my gratitude to **Dr. Suneel Bomisetty GVK Biocampus** for valuable inputs throughout my research work.

*I* would like to express my heartily appreciation to *GVK Biocampus Hyderabad* for providing me software facility for my Insilico studies.

My profound thank to University Grant Commission for the award of financial assistance to carry out the research work.

*I wish to express my deepest thanks to my senior* **Dr. Yogendra Singh** *for supporting me during my Ph.D.* 

Furthermore my heartfelt thanks to all my juniors **Rupika**, **Sumedha**, **Shipra**, **Ashish & Sukhendra** for their joyous company and for helping me in several ways.

Words fails to express my immense appreciation for my loving husband *Mr. Raghvendra Singh*, whose faithful support, moral motivation and patience during final stage of my Ph.D. is so appreciated.

I owe him for encouraging me and showing great confidence on my abilities. I would also take this opportunity to thank my mother in law and father in law for their blessing and unconditional support. I owe my deepest gratitude to my elder sister **Seema Singh**, brother in law **Dr. Bhupendra Pratap Singh** and my loving niece **Aarya Pratap**, for providing me love care and support during my entire Ph.D.

Above all, I can never adequately thank my parents for their perpetual love, sacrifices and for their constant support through all the ups and downs in my life.

I can also not forget the valuable mental support of my brothers Abhishk Singh, Shashank Singh, my sister Vibha Singh and brother in-law Pankaj Singh though out my research work.

With deepest gratitude and love I owe my **Grandma** who left us. I could show just how much I miss her.

*I convey my regards to all the non teaching staff members specially Suchit Verma* for their valuable support and help during the research work.

Shalini Singh