I express my sincere gratitude to my supervisor Prof. M. K. Mondal, Department of Chemical Engineering and Technology, Indian Institute of Technology (BHU), Varanasi, India for his wholehearted co-operation, never-ending inspirations and guidance. Working under his guidance is a new experience in teaching and research field that I will use to make the future and human society as well.

I also express my heartiest thanks to Prof. P. K. Mishra (Head of the Department, Department of Chemical Engineering and Technology) Prof. S. B. Dwivedi (Dean of Academic Affairs) and Prof. A.S.K Sinha (Ex-Head of Department of Chemical Engineering and Technology), Indian Institute of Technology (BHU), Varanasi for providing essential facilities during the whole research work.

I would especially thank to my RPEC members Prof. P. Ahuja and Prof. Y.C. Sharma, Indian Institute of Technology (BHU). They gave valuable advice and suggestions throughout the research work. I would also thank to DPGC members and all faculty members of the Department for their valuable suggestions.

I am very thankful to senior technical superintendent Mr. Dayaram Singh Yadav of Chemical and Instrumental analysis Laboratory, Department of Chemical Engineering and Technology, Indian Institute of Technology (BHU) Varanasi for his all kinds of help during fabrication of experimental apparatus for research work.

I am also thankful to all technical and non-technical staffs of Department of Chemical Engineering and Technology, Indian Institute of Technology (BHU), Varanasi.

I also owe my sincerest thanks to my seniors Dr. Chelluboyana Vaishnava Raghunath, Dr. Meghna Kapoor, Dr. Roli Saini, Dr. Shalini Shrivastav, Dr. Devendra Kumar Singh, and my friends Mr. Ritesh Padhan, Mr. Vikas Singh, Mr. Devansh Jaiswal, Ms. Renu Bala, Mr. Dilip Kumar, Mr. Anuj Kumar Prajapati, Mr. Deoashish Panjiara, Mr. Pradeep Saw, Mr. Mahendra Ram, Mr. Diwakar Pandey, Mr. Goutam Kishore Gupta, Mr. Akhilesh Kumar Yadav, and Mr. Akhilesh Prasad Singh, for their help and support during my course of study

Furthermore, I must put on record my gratitude to my parents, brother, sister, sister-inlaw, brother-in-law, and family members for their support and encouragement for this endeavor.

I would like to acknowledge special thanks to Ministry of Human Resource Development (MHRD), Government of India for providing financial support during the research work. Finally, I wish to extend warm thanks to all those who could not find a separate name but they helped directly or indirectly. Last but not least, I am especially thankful to the Almighty God from whom I gathered the strength and perseverance during the course of my whole research work.

Date:

Varanasi

(Shailesh Kumar)