The work represented in the thesis entitled “Synthesis and Characterization of New heterocyclic compounds & their application” is divided into five chapters which can be summarized as under.

**Chapter-1** covers basic introduction to Microwave assisted organic synthesis including comparison of conventional vs microwave assisted reaction and introduction of 2-aminoimidazole and their presence as naturally occurring marine alkaloids described. In this part various synthetic approaches toward 2-aminoimidazole and short review on 2-aminoimidazole as pharmacophores also presented. Finally basic concept of anti biofilm activity described.

**Chapter-2** deals with microwave assisted one pot synthesis and Structure Activity Relationship of 2-Hydroxy-2-phenyl-2,3-dihydro-imidazo[1,2-a] pyrimidinium Salts and 2N-Substituted 4(5)-Phenyl-2-Amino-1H-imidazoles as Inhibitors of the Biofilm Formation by Salmonella Typhimurium and Pseudomonas aeruginosa.

**Chapter-3** entitled “Structure Activity Relationship of N1-Substituted 2-Aminoimidazoles as Inhibitors of Biofilm Formation by Salmonella Typhimurium and Pseudomonas aeruginosa.” In this chapter a library of N1-substituted 4(5)-phenyl-2-aminoimidazoles was synthesized and tested for the antagonistic effect against biofilm formation by *Salmonella* Typhimurium and *Pseudomonas aeruginosa*. The substitution pattern of the 4(5)-phenyl group and the nature of the N1-substituent were found to have a major effect on the biofilm inhibitory activity. The most active compounds of this series were shown to inhibit the biofilm formation at low micromolar concentrations.

**Chapter-4** deals with microwave-assisted Cu-catalyzed one pot protocol for the synthesis of 2-aminoimidazole-triazole framework via two consecutive steps of dimorth rearrangement and click reaction was demonstrated. Library of 22 compounds have been synthesized and were subjected to test for antibiofilm activity. However, the antibiofilm activities of these classes of compounds are under pipeline.
After careful study of Structure Activity Relationship, a fresh libraries of N1-substituted 2-aminoimidazoles and N1-unsubstituted 2-aminoimidazoles have been synthesized and tested for anti biofilm activity. In Chapter-4 microwave assisted one pot protocol for synthesis of 2-aminoimidazole-triazole framework has been described and all newly synthesized compounds were tested for antibiofilm activity. However activities of these calls of compounds are under pipeline.

Chapter-5 entitled “Crystal and molecular structure analysis of DP-7: A new Multi Drug Resistance Reverter Lead Molecule” deal with crystal and molecular structure analysis. 3,5-Dibenzoyl-4-(3-methoxyphenyl)-1,4-dihydro-2,6-dimethyl pyridine (DP-7) has been shown to be a powerful P-gp inhibitor, almost devoid of cardiovascular effects, but capable of inhibiting liver CYP3A, thus it can be conclude that DP-7 is a good lead compound for the synthesis of new dihydropyridines. As DP-7 demonstrated promising MDR activity, several scientific publications on this molecule appeared. However study of X-ray crystallography was done first time and presented in the current work.

All newly synthesized compounds have been characterized by $^1$H NMR, $^{13}$C NMR and HRMS. Some representative copy of $^1$H and $^{13}$C NMR spectra also presented.