Schiff’s base based transition metal complexes have been found to show immense applications in the various field such as pharmaceutical, medicinal chemistry, biology, catalysis, pigments and dyes. Lone pair of electrons present in nitrogen atom of azomethine group of Schiff’s base can easily coordinate with transition metal ions and produce metal complexes of different geometries, such as octahedral, distorted octahedral, square pyramidal and square planar. Schiff’s base transition metal complexes, particularly those of the first transition series are of special interest because it can serve as non radioactive cancer combating therapeutic and diagnostic tools in the future. Moreover, Schiff’s base transition metal complexes are known to possess enhanced antimicrobial activity as compared with metal free ligand. So, Schiff’s base transition metal complexes could be a way to handle the problem of emerging bacterial resistance against the available antibiotics.

In this thesis, we report syntheses and characterization of transition metal complexes of Co(II), Ni(II), Cu(II), Mn(II) and Zn(II) of six Schiff’s base ligands derived from dehydroacetic acid with malonohydrazide, 2-cyanoacetohydrazide, 4-hydroxybenzoylhydrazide and that of 2-cyanoacetohydrazide with 2-hydroxyacetophenone and 2-hydroxy benzaldehyde. The structure of all the synthesized compounds were established on the basis of various spectroscopic techniques like elemental analysis, NMR, IR, UV-visible, conductance and mass spectrometry. Complexes were found to possess square planar and octahedral geometries.

All the synthesized compounds were screened for DNA photocleaving potential by agarose gel electrophoresis method. Furthermore, in vitro antibacterial activity of the Schiff’s bases and their transition metal complexes have been assessed against two gram positive and two gram negative bacterial strains using the well diffusion method. Schiff’s base metal
complexes were found to possess increased level of DNA photocleavage and *in vitro* antibacterial activities against the pathogenic strains of bacteria under similar experimental conditions. The metal complexes presented in this thesis assure significance as they may serve the basis of some novel and efficient antitumor, anticancer, antifungal or antibacterial agent in the future after some structural modifications.