The importance of coordination complexes in our day to day life is increasing due to their complex structures and interesting magnetic, electronic and optical properties. Twentieth century witnessed the development of Alfred Werner's coordination chemistry as one of the most productive areas of research. He developed the modern theory of coordination compounds in 1892, explaining two types of valencies for the metal. Since then the field of coordination chemistry has been widely explored. The number, variety and complexity of coordination compounds still continue to grow. The stereochemistry of coordination compounds is one of the major interests of the coordination chemist. Coordination complexes can assume a wide variety of structures depending on the metal ion, its coordination number and the denticity of the ligands used. The ligands also range from monodentate to polydentate based on the potential donor sites available in their structural skeleton.

Metal complexes of thiosemicarbazones with aldehydes and ketones have been widely reported. But there have been fewer reports on potential pentadentate bis(thiosemicarbazones) formed from 2,6-diacyetylpyridine. This work stems from our interests in the coordination behaviour as well as the structure of the metal complexes of bis(thiosemicarbazones). The primary aim of this investigation was to synthesize and characterize some transition metal complexes using the ligands 2,6-diacyetylpyridine bis($\mathcal{N}^1$-substitutedthiosemicarbazones). Complexation with metal ions like copper, manganese, nickel, palladium, zinc and cadmium were tried. Various spectral techniques were employed for characterization. The structure of one complex has been well established by single crystal X-ray diffraction studies.
The work is presented in six chapters and the last section deals with summary and conclusion. Chapter 1 involves a brief foreword of the metal complexes of bis(thiosemicarbazones) including their bonding, stereochemistry and biological activities. The different analytical and spectroscopic techniques used for the analysis of the ligands and their complexes are discussed in this chapter. Chapter 2 deals with the synthesis and spectral characterization of the bis(thiosemicarbazones). Chapter 3 describes the synthesis, and spectral characterization of copper(II) complexes with SNNNS donor bis(thiosemicarbazones). Chapter 4 deals with the synthesis and spectral characterization of manganese(II) complexes. Chapter 5 contains the synthesis and spectral characterization of the nickel(II) and palladium(II) complexes. Chapters 6 includes the synthesis, structural and spectral characterization of zinc(II) and cadmium(II) complexes with SNNNS donor bis(thiosemicarbazones).