The hyperfine interaction studies are important to provide information about the electronic spin and charge distributions in different types of materials. Sometimes the study with respect to the variation of the external physical parameters, like pressure, helps to understand the relationship of the hyperfine fields (magnetic and electric both) with the impurity-host electronic structure. In the present work, the pressure and the temperature dependence of the hyperfine fields have been studied. The hyperfine field studies are discussed in the following four chapters.

The first chapter contains a brief history of the different techniques and the information obtained by them, in the hyperfine interaction studies. The use of the nuclear techniques in the solid state physics studies has been stressed, especially for the temperature and the pressure dependence studies of the hyperfine fields.

In the second chapter, a survey of the dilute impurity magnetic and electric hyperfine fields in different metallic systems is given. Various theoretical approaches are discussed to understand the origin and the systematics of these fields in the metallic systems. The present status of the theoretical understanding of the temperature dependence and the pressure dependence of these fields is also given.

In the IIIrd chapter, the PAC (Perturbed Angular Correlations) theory and instrumentation relevant to the
present measurements are discussed. No new formulation of
the PAC theory is claimed.

The chapter IV contains the experimental studies
carried out by the author at two places; (1) the Physics
Department, Panjab University, Chandigarh; and (2) the
Institute of Physics, Uppsala (Sweden). In these measure­
ments, both the IPAC and the DPAC techniques have been used
depending on the probe characteristics. The experimental
techniques, source preparation, results and their discussion
are given independently for the each case.

In the Heusler alloys, Pd$_2$MnSn, Ni$_2$MnSn and Co$_2$MnSn,
the hyperfine magnetic fields at Pd probe are reported.
The IPAC technique was used for these measurements at different
temperatures. For the reported results of the pressure and
the temperature dependence of the hyperfine fields at Cd
in Cu$_2$MnIn, the DPAC technique was used.

In a different experiment with the IPAC technique,
the correlation of the exchange enhanced susceptibility with
the hyperfine fields at Pd was studied in the Pd$_{95}$Fe$_{0.05}$.

The next measurements using the IPAC technique are
the hyperfine fields at Hf in Co and Ni host at room
temperature. In these measurements, the hyperfine field value
depends on the sample preparation method.

For the electric field gradient studies, the DPAC
technique was used. The pressure dependence of the electric
field gradient studies, the IMPAC technique was used. The pressure dependence of the electric field gradient at Cd in Ho-metal was studied at room temperature and at 150 K.

Another reported efg measurements are linked with the impurity induced efg at the probe in the cubic metal. The Ta probe have been used for Pd host.