P R E F A C E

One dimensional magnetic systems is of growing interest in many body and condensed matter physics, because exact solution is comparatively easier in 1D system than in higher dimension. Experimentalists have found a large variety of compounds which contain effective 1D magnetic structure. Availability of these compounds raised interest in the study of 1D systems. Our work is mainly centred on 1D spin-1/2 XY model. We have performed some exact calculations on this model using the spin-spin correlation function.

In Chapter I the diagonalisation of the spin-1/2 1D XY Hamiltonian is briefly reviewed. In this Chapter we have discussed shortly the features of the model studied in our thesis work and along with this we have reviewed briefly the previous works on this model.

In Chapter II finite temperature correlation functions and correlation lengths have been calculated for isotropic and anisotropic model. From the low temperature data the exponent of correlation length is calculated. We have also calculated the in-plane susceptibility in the scaling limit and then the critical exponent of susceptibility. Finally we have discussed the cross-over phenomena from XY to Ising model.

In Chapter III we have calculated exactly some thermodynamic quantities of 1D spin-1/2 XY model using static spin-spin correlation functions, e.g, the longitudinal susceptibility, specific heat, static structure factor etc.

In Chapter IV we have explained the experimental data of some compounds with the help of results of exact calculations. The comparison of
the experimental and theoretical results establishes the one dimensional nature of the magnetic structure of the compounds.