Multiple hypergeometric functions are now awe-inspiration in their scope, variety and depth. Although the intrinsic mathematical interest of these functions is considerable many research workers will be more concerned with their wide applications in Statistics, Physics, Operational Research, Engineering, Quantum Mechanics, Lie Theory and Theory of Elasticity et cetera. Not only there is rapid growth in pure mathematics and its applicatic in these traditional fields, but new field of application are emerging in biology, ecology and social sciences.

Multiple hypergeometric functions constitute a natural generalization of the Gauss hypergeometric functions of one variable. Since the introduction of double hypergeometric function by Appell and triple hypergeometric function by Lauricella, numerous papers by many workers in the field have been published and the theory has been considerably extended. An extensive study was made in Europe, America and India of these multiple functions which produced explosion of knowledge of the subject.
In the present work, the author explores the interconnection of the general double and triple functions introduced by Appell [5], Kampé de Fériet [5], Lauricella [66], Horn[34;p.36], Saran [105], Srivastava [121], [122],[126] and Exton [34] and discussed their expansions, summations, identities, transformations and reduction. This work is an attempt to give new results and to unify and generalize certain results scattered in literature by various researchers such as Bailey [8], [9], Gould [39], Erdelyi[26], [28], Brychkov etal [12], Exton [34], Pathan [91], Pathan and Qureshi [96], Prudnikov [100], Sinha [116], and Srivastava and Hussain [129] and Glasser and Montaldi [37].

The thesis has been made self contained by the inclusion, in Chapter 1, of the brief treatment of the definitions and notations of the special functions with their convergence conditions. This chapter intended to provide an introduction to variety of hypergeometric functions together with other special functions used in the thesis. This would serve two purposes. First, it does discuss the basic concepts of the functions, more or less from scratch. Second it seeks to place
the study of later chapters in such a way that explicit references may be applied and be brought gradually to a level of considerable proficiency.

Chapter 2, devoted to obtain a number of transformation and reduction formulae involving \( F_{q:s;v}^{p:r;u} \) which appear to be new. These have been derived by finding an integral involving the product of Bessel functions of different order and argument and Legendre polynomials in terms of the generalized hypergeometric functions.

Chapter 3, incorporates a number of transformations of triple hypergeometric functions. The main interest of this chapter is that the Eulerian integral formula (obtained in Section 3.2) is evaluated in terms of Lauricella's functions \( F_S \) and \( F_D \) and Srivastava function \( F^{(3)} \). Certain transformations of Appell's function \( F_1 \) and \( F_3 \) and Kampé de Fériet's function \( F_{\ell:m;n}^{p:q:k} \) are also obtained from our main results and are listed in Section (3.3).

In Chapter 4, we obtained an expansion of generalized Horn's function \( H_4^{(k)(n)} \) with the help of the result of Exton [34] and Pathan [91]. The main result of \( H_4^{(k)(n)} \) has been used in a
natural way to get the expansion of $F_A$, $F_C$, $F_2$, $F_4$ and $H_4$. More specially, we have shown that some of these expansions are, in fact, transformation formulas of Lauricella's function $F_G$, Panday function $G_B$, Appell's function $F_1,F_2$ and $F_4$.

Chapter 5 deals with the product of hypergeometric functions. In this chapter we have obtained the generating function for product of hypergeometric functions. Many special cases involving the product of polynomials of Jacobi, Laguerre, Bessel, Hermite and Rice are obtained.

Finally chapter 6 provides us a unified presentation of a class of Humbert's polynomials which generalizes the well known class of Gegenbauer, Legendre, Pincherle, Horadam, Kinney, Horadam-Pethe, Gould and Milovanović-Dordević polynomials and many not so well known polynomials. We devote ourselves to obtain some basic relations involving the generalized Humbert polynomials and then take up several generating functions, hypergeometric representations and expansions in series of some relatively more familiar polynomials of Legendre, Gegenbauer and Laguerre.