The present thesis is the outcome of my research work carried out in the Post Graduate Department of Studies and Research in Mathematics, M. L. K. (P.G.) College, Balrampur under the kind supervision of Dr. S. B. Misra, Reader and Head of the Department, during the period January 2005 to March 2008.

The work has been divided into six chapters and each chapter is subdivided into a number of articles. The references to the equations are of the form (c.a.e) where c, a and e indicate the number of chapter, article and equation respectively. If c coincides with the chapter at hand, if will be omitted. The numbers in the square brackets in a chapter correspond to the references given at the end of that chapter. The symbols $\partial_k$ and $\partial^k$ denote the partial differentiation with respect to $x^k$ and $y^k$ respectively. The round brackets denote the symmetric part, $2T_{(i<j<k)} = T_{ijk} + T_{kji}$ and the square brackets denote the skew symmetric part, $2T_{[i<j<k]} = T_{ijk} - T_{kji}$ . The indices enclosed in $<$ are excluded from symmetric and alternating part $T_{(ijk)}$ and $T_{[ijk]}$ are equivalent to

$$\frac{1}{3}(T_{ijk} + T_{jki} + T_{kij} + T_{ikj} + T_{kji} + T_{jik})$$

and

$$\frac{1}{3}(T_{ijk} + T_{jki} + T_{kij} - T_{ikj} - T_{kji} - T_{jik})$$

respectively.

In general the notations used by H. Rund. "The differential geometry of Finsler spaces" have been followed.

The first chapter of the thesis is introductory and it includes the basic concepts and formulae from existing literature, which are useful for our discussion of subsequent chapters.
The second chapter of the thesis deals with Lie-derivatives and affine motion in a Finsler space equipped with semi-symmetric connection. In this chapter we have obtained the Lie-derivatives of covariant and contravariant vectors and have generalised the results thus obtained for tensor fields of various orders in a Finsler space equipped with semi-symmetric connection. We have also discussed about the Lie-derivative of the semi-symmetric connection parameter and have obtained the commutation formulae involving the processes of Lie-differentiation, partial differentiation and $\zeta$-differentiation. In the last two sections of the chapter we have discussed affine motion in a Finsler space equipped with semi-symmetric connection and have obtained the conditions for the vanishing of $\mathcal{L}_\zeta R^i_{jkh}$ in special recurrent $F_n^r$ of first and second kinds where an identification of the two kinds of spaces has been made under the condition that $\lambda_m \nu^m \neq$ constant and $\lambda_m \nu^m =$ constant respectively. We have also obtained the necessary and sufficient condition for the existence of $\alpha R^i_{jkh} = \beta_{kh} (\zeta \nu^i)$.

The third chapter of the thesis has been devoted to the study of curvature collineation and conformal motion in a Finsler space equipped with non-symmetric and semi-symmetric connection coefficients. The chapter has been divided into five sections. The first section is introductory, in which a brief account of the nature and contents to be found useful in the later sections of the chapter has been given. The second section of the chapter deals with projective curvature collineation in a Finsler space equipped with non-symmetric connection. In this section we have stated that the infinitesimal point transformation $\tilde{x}^i = x^i + v^i(x)dt$ defines a projective curvature collineation provided that the space under consideration admits a vector field $v^i(x)$ such
that \( L_v R^i_{jkh} = 0 \) whereas the Finsler space equipped with non-symmetric connection admits a Ricci type projective curvature collineation provided that the space admits a vector field \( \nu'(x) \) such that \( L_v R^i_{kh} = 0 \) where \( R^i_{kh} = R^i_{kh} \). In this section we have established conditions under which a special projective motion (i) may become a projective curvature collineation and (ii) may become a Ricci type projective curvature collineation. In the third section of the chapter we have studied conformal motion in a Finsler equipped with non-symmetric connection and have obtained conditions under which the space under consideration may admit a conformal motion as well as a curvature collineation. The fourth section of the chapter has been devoted to the study of projective curvature collineation in a Finsler space equipped with semi-symmetric connection. We have said that the infinitesimal point transformation \( \bar{x}^i = x^i + \nu'(x)dt \) defines a special projective motion if the Lie-derivative of the semi-symmetric connection \( \Pi^i_{jk} \) satisfies \( L_v \Pi^i_{jk} = \delta^i_j \in_k + \delta^i_k \in_j \) where \( \in_k \) is any non-zero covariant vector and satisfies \( \in_k \dot{x}^k = 0 \) and have obtained conditions as to what happens when special projective motion becomes (i) special projective collineation and (ii) special Ricci type projective curvature collineation. In the fifth and the last section of the chapter, we have studied conformal motion in a Finsler space equipped with semi-symmetric connection where we have said that the Finsler space \( F^+ \) equipped with semi-symmetric connection defines a conformal motion if \( L_v \Pi^i_{jk} = \delta^i_j \in_k + \delta^i_k \in_j - \varepsilon^i \ g_{jk} \) and have obtained the conditions under which the Finsler space equipped with semi-symmetric connection admits (i) both a conformal motion and a curvature collineation and (ii) both a conformal motion and a Ricci type curvature collineation.
The fourth chapter of the thesis deals with theory of transformations and motions in a Finsler space and also in such a Finsler apace which is equipped with semi-symmetric connection. This chapter has been divided into five sections, the first section is introductory in nature while the second section deals with non-affine infinitesimal projective transformation in a Finsler space equipped with semi-symmetric connection, in this section we have investigated the conditions to be satisfied under which (i) the covariant derivative of special pseudo projective deviation tensor remains invariant under a non-affine infinitesimal projective transformation and (ii) non-affine infinitesimal projective transformation holds a symmetric Finsler space. The third section of the chapter deals with projective motion in a Finsler space equipped with semi-symmetric connection and have obtained conditions under which a bi-recurrent vector field $\mathbf{v}'$ generates a projective motion. We have also investigated that the bi-recurrent vector field with skew-symmetric recurrence tensor cannot generate an affine motion. The fourth section of the chapter deals with infinitesimal special projective transformation in a Finsler space equipped with semi-symmetric connection. In this section we have studied the behaviour of the infinitesimal special projective transformation with respect to the semi-symmetric connection coefficient $\Pi_{j;k}^i (x, \dot{x})$ and the point transformation $\bar{x}' = x' + \mathbf{v}'(x) dt$. The fifth and the last section of the chapter deals with special projective motion in a Finsler space, we have said that infinitesimal point transformation $\bar{x}' = x' + \mathbf{v}'(x) dt$ defines a special projective motion if $
abla \vec{v} G_{jk}^i = \delta^j_k p_h + \delta^i_h p_j - g_{jk} g^{\ell\ell} d\ell$ where $p$ and $d\ell$ are arbitrarily chosen positively homogeneous functions of degree two in directional arguments and satisfy certain relations. We have obtained conditions under which the
infinitesimal transformation $\bar{x}' = x' + \nu'(x) dt$ defines a special projective motion in a Finsler space as well as in a symmetric Finsler space.

Chapter fifth of the thesis deals with the decomposition of tensor fields in a recurrent Finsler space. Like previous chapters this chapter too has been divided into five sections. The first section is introductory in nature while the second section has been devoted to the study of decomposition of projective tensor fields in a generalised 2-recurrent Finsler space and have observed that the decomposition tensor fields also satisfy the generalised 2-recurrence requirements if the projective entity $Q'_{jkh}(x, \dot{x})$ be supposed to be generalised 2-recurrent. We have also obtained several other results connecting the decomposition tensor field. The third section of the chapter has been devoted to the study of decomposition of projective tensor fields in a recurrent Finsler space but here the decomposition rule is quite different from the decomposition rule of the previous section. Like the studies in the previous section in this section too we have established the relations to be satisfied be decomposition and recurrence tensor fields under different condition. In the fourth section of the chapter we have considered the decomposition of the curvature tensor type entity $Q'_{ijk}(x, \dot{x})$ but in a different way and have obtained the relations between the decomposition tensor fields and other symmetries. The last section too deals with the decomposition of the same curvature tensor field and identity to be satisfied in a SPR-Fn has been established.

The sixth and the last chapter of the thesis deals with studies in special Finsler spaces. This chapter consists of five sections, the first section is introductory in nature. The second section deals with C-deviation tensor, in this section we have established that if C-deviation tensor vanishes in an Fn then such an Fn is C-reducible and conversely we have investigated as to what happens in a C-reducible Finsler space when C-deviation tensor vanishes. We
have also established that in a C-reducible Fn if C-deviation tensor vanishes then such an Fn is C-2 like, an attempt has also been made to establish the necessary and sufficient condition in order that a C2-like Finsler space be semi C-reducible, we have also noticed that in a Berwald space the h-covariant derivative of the C-deviation tensor with constant coefficients vanishes. The third section of the chapter deals with $C^h$-birecurrent spaces where a $C^h$-recurrent space is characterised by $C_{ijk}^h = \lambda_n C_{ijk}$ where $\lambda_n$ is a non-vanishing covariant vector field and accordingly $C_{ijk}^h = \alpha_{hm} C_{ijk}$ where $\alpha_{hm} = \lambda_{rm} + \lambda_n \lambda_m$, we call such an Fn as a $C^h$-birecurrent space. In this section we have established the condition under which a $C^h$-birecurrent space is $C^h$-recurrent, we have established he conditions when the deviation tensor vanishes in a $C^h$-birecurrent space. The fourth section of the chapter deals with recurrence and P-symmetry in a special Finsler space and have observed that (i) a Landsberg space is necessarily a P-symmetric space (ii) a Berwald space is necessarily a P-symmetric space (iii) a P-2 like Finsler space is always P-symmetric and (iv) a C-reducible Finsler space is P-symmetric if and only if such an Fn is a Landsberg space. The fifth and the last section of the chapter deals with Finsler spaces with a semi concurrent vector field and have observed that (i) in an Fn, the covariant component $X_i$ of a semi-concurrent vector field are functions of position and (ii) if a Landsberg space admits a semi-concurrent vector field then the space is Riemannian and (iii) a two dimensional Finsler space admitting a concurrent vector field is necessarily Riemannian.

A selected bibliography consisting of the references of the existing literature on the subject is given in the end.