This thesis is the outcome of my research work carried out at H.N.B. Garhwal University, Campus Badshahi Thaul, Tehri Garhwal under the supervision of Dr. A.K. Singh, Professor and Head, Department of Mathematics, H.N.B. Garhwal University, Campus Badshahi Thaul, Tehri Garhwal (Uttarakhand).

The thesis has been divided into six chapters and each chapter is subdivided into a number of articles. The references quoted in the thesis are in the form \((C-a. e)\), where \(C\), \(a\) and \(e\) stand for the number of chapter, article and equation respectively. If \(C\) coincides with the chapter at hand, it will be omitted. The figures within the square brackets \([\ ]\) in the thesis correspond to the references mentioned in the selected bibliography given at the end of thesis. In general, notations of Yano, K. [198] and Tachibana, S. [173] have been adopted.

**Chapter-I** is an introductory one, in which some of the basic definitions, preliminary facts and fundamental formulae of complex, almost complex, Riemannian, Kaehlerian, almost Kaehlerian, Tachibana, almost Tachibana and Hermitian manifolds etc. have been studied, which are the necessary pre-requisites for the study of following chapters.

**Chapter-II** has been devoted to the study of different kinds of recurrence and symmetric properties in Tachibana, almost Tachibana, Kaehlerian and almost Kaehlerian spaces and several interesting theorems together with the relations among different kinds of recurrent spaces have been investigated. Also, we have defined and studied the Tachibana concircular \(r\)-recurrent and Tachibana concircular \(r\)-symmetric spaces and the necessary and sufficient condition that a Tachibana space be a Tachibana concircular \(r\)-recurrent has been investigated. Further, a necessary and sufficient condition
that Tachibana concircular space be Tachibana Ricci r-recurrent with the same recurrence tensor have been obtained. Some more recurrent spaces like; Tachibana projective r-recurrent, Weyl-Tachibana projective r-recurrent, Weyl-Tachibana conformal r-recurrent, Einstein-Tachibana conharmonic recurrent, Einstein-Tachibana projective recurrent spaces and Tachibana space with recurrent Bochner curvature tensor have been defined and studied. A necessary and sufficient condition for a Weyl-Tachibana projective r-recurrent space to be Tachibana r-recurrent space has also been investigated. Further, the necessary and sufficient conditions for an Einstein-Tachibana projective recurrent space to be Tachibana recurrent and Einstein-Tachibana conharmonic recurrent space have been obtained.

Finally, various types of decompositions in Kaehlerian recurrent and Tachibana recurrent spaces have been discussed. Also, the decomposition of curvature tensor field $R_{ijk}^h$ in recurrent Tachibana spaces with three different approaches namely; one vector-two tensors, two vectors-one tensor and two tensors have been defined and studied. Besides, several theorems on these three types of decompositions in recurrent Tachibana spaces have been investigated.

Chapter-III comprises the study of different kinds of curves like; hyper-normal curves, hyper-asymptotic curves, union and special union curves etc. in Kaehlerian and Tachibana hypersurfaces and several interesting results concerning to such types of curves have been obtained. Also, asymptotic lines and hyper-Darboux lines in Tachibana and Kaehlerian spaces have been defined and several theorems have been investigated therein. Also, hyper-asymptotic curves, hyper-normal curves, union curves and some more special categories of such curves in Hermitian manifold and Hermitian hypersurfaces have been considered. The necessary and sufficient conditions for the curvature congruences to be hyper-D lines have also been obtained.

Chapter-IV is devoted to the study of curvature of congruence relative to a vector field of Kaehlerian and Tachibana hypersurfaces. The concepts of
fourfold generalization to the hypersurface of a complex Finsler space given by Kaul [49] and subspaces of the generalized metric spaces studied by Eliopoulos [33] has been used to define and study normal and secondary normal curvature vectors and the normal curvature vector of the hypersurface of Kaehlerian spaces. Also, by introducing two sets of vectors:

\[ \langle M^\mu, M^\mu \rangle \quad \text{and} \quad \langle M^{\bar{\mu}}, M^{\bar{\mu}} \rangle, \]

we have discussed the concepts of primary relative associate curvature vector and secondary relative associate curvature vector (both the vectors are considered along the same curve \( C \)). A necessary and sufficient condition that the derived vector be equal to the primary relative associate curvature vector has also been investigated.

Chapter-V has been dealt with the study of various types of transformations like; projective conformal and homothetic transformations etc. in Kaehlerian, Tachibana and complex manifolds. Also, an analytic H-projective transformation as an infinitesimal transformation, preserving H-planar curves has been defined and studied. Further, we have investigated the complex spaces admitting an analytic H-projective transformation, which leaves the covariant derivative of H-projective curvature tensor. Finally, we have discussed the existence of affine motion in recurrent Tachibana space of first kind and the existence of affine motion in a special Tachibana recurrent space of the first kind and several theorems have been investigated. Also, some theorems on an analytic HP-transformation in a complex space satisfying:

\[ \nabla_{(k}R_{j)} = 0 \]

have been obtained therein.

Chapter-VI comprises the conditions for minimal subspaces in Tachibana and Kaehlerian spaces and the study of curvature collineations in recurrent Hermitian spaces. We have established a relation between the mean
curvature vector of $T^c_l$ in $T^c_m$, $T^c_l$ in $T^c_n$ and relative mean curvature vectors of $T^c_l$ with respect to $T^c_m$ and $T^c_n$. The conditions, under which the space $T^c_l$ is minimal in the embedding space $T^c_m$ and $T^c_n$, have also been obtained therein.

Finally, we have defined and studied some well known space-time symmetries like; conformal motions, curvature collineations, affine motions, projective collineations, homothetic collineations and conformal collineations etc. and have established various relations among them.

A selected bibliography has been given in the end of the thesis.