ABSTRACT OF THE THESIS

Title of the Thesis: Study of some almost complex and complex manifolds under certain conditions

Index No.: - 60/18/Maths./25

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The aim of this doctoral thesis is to study some almost complex and complex manifolds under certain conditions. The thesis consists of six chapters. The first chapter is introductory one, where basic definitions, important properties, some examples, and relevant results have been utilized to inspire our research and motivate us to study the subject.

The second chapter aims to investigate weakly symmetric Kähler manifolds that exhibit properties of being pseudo-projectively flat and quasi- conformally flat. Moreover, we examine weakly pseudo-projectively symmetric and quasi-conformally symmetric Kähler manifolds, which are further characterised as Einstein manifolds.

The third chapter is based on some curvature identities pertaining to a nearly Kähler manifold that exhibits con-circular and projective flatness. Furthermore, we have attained intriguing findings concerning a 6-dimensional nearly Kähler manifold, and we provided a detailed example to illustrate these results.

The fourth chapter aims to study some curvature identities on Kähler-Norden manifold that are quasi-conformally flat, pseudo-projectively flat, Weyl-conformally flat, and Bochner flat.

The fifth chapter is devoted to study some curvature identities on hyperKähler manifold that is locally symmetric. Additionally, we explore the concepts of conformal flatness and Bochner flatness of a hyperKähler manifold. Later, we define generalised W_2 and quasi-W_2 curvature tensors and using these we develop that a generalised W_2-flat hyperKähler manifold and quasi-W_2-flat hyperKähler manifold are Ricci flat. Finally, we present some examples of hyperKähler manifolds.

The six chapter conducts an investigation into various curvature properties in paraKähler manifolds that possess characteristics such as pseudo-quasi-conformal flatness, pseudo-projective flatness, W_2-flatness, and Bochner flatness. Moreover, we explore significant findings concerning the sectional curvature within the paraKähler manifolds. Additionally, we analyze the behavior of paraKähler space-time in the presence of a perfect fluid. Furthermore, we examine the behavior of weakly symmetric and weakly Ricci symmetric perfect fluids in the context of paraKähler space-time. Our study also encompasses the study of curvature identities in paraKähler space-time, specifically focusing on flatness properties related to the previously mentioned curvature tensors. Finally, we expand upon crucial properties associated with sectional curvature in paraKähler space-time.

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