Abstract

The Gauss's Theorema Egregium and the Gauss Bonnet theorem are few of the foundational results in Differential geometry that present non trivial hypothesis about curvature. The former asserts that curvature is an invari- ant of the metric. In higher dimensions there is a well known theorem by F. Schur : THEOREM. Let M be a Riemannian manifold with dim(M) >= 3 . If the sectional curvature K of M is constant at each point ofM, then K is actually constant on M. In this thesis we have attempted to give an exposition of a celebrated the- orem of R.S Kulkarni that relates the geometry of the curvature with the underlying metric. We consider all manifolds and functions to be smooth. Also all manifolds are assumed to be connected. The theorem is stated as follows: FUNDAMENTAL THEOREM (R.S Kulkarni, 1970). If dimension >= 4, then isocurved manifolds with analytic metric are globally isometric except in the case of diffeomorphic, non-globally isometric manifolds of the same constant curvature. In other words, under the above hypothesis, a curvature preserving diffeo- morphism itself is an isometry. We will prove the theorem in two chapters. In the first chapter we derive the necessary results required to prove the theorem. One of the result needed is the Weyl's theorem that is stated in the end of the first chapter. In the second chapter we give the complete proof. We have assumed a knowledge of John M. Lee's book on Riemannian geometry for reading the thesis.