The subject of fractional calculus deals with derivatives and integrals of arbitrary real or complex order. It has gained considerable popularity and importance during the past three decades or so, due mainly to its demonstrated applications in widespread fields of science and engineering. It does indeed provide several potentially useful tools for solving differential and integral equations, and various other problems involving special functions of mathematical physics as well as their extensions and generalizations in one and more variables. The main objective of the present talk is to discuss the applications of Special Functions in Fractional Calculus. Some particular fractional differential equations have been solved. (Received January 28, 2014)