Preface

The study of compact objects began immediately after the seminal work of Chandrasekhar on white dwarf. It is realized that Newtonian mechanics is not enough to understand some observed stars having mass of few solar masses and radius of few kilometers. The density of matter of such stars are even more than the nuclear density, these are objects of extreme physical conditions which is not possible yet to reproduce in terrestrial laboratory. As a result a number of issues of compact objects are not clearly understood. Since the compact objects are highly gravitating objects, these stars are to be investigated in the framework of general theory of relativity (GTR). The study of compact object began by considering static metric in GTR. A number of stellar models may be constructed with isotropic fluid, anisotropic fluid and in the presence of Maxwell's electromagnetic field. The study is however not complete yet to understand their inner structure. The present thesis is a outcome of my research work on compact objects taking into account various forms of geometries and their physical features. The four dimensional stellar model is also extended in higher dimensions to probe the effect of extra dimensions on the inner fluid of compact objects.

The thesis contains seven chapters based on relativistic solutions of compact stars obtained in different space-time geometries. The research work is carried out at the Department of Physics, University of North Bengal, West Bengal, India. The first Chapter contains an introduction, aim of the work and brief summary of the work. The second chapter is based on : Relativistic models of a class of compact objects -*Pramana-J. Phys.* **79** (2012) 211; the third chapter is based on: Relativistic Solution for a class of static compact charged star in pseudo-spheroidal space time- *Int. J. Mod. Phys.* **D 21** (2012) 1250071; the fourth chapter is based on: Relativistic solutions of anisotropic compact objects - *Astrophys. Space Sci.* **354** (2014) 421; the fifth chapter is based on: Dissipative gravitational collapse of anisotropic star- *Astrophys. Space Sci.* **361** (2016) 1; the sixth chapter is based on two papers: Relativistic charged star solutions in higher dimensions - *Int. J. Theor. Phy.* **53** (2014) 1666 and Higher dimensional compact object with Electromagnetic Field in Spheroidal geometry - (in preparation) and finally in seventh chapter concluding remarks and future plan of research are presented.

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