Neutron stars are the dense core of matter left after the supernova explosions of massive stars, they comprise of the most densest form of matter with densities going upto nearly 2- 10 times the nuclear saturation density. Correct prediction of macroscopic properties such as mass and radius of neutron stars is necessary to study the extreme states of matter found inside the structure of neutron star as well as to study the implications of such scenarios on the metric of space time. There have been many uncertainties on the measurement of neutron star’s radius as well as on determining the maximum mass limit of neutron stars. This uncertainty is mainly due to the limited knowledge of the equation of state(EOS) of the matter present inside neutron star. The largely varying densities inside neutron star results in significantly different states of matter inside, varying from Iron like densities at the surface to possibly exotic state with immense densities of nearly 10 15 gcm 3 at the core. This work involves the study of several theoretical models (such as BPS model, polytropic approaches, etc.) for the lesser dense hadronic part of neutron star. A C++ code for solving the structural equations (TOV equations) considering the general relativistic correction has been developed. I have used many models of EOS to evaluate the mass-radius relationship. Further, due to the immense densities inside a neutron star, there is a possibility of the existence of pure-quark matter in “De-confined” state. The resulting consequence of such state would be to reduce the volume of the star. The effect of such state and the resulting changes in the radii have been discussed and calculated in this thesis.