This thesis deals with the generation, estimation and preservation of novel quantum states of two and three qubits on an NMR quantum information processor. Using the maximum likelihood ansatz, a method has been developed for state estimation such that the reconstructed density matrix does not have negative eigenvalues and the errors are within the space of valid density operators. Due to interactions with the environment, unwanted changes occur in the system, leading to decoherence. Controlling decoher- ence is one of the biggest challenges to be overcome to build quantum computers. To decouple the quantum system from its environment, several experimental strategies have been used. These strategies are based on our knowledge of system-environment interaction and states that need to be preserved. Considering the first case, where the system state is known but there is no knowledge about its interaction with the envi- ronment. To tackle decoherence in this case, the super-Zeno scheme is used and its efficacy to preserve quantum states is demonstrated. The next situation considered is that where only the subspace to which the system state belongs is known. To address such a situation, the nested Uhrig dynamical decoupling scheme has been used. The later part of the thesis deals with situations where the state of the system as well as its interaction with the environment is known. In such situations, since the noise model is known, decoupling strategies can be explicitly designed to cancel this noise. Using these decoupling strategies, the lifetime of time-invariant discord of two-qubit Bell- diagonal states has been experimentally extended. The decay of three-qubit entangled¯ state are studied, and the noise states namely the GHZ state, the W state and the W W model is constructed for the spin system. The experimentally observed and theoretical expected entanglement decay rates of these states are compared. Then, the dynamical decoupling scheme is applied to these states and remarkable protection is observed in¯ state. the case of the GHZ state and the W W