The main objective of this thesis is to study some qualitative properties, namely existence of mild solutions, approximate controllability and existence of optimal control of various classes of FSDEs. The necessary and sufficient conditions have been established to ensure the qualitative properties under various hypotheses and assumptions by using fixed point techniques. The applications of the obtained theoretical results have been provided in-order to show the effectiveness of the theoretical findings. The main contributions of this thesis are summarized as follows.

In Chapter 2, the local and global existences of mild solutions have been studied for impulsive FSDEs with nonlocal condition in Hilbert space. The local existence of mild solution has been obtained by using various fixed point theorems, namely Banach contraction mapping principle and Schauder fixed point theorem. Further, the global existence of mild solution has been examined.

In Chapter 3, some new kind of mild solution has been proposed for the considered FSDEs. Further, the existence of mild solution has been analysed for the fractional neutral stochastic integrodifferential equations with infinite delay in Hilbert space by employing Nussbaum fixed point theorem, Mainardi’s function and fractional calculus.

Chapter 4 is concerned with the class of fractional neutral stochastic integrodifferential inclusions with infinite delay in Hilbert space. The new set of sufficient conditions has been established for approximate controllability of the considered system by utilizing Bohnenblust-Karlin’s fixed point theorem, Mainardi’s function, fractional calculus under the assumption that corresponding linear system is approximately controllable.

Chapter 5 dealt with the approximate controllability of a class of FSDEs driven by mixed fBm with Hurst parameter $\mathcal{H} \in \left(\frac{1}{2}, 1\right)$. The approximate controllability of the considered system has been investigated by applying fractional calculus, analytic resolvent operators and with the help of Schaefer’s fixed point theorem under the assumption that corresponding linear system is
approximately controllable.

In **Chapter 6**, the solvability and optimal controls have been addressed for impulsive fractional stochastic integrodifferential equations and FSDEs driven by Poisson jumps in Hilbert space. Sufficient conditions have been obtained for the existence of mild solution of the considered systems respectively by using Leray-Schauder fixed point theorem and Banach contraction mapping principle. Then, the existence of optimal controls has been investigated for the corresponding Lagrange optimal control problems.

Apart from the results presented in this thesis, there are few interesting and challenging topics exist for further future research. They are briefly stated as follows. It will be interesting to consider some other qualitative properties, such as Mittag-Leffler stability, Hyers-Ulam stability etc. for various classes of FSDEs by using fixed point techniques. Formulating the general approach to obtain an unified concept of solution for all classes of FSDEs, is an open problem so far. An interesting and challenging future research topic is investigations of qualitative properties of FSDEs with higher order.