Conclusions and Future Work

In Chapter 2, the existence of solutions and approximate controllability of impulsive fractional stochastic differential systems with infinite delay and Poisson jumps of order $0 < q < 1$ is established. The existence of solutions of the fractional stochastic differential system is proved by using the Banach contraction principle and Krasnoselskii’s fixed point theorem. We can extend the result for the nonlinear fractional nonlocal neutral impulsive stochastic differential equations of order $0 < q < 1$ with infinite delay and Poisson jumps.

In Chapter 3, the existence of mild solutions and approximate controllability of nonlinear fractional nonlocal neutral impulsive stochastic differential equations of order $1 < q < 2$ with infinite delay and Poisson jumps is studied by using fixed point theory with the corresponding linear system is assumed as controllable. For the future work, the controllability results could be extended to study sufficient conditions for stochastic nature of wave equations, heat equations, Burger’s equations and Navier stochastic equations with infinite delay and Poisson jumps satisfying the nonlocal conditions as defined in equation (3.1). Real life models can also be used for discussing the above result. Also we can extend the result to find the existence of solutions and approximate controllability of fractional nonlocal neutral impulsive stochastic differential equations with infinite delay and Poisson jumps of orders $\frac{1}{2} < q \leq 1$, $2 < q < 3$ and $2 < q \leq 3$ etc. Numerical study of various kinds of nonlinear fractional nonlocal neutral impulsive stochastic dynamical systems is an another important area of research. The corresponding results will appear in the near future.

In Chapter 4, the existence of mild solutions and approximate controllability of nonlinear fractional nonlocal stochastic differential equations of order $1 < q \leq 2$ with
infinite delay and Poisson jumps is studied by using Sadovskii’s fixed point theory with the corresponding linear system is assumed as controllable. We also discussed the extension of our result for fractional nonlocal neutral impulsive stochastic differential equations with infinite delay and Poisson jumps of order $1 < q \leq 2$ as a remark. For the future work, the controllability results could be extended to study sufficient conditions for stochastic nature of partial differential equations with infinite delay and Poisson jumps satisfying the nonlocal conditions as defined in equation (4.1).

Also the existence of global solutions of nonlinear fractional nonlocal neutral impulsive stochastic differential equations of order $1 < q \leq 2$ with infinite delay and Poisson jumps is studied by using Leray-Schauder’s Alternative fixed point theorem. We can extend the result to study the existence of global solutions of fractional nonlocal neutral impulsive stochastic differential equations with infinite delay and Poisson jumps of orders $\frac{1}{2} < q \leq 1$ and $2 < q \leq 3$ etc.

In Chapter 5, we have established the existence and uniqueness of mild solutions for non-Lipschitz Sobolev type fractional neutral impulsive stochastic differential equations satisfying fractional stochastic nonlocal condition with infinite delay and Poisson jumps in $L_p$ space. A new set of sufficient condition is derived with the coefficients in the equations satisfying some non-Lipschitz conditions. The existence of mild solutions is established by using Picard type approximate technique. In future, we will investigate the control problem for neutral stochastic fractional differential equations with infinite delay Poisson jumps in $L_p$ spaces. Moreover, It should be mentioned that the fundamental solution theory is a very useful tool and can be applied to study many other aspects of asymptotic behaviours and control problems such as optimal control for semilinear fractional stochastic differential systems with infinite delay and Poisson jumps.