ABSTRACT

One of the major challenges in real life situation and computer network communication is to get service without waiting in the queue (buffer). It is highly impossible as all the parameters of queuing models may not be known precisely due to uncontrollable factors. Fuzzy logic is a marvellous mathematical tool for making decisions and controlling the systems in uncertain conditions. Fuzzy logic creates the ability to mimic the human intelligence effectively to employ modes of reasoning that are approximate rather than exact. There is a need to apply fuzzy logic in queuing models for complex systems.

Most of research works on fuzzy queuing models are focused on fuzzification of system performance measures of various queuing models using $\alpha$-cut approach in which fuzzy queues have been converted into family of crisp queues. After that, as the system designers are in need of precise data for decision making, defuzzification has been made to obtain crisp values. Construction of membership functions of system characteristics for queuing models by $\alpha$-cut approach provides heavy workload and it is difficult to directly reflect the characteristics of the structure. In a review of lot of articles published on this subject, it was found that no one provides input parameters as fuzzy and outputs as crisp values in a simple way. So, this research work proposes system performance measures of various fuzzy queuing models in
terms of crisp values in different approaches and improves the Quality of Service (QoS) in computer networks using fuzzy queues.

In this research, an elaborate literature survey and background study was made on existing fuzzy queuing models, ranking techniques, queues with fuzzy structured element and series queues with probability of packets blocking in computer networks. Membership function of performance measures for FM/FM/1: (∞/FIFO:/∞) queuing model using fuzzy structured element has been made and crisp results have been presented using defuzzification. An evaluation of performance measures in terms of crisp values for fuzzy non pre-emptive priority queues, fuzzy bulk arrival queues was made using robust ranking technique and results have been presented.

Quality of Service (QoS) performance optimization in computer network communication is challenging but necessary task. In this research series queue with blocking technique has been used to reduce energy consumption during data transmission. An evaluation of probability of packets blocking in Mobile Ad hoc Networks (MANETs) was made using fuzzy queue and results have been presented. Multi processing unit for reducing probability of packets blocking in Open System Interconnects (OSI) network was used and results of blocking probability have been presented using fuzzy queue. An analysis of system characteristics of heterogeneous computing network using fuzzy queue with heterogeneous servers was made.
and results have been presented. According to the arrived results, performance measures evaluation of various fuzzy queuing models and QoS optimization in various computer networks provide better results. The proposed method applied to other fuzzy queuing models and the improved QoS with respect to other performance metrics outperforms the other methods.