

# Queueing system with failures and priorities

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## Abstract

Queueing theory provides models, structural insights, problem solutions and algorithms to many application areas. Due to its practical applicability to production, manufacturing, home automation, communications technology, etc, more and more complex systems requires more elaborated models, techniques, algorithm, etc. need to be developed. Discrete-time models are very suitable in many situations and a feature that makes the analysis of discrete time systems technically more involved than its continuous time counterparts.

In this paper we consider a discrete-time queueing system where failures in the server can occur as-well as priority messages. The possibility of failures of the server with general life time distribution is considered. We carry out an extensive study of the system by computing generating functions for the steady-state distribution of the number of messages in the queue and in the system. We also obtain generating functions for the stationary distribution of the busy period and sojourn times of a message in the server and in the system. Performance measures of the system are also provided.

*Keywords:* Discrete-time queueing theory, service lifetimes, priority messages, busy period and sojourn times.

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