

On an $M(X)/(G1, G2, G3)/1$ Queue with Three Serial Phases of Heterogeneous Service, Customers' Choice for a Variable Number of Phases and Optional Server Vacations

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Abstract

We study a single server queueing system with three phases of heterogeneous service arranged in series in which a customer has a choice of only the first phase service, or the first two phases or all three phases of services one after the other. Customers arrive at the system in batches of variable sizes in a Poisson stream. The three phases of services are assumed to be general with heterogeneous service time distributions. We further assume that the server has the option to take a vacation of random length according to a general vacation time distribution. The choice for the server to take a vacation of random length is after completing all phases chosen by a customer. We find the steady state probability generating functions of the queue length and the steady state probabilities of the various states of the system. We discuss some cases of interest and derive meaningful results.

Keywords

Poisson arrivals, three phases of serial service, general service time, optional vacation, general vacation time, steady state.