Analysis of $M^x/G/1$ Queue with Service Interruption and Extended Server Vacations with Bernoulli Schedule

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Abstract

We study a batch arrival queueing system with service interruption and Extended server vacation based on Bernoulli schedule. A single server provides essential service to all arriving customers with service time following general distribution. After every service completion the server has the option to leave for phase one vacation of random length with probability $p$ or to continue staying in the system with probability $1-p$. The new assumption in this paper is that the server go on extended vacation, as soon as the completion of phase one vacation, the server undergoes phase two and phase three vacation. On completion of three heterogeneous phase of vacation the server return back to the system. The vacation times are assumed to be general. The server is interrupted at random and the duration of attending interruption follows exponential distribution. Also we assume, the customer whose service is interrupted goes back to the head of the queue where the arrivals are Poisson. Using supplementary variable technique, the Laplace transforms of time dependent probabilities of system state are derived. From this we deduce the steady state results. We also obtain the average queue size and average waiting time.

References
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Index Terms

Computer Science Applied Mathematics
Keywords

Batch arrival  Transient state solution  Extended vacation time  Average queue size  Average waiting time