

## **Analysis of Finite-Buffer Discrete-Time Batch-Service Queue with Multiple Vacations**

*V. Goswami and P. Vijaya Laxmi*

KIIT University and Andhra University

### **Abstract**

This paper investigates a discrete-time single-server finite-buffer batch-service queue with multiple vacations wherein arrivals occur according to a discrete-time renewal process. Service and vacation times are mutually independent and geometrically distributed. The service is performed in batches and the server takes vacations when the system does not have any waiting customers at a service completion epoch or a vacation completion epoch. The system is analyzed under the assumptions of late arrival system with delayed access and early arrival system. Using the supplementary variable and the embedded Markov chain techniques, we obtain the queue-length distributions at pre-arrival, arbitrary and outside observer's observation epochs. Some performance measures, waiting-time distribution in the system and cost analysis have also been discussed. Finally, a variety of numerical results as tables and graphs showing the effect of model parameters on key performance measures are presented.

*Keywords:* Discrete-time, supplementary variable, batch service, vacation, finite buffer, cost.