ABSTRACT

Stochastic modelling of queueing systems with vacations and server failures have been widely used in many real time applications like production line systems, manufacturing industries, inventory management, telecommunication, computer networks, etc. The objective of the thesis is to analyse state dependent bulk queueing models with server failures and various vacation strategies. In this work seven different queueing models are analysed in which four models are classical queueing models and three are retrial queueing models. The following concepts are addressed in the thesis- classical bulk queueing models with server loss in two service modes, phase dependent breakdown, secondary service and two patterns of working vacation. Also the present work concentrates bulk arrival and batch service retrial queueing models with multiple vacations, server failure, working vacation, non-working vacation, state dependent arrival and active Bernoulli feedback. Customers, arriving into the system in bulk, are served in batches according to general bulk service rule. All the proposed models of this research work are theoretically developed and numerically justified. The probability generating function of the steady state queue (orbit) size distribution at an arbitrary time epoch is obtained by using supplementary variable technique with remaining service time as a supplementary variable. Various performance measures are computed. Real time applications are presented for the queueing models. Some special cases and particular cases are also given. Additionally an optimum cost analysis is also carried out for the queuing models to make decision in optimizing the overall cost of the system.

Keywords: *Phase dependent breakdown, secondary service, renewal of service station, server loss, working vacation, two service modes*