

A Reliability–Queueing–Inventory System with Replenishment and Repair of Failed Components

Arya P. S.,* Manikandan R,[†]A. Krishnamoorthy[‡]

August 16, 2022

In this paper, we consider an integrated Reliability-Queueing-Inventory (RQI) system. We study a k -out-of- n : G system of identical components, each of which has an exponentially distributed lifetime with parameter λ ; the lifetimes are independent of each other. The system under consideration is assumed to be a COLD system. Failed components waiting for repair forms a queue. Repair starts when the number of working components falls to L due to failures. The repair time is exponentially distributed with parameter γ . An order for $n - k + 1$ components is placed when the number of working components goes down to N ($N < L$); the realization of the order (duration of lead time) takes place after an exponentially distributed amount of time with parameter β . We derive an explicit solution for this RQI system. Some important performance measures are obtained. Finally, the optimal value of N and L are computed numerically.

*Department of Mathematics, Central University of Kerala, Kasaragod, India,
Email:arya.p.s@cukerala.ac.in

[†]Department of Mathematics, Central University of Kerala, Kasaragod, India,
Email:mani@cukerala.ac.in

[‡]Centre for Research in Mathematics, C.M.S. College, Kottayam, India; Department
of Mathematics, Central University of Kerala, Kasaragod, India,
Email:achyuthacusat@gmail.com