

A Thesis presented as Partial Fulfillment for the Degree of Doctor of Philosophy in Mathematical Statistics

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Abstract

Some systems are able to perform their task with partial performance, failure of their components lead to degradation of performance. Such systems or components have one working state and two or more different failure states, these systems are called multi state System (MSS).

The MSS was first introduction by Murchland (1975). For the past thirty years, there has been an increasing interest in the study of the MSS.

This thesis presents the preventive maintenance problem of the multi state system considering the three state system, assuming the exponential distribution for failure times and repair times. TI Lap lace transformations technique is used to calculate the point availability, the average availability and the steady state availability. The optimal number of preventive maintenance that maximize the expected profit values are evaluated and used to increase the availability of the there state system. A Complete view for the multi state system considering the four state system are here introduced, assuming the exponential distribution for failure times and repair times. The steady state availability is evaluated, different warranty and preventive maintenance policies are introduced and the cost of these policies for the manufacturer and for the buyer in the multi state system case is evaluated.