ABSTRACT

The complexity, interdependences and rapidity of the events in modern society have accelerated demands for more effective ways to store, process and manage information. Advantages of both computer hardware and software have provided the technology that can make it possible to effectively address many of these demands. Today’s computers are highly versatile tools across a myriad disciplines and usages. They can perform varied tasks, from correspondence to maintain inventory information to creating drawing and illustrations and many more. A breakdown of computer base systems may be costly, dangerous and make cause confusion in our society. It is, therefore, of great importance to operate such systems with high reliability. Inspite of increasing development and availability of new computer technologies, a little work has been dedicated to the reliability modeling of computer systems with independent failure of h/w and s/w components. Hence, in the present thesis entitled “Reliability Modeling and Economic Analysis of Computer Systems with Hardware and Software Failures” some reliability models of a computer system of two identical units are analysed stochastically in detail introducing the concepts of independent failure of h/w and s/w components, repair of h/w components subject to inspection, replacement of s/w components instead of repair and priority to replacement of the h/w and s/w components over repair activities of each other. The expressions for several reliability and economic measures of the system models such as transition probabilities, mean sojourn times, mean time to system failure (MTSF), availability, busy period of the server due to hardware and software failures, expected number of replacements due to hardware and software failure, expected number of visits by the server are derived by adopting semi-Markov process and regenerative point technique. The numerical results for a particular case are obtained to depict the graphical behavior of some measures of system effectiveness. The profit comparison of the system models has also been made to highlight the utility of the concepts.
Main Findings of the Study

1. The concept of the immediately replacement of the h/w components by new one is more economically beneficial as compared to the system in which h/w components are replaced giving some replacement time.

2. The concept of priority to the replacement of the s/w components with some replacement time over the repair activities of h/w is not much economically beneficial as compared to the system in which no such priority is given.

3. The concept of priority to the h/w repair activities over the s/w replacement is not much economically beneficial as compared to the system in which no such priority is given.

4. The concept of priority to h/w repair activities over s/w replacement is more economically beneficial as compared to the system in which priority to the s/w replacement is given over the repair activities of h/w.

5. The concept of priority to replacement of s/w over repair activities of h/w with h/w and s/w replacement time is economically beneficial as compared to the system in which no such priority is given.

6. The concept of immediate replacement of h/w subject to inspection is not much economically beneficial in case priority to the replacement of the s/w components with some replacement time is given over repair activities of h/w.

7. The concept of priority to the replacement of h/w components with some replacement time to h/w and s/w is not much economically beneficial.

8. The concept of immediate replacement of the h/w by new one giving priority to repair activities of h/w over replacement of the s/w is more profitable as compared to the system model in which replacement of the s/w is made giving some replacement time.