

Editorial. Special issue on Queuing and Reliability Models with their Applications

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This special issue is the outcome of the selected papers presented in the twenty-seventh international conference of Forum for Interdisciplinary Mathematics (FIM) in conjunction with third convention of IARS on Interdisciplinary Mathematics, Statistics and Computational Techniques (IMSCT 2018–FIM XXVII) which is held in the Department of Statistics, University of Jammu, Jammu & Kashmir, India during November 02-04, 2018.

In the paper, ‘A Discrete Parametric Markov-Chain Model of a Two Unit Cold Standby System with Appearance and Disappearance of Repairman’ by Rakesh Gupta and Parul Bhardwaj, they have performed the stochastic analysis of a two identical unit system model in which repairman does not always remain with the system and appears and disappears at random epochs. In this paper authors have taken discrete failure and repair time distribution, a rare consideration in reliability models. All the failure time distributions, repair time distributions and the appearance and disappearance time distributions of repairman have been considered geometric with different parameters. Graphs have been drawn for profit function and mean time to system failure to give more clarity about the behaviour of performance measures of the system model in respect to different parameters of various distributions considered in the study.

The paper, ‘A Discrete Parametric Markov-Chain Model of a Two-Unit Cold Standby System with Repair Efficiency Depending on Environment’ by Rakesh Gupta and Arti Tyagi deals with a two-unit cold standby system with repair efficiency depending on environmental conditions. The repairman at the time of need may be in poor or good physical condition. All the failure, repair and change of environment conditions time distributions are taken to be geometric with different parameters. Various measures of system effectiveness are obtained and behaviour of some of them is explained through graphs.

In the paper, ‘A Two Identical Unit Cold Standby System Subject to Two Types of Failures’ by Pradeep Chaudhary and Rashmi Tomar Authors have performed the stochastic analysis of a two identical unit system model with two types of failure viz. normal failure and failure due to chance causes which may occur randomly and are beyond human control. Several reliability measures of system performance have been obtained by

taking failure time distribution as exponential and repair time distribution as general. Graphical study of some of the obtained reliability characteristics is also performed.

In the paper, 'Analysis of Reliability Measures of Two Identical Unit System with One Switching Device and Imperfect Coverage' by Akshita Sharma and Pawan Kumar a two identical unit system model with safe and unsafe failures, switching device and rebooting is investigated and analysed. The purpose of rebooting is to convert the unsafe failures in to safe failures and make system ready for repair. A repaired and standby unit is put into operation through a switching device. All the failure time distributions are considered to be exponentially distributed and repair time distribution as arbitrary. Regenerative point technique is used to perform the reliability analysis, besides finding the expressions for important reliability characteristics their behaviour w.r.t. failure and repair parameters has also been studied.

In the paper, 'Performance Measures of a Two Non-Identical Unit System Model With Repair and Replacement Policies' by Urvashi Gupta and Pawan Kumar, a two non-identical unit system model with repair and replacement policies has been developed for its stochastic analysis. Here authors have considered that a unit gives an indication of failure before it actually fails and the possible steps may be taken to prevent its failure. Also a failed unit needs some preparation time (which is a random variable) to start its repair. All the failure time distributions are taken as exponential and repair time distribution as general. Reliability characteristics useful to system manager have been found and their nature and pattern of variation for varying values of failure and repair parameters have been studied through graphs.

The paper, 'Assessment and Prediction of Reliability of an Automobile Component Using Warranty Claims Data' by Tahsina Aziz and M. Rezaul Karim, an analysis of warranty claims data of a component of an automobile is performed. The objectives of the analysis are to assess and predict the reliability of the component. To do this they present non-parametric and parametric analyses for the lifetime variable, age in month, based on warranty claims data. It also investigates on the variation of reliability of the component with respect to month of production and dominant failure modes. The work could be useful to the manufacturers for assessing and predicting reliability and warranty costs and for assuring customer satisfaction and product reputation.

The paper by Gulab Singh Bura and Shilpi Gupta entitled, 'Time Dependent Analysis of an M/M/2/N Queue with Catastrophes' considers a Markovian queueing system with two identical servers subjected to catastrophes. When the system is not empty, catastrophes may occur and destroy all present customers in the system. Simultaneously the system is ready for new arrivals. The time dependent and the steady-state solutions are obtained explicitly. Further, they have obtained some important performance measures of the queueing model.

In the paper, 'Cost-profit Analysis of Stochastic Heterogeneous Queue with Reverse Balking, Feedback and Retention of Impatient Customers' by Bhupender Kumar Som, the author has developed feedback queueing system with heterogeneous service, reverse balking, reneging and retention. The model is solved in steady-state recursively. Necessary measures of performance are drawn. Numerical interpretation of the model is presented. Cost-profit analysis of the system is performed by developing a cost model. Sensitivity analysis of the model is also presented arbitrarily.

Finally, in the paper, 'Transient Analysis of a Single-Server Queueing System with Correlated Inputs and Reneging' by Rakesh Kumar and Bhavneet Singh Soodan, the

authors study a continuous-time single-server queuing system, wherein the arrivals at two consecutive transition marks are correlated. The service times and the renegeing times are exponential distributed. The time-dependent behavior of the model is studied using Runge-Kutta method.

At last, the guest editors would like to acknowledge the contributions of all those professors who helped them to bring this special issue in current form. The guest editors would also like to thank the Editor-in-Chief, and also the Managing Editor, Prof. Alexander Bochkov of the journal Reliability: Theory and Applications for providing a platform for publishing the research papers in special issue.