**PREFACE**

The Reliability theory has been formulated as the science of prediction, estimating or optimizing the probability of survival the mean life or more generally the life distribution of components or system. Product reliability contributes much to quality and competitiveness. Critical business applications require reliable software, but developing reliable software is one of the most difficult problems facing the software industry. After the software is shipped, software vendors receive customer feedback about software reliability. However by then it is too late, software vendors need to know whether their products are reliable before they are delivered to customers. Software reliability Growth Model helps, provide that information. Major software releases follow a well defined development process and involve a coordinate quality assurance effort. Software Reliability Growth modelling is applied to the release of accrual failure data.

In this thesis, we have developed Non-Homogenous Poisson Process for Software reliability Growth Models such as Pareto, Burr Type - III and Burr Type - X distributions. The thesis comprises of five chapters. A brief introduction of the problem is presented at the beginning of each chapter and provided at the end of the chapter 3, chapter 4 and chapter 5.

Chapter 1 is an introductory part of thesis, which describes some fundamental aspects of Software Reliability Growth Model, Non-Homogenous Poisson Process including important parametric models and statistical models, cost criteria and release policy.

Chapter 2 presents a brief of development of research work in Software Reliability Growth Models (SRGMs) in chronological order. Twenty eight landmark research contributions have been selected for giving a
thorough insight into the SRGMs designs problems and solutions, which covered almost entire spectrum of the software reliability growth models.

Chapters 3 deals with software reliability growth models with a Pareto-testing effort. In this testing, the error detection phenomenon is modeled by Non-Homogenous Poisson Process. It is assumed that the error detection rate to the amount of testing effort spent during the testing phase is proportional to the current error content. For the model, the software reliability measures and estimation methods of parameters are investigated. Here we show that Pareto-testing effort function can be expressed as a software test effort curve. Using the model, the method of data analysis for the software reliability measurement with actual software data is developed. Also tables, figures and conclusion are given at the end of this chapter.

Chapter 4 develops a software reliability growth model based on the Non-Homogenous Poisson Process incorporating the amount of test-effort expenditures during the software testing phase. The time dependent behavior of test-effort expenditures is described by a Burr Type III curve and parameters involved in SRGM are estimated by LSE and MLE Methods. SRGMs proposed by most researchers incorporate the effect of testing effort in the software reliability growth and the software development effort can be described by the traditional Rayleigh, Weibull or Exponential curve. However, in much software testing environment it is difficult to describe the testing-effort function by the above three consumption curves. Here, we will show that a Burr type III testing-effort function can be expressed as a software development/test effort curve. Experiments have been performed based on real test/debug data set. The results show that the SRGMs with a Burr type III testing-effort function can estimate the number of initial faults better than
previous approach. Comparative studies are also performed to see the fitness our model with other models studied previously and conclude that Burr Type-III performs better. Also tables, figures and conclusion are given at end of chapter.

Chapter 5 presents a realistic software reliability growth process. The software reliability assessment measure and the estimation methods of parameters are investigated. The software reliability assessment is discussed. We know that actual test effort data expresses various consumption pattern, sometimes the test effort consumption are difficult to describe only by Exponential, Weibull, Pareto, Burr type III & Logistic curve. Therefore, we try to incorporate a Burr type X test effort function instead of above consumption functions as the test effort function during the software development process. Computational results are performed using three actual data sets. Comparative studies that Burr Type-X distribution fit the data better as compared to previous studies. In addition software release policy based on reliability criteria using three actual software data sets area also discussed.

At last portion of this thesis, we have discussed all reference which is referred inside this thesis.

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