PREFACE

This Doctoral Thesis entitled “Monitoring Exponential Software Reliability Using SPC” was taken up at the instance of Dr. R. Satya Prasad, Associate Professor of Computer Science, Acharya Nagarjuna University, motivated, as I was, by a desire to study some problems of using Statistical Process Control (SPC) techniques for assessing software reliability using Non-Homogeneous Poisson Process (NHPP) based Exponential Distribution as mean value function. Control mechanisms to develop control charts and to assess whether the software failure process is under control or out of control were developed. Chapter 1 is on software reliability, software process, SPC preliminaries with exhaustive literature relevant to the proposed study. In all we studied four problems which in brief are

A control scheme which can be easily and fruitfully applied to monitor the software failure process for Exponential Distribution, based on NHPP, using Maximum Likelihood Estimate (MLE) method for parameter estimation of different datasets are developed and results are presented in Chapter 2.

A control mechanism, based on time between failures observations using Exponential Distribution, with Modified Maximum Likelihood Estimation (MMLE) which is based on NHPP to different datasets is developed for parameter estimation, and results are presented in Chapter 3.

A control mechanism based on order statistics of cumulative quantity between observations of time domain failure data using mean value function of Exponential Distribution based on NHPP with MLE method for parameter estimation is developed and applied on different datasets and results are presented in Chapter 4.

Two more control mechanisms based on time between failure observations using Half Logistic Distribution (HLD) and Weibull Distributions are compared with Exponential Distribution and results are presented in Chapter 5.

The respective brief contents of these four problems are given in the “Introduction” of chapters 2 to 5. The numerical calculations and subsequent tables are provided at appropriate places in the respective chapters. The reprints of some of our findings in published form are appended towards the end of the thesis. List of references arranged alphabetically is also provided towards the end of the thesis.