Chapter 8
Summary and Conclusion

Statistical quality control and reliability tests are performed to estimate or demonstrate quality and reliability characteristics on the basis of data collected from sampling tests. Reliability of a unit (or product) is the probability that the unit performs its intended function adequately for a given period of time under the stated operating conditions or environment. By a unit we mean an element, a system or a part of a system, or the like. Acceptance sampling prescribes a procedure that, includes decisions about sampling versus complete inspection.

The contribution of this thesis mainly relates to the study of truncated life test through different acceptance sampling plans when the lifetime of the items follows different lifetime distributions. Quality personnel would always like to know whether the life time of the products reach the consumer’s standard or not. Management can select the best plan by using operating characteristics values of different sampling plans using lifetime distributions.

Going over the results of the numerical investigation presented, the main conclusions are summarized below.

Chapter 1 comprises of sections that consists of basic concepts and terminologies associated to statistical quality control, acceptance sampling, reliability, review of sampling plans and lifetime distributions which are relevant to this thesis.

In Chapter 2, the probability of acceptance for special purpose double sampling plan of type Dsp(0,1) for truncated life test is determined for various values of mean ratios and for different experiment times assuming that the life time of the distribution follows the generalized exponential distribution, Weibull.
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distribution, Marshall _ Olkin extended exponential distribution, Marshall _ Olkin extended Lomax distribution, Rayleigh distribution and the inverse Rayleigh distribution. The minimum sample sizes $n_1$ and $n_2$ are determined at the worst case and are used to calculate the probability of acceptance for different consumer’s confidence levels. These are discussed with the help of tables, figure and examples. These distributions provide the high probability for the mean ratio that are greater than six. Among all the distributions used, the Inverse Rayleigh distribution is comparatively better as its probability of acceptance is higher when compared with the other distributions.

In Chapter 3, a chain sampling plan for truncated life test is proposed. When the lifetime of the distribution follows different lifetime distributions namely, the generalized exponential distribution, Weibull distribution, Marshall _ Olkin extended exponential distribution, Marshall _ Olkin extended Lomax distribution, Rayleigh distribution and the inverse Rayleigh distribution, the minimum sample size $n$ required is determined for the chain sampling plan for truncated life test is used to determine when the acceptance criteria i, consumer’s risk and the test termination time are specified. The probability of acceptance according to various quality levels is obtained. The results are presented in tables and are compared with figures and examples. Of all the distributions used in this chapter observed, inverse Rayleigh distribution is comparatively better than the other distributions in case of sample sizes and the probability of acceptance.

In Chapter 4, a modified chain sampling plan for truncated life test is proposed. When the lifetime of the distribution follows different lifetime distributions namely, the generalized exponential distribution, Weibull distribution, Marshall _ Olkin extended exponential distribution, Marshall _ Olkin extended Lomax distribution, Rayleigh distribution and the inverse Rayleigh distribution, the minimum sample size $n$ required is determined for the modified chain sampling plan for truncated life test is used to determine when the acceptance criteria i, consumer’s risk and the test termination time are specified. The probability of acceptance according to various quality levels is obtained. The results are
explained with tables, figures and examples. Of all the distributions used in this chapter observed, inverse Rayleigh distribution is comparatively better than the others in case of sample sizes and the probability of acceptance.

In Chapter 5, a hybrid group acceptance sampling plan using weighted binomial for truncated life test is proposed. When the lifetime of the items follows different lifetime distributions such as generalized exponential distribution, Weibull distribution, Marshall _ Olkin extended exponential distribution, Marshall _ Olkin extended Lomax distribution, generalized Rayleigh distribution and the inverse Rayleigh distribution, the number of testers \( r \) is determined for the group acceptance sampling plan using weighted binomial at the worst case when the consumer's risk (\( \beta \)) and the other parameters are specified. The operating characteristic values according to various quality levels are also obtained and discussed with tables, figures and examples. It can be observed that the minimum number of testers required decreases as test termination time multiplier increases and also the operating characteristics values increases more rapidly as the quality improves. On comparing all the life time distributions used in this chapter, one can find that inverse Rayleigh distribution is comparatively the best among the other distribution. Here the minimum number of testers used is low and more positively the probability of acceptance is high than the other distributions.

In Chapter 6, a two-stage hybrid group sampling plan for truncated life test is proposed. When the lifetime of the distribution follows different lifetime distributions namely, the generalized exponential distribution, Weibull distribution, Marshall _ Olkin extended exponential distribution, Marshall _ Olkin extended Lomax distribution, generalized Rayleigh distribution and the inverse Rayleigh distribution, the minimum number of testers \( r \) is determined for the two stage group acceptance sampling plan at the worst case when the consumer's risk (\( \beta \)), group sizes \( g_1 \) and \( g_2 \), acceptance number and the time termination ratios are specified. The operating characteristic values according to various quality levels are also obtained and discussed with tables, figures and examples. It can be
observed that the minimum number of testers required decreases as test termination time multiplier increases and also the operating characteristics values increases more rapidly as the quality improves. On comparing all the life time distributions used in this chapter, one can find that inverse Rayleigh distribution is comparatively the best among the other distribution. Here the minimum number of testers used is low and more positively the probability of acceptance is high than the other distributions.

In Chapter 7, a multiple repetitive group sampling plan for truncated life test is proposed. When the lifetime of the distribution follows different lifetime distributions namely, generalized exponential distribution, Weibull distribution, Marshall _ Olkin extended exponential distribution, Marshall _ Olkin extended Lomax distribution, Rayleigh distribution and the inverse Rayleigh distribution, the minimum sample size \( n \) required is determined for the multiple repetitive group acceptance sampling plan for truncated life test is used to determine when the acceptance numbers \( c_1 \) and \( c_2 \), consumer’s risk and the test termination time are specified. The probability of acceptance according to various quality levels is obtained. The results are presented in tables and are compared with figures and examples. Of all the distributions used in this chapter observed, Weibull distribution is comparatively better than the other distributions in case of sample sizes and the probability of acceptance.