CHAPTER 39

OPERATIONAL RESEARCH

Doctoral Theses

01.   AAKANSHA KISHORE
       Optimal Inventory Policies for Imperfect Quality Items.
       Supervisors : Prof. Chandra K. Jaggi and Dr. Aditi Khanna
       <u>Th 24585</u>

Contents

1. Introduction 2. Literature review 3. Optimal replenishment policy for imperfect quality items under the effect of inflation 4. Supply chain inventory models for imperfect quality items, inspection errors under two level trade credit policies 5. Production inventory models for imperfect quality items along with inspection error and imperfect rework 6. Effect of learning in set-up cost on imperfect production process 7. Conclusion and recommendation for future research. Bibliography. Appendices. List of publications.

02.   DAS (Subhrata)
       Some Contributions to Multi UP-Gradation Modelling and Software Testing Schedule.
       Supervisors : Dr. Ompal Singh and Dr. Adarsh Anand
       <u>Th 24586</u>

Abstract
(Verified)

The trend now-a-days is that firms don't release their complete offering in one go but keep on launching newer versions so as to maintain its position in the market. This phenomenon of multi up-gradation of the software aids in attaining the expected level of quality and operational reliability set by the markets. A generic approach for quantifying the fault removal process for a multi up-graded software system based on varied aspects have been formulated. The work studies the debugging environment and the concept of imperfect environment has been used for determination of release time of the software versions. Further, emphasis has been laid to understand the resource allocation pedagogy for a software system with different versions. A key approach to make software more reliable is to test it adequately and for apt time duration. The release time decision becomes even more complicated when dealing with successive versions. Moreover, a distinction between release time and testing time of the software system has been made. In order to model the aforesaid situation, an optimization problem for determination of release time under crisp and fuzzy environment has been modeled. To highlight the importance of patching a fault removal process has been formulated and the impact of patching on release time has been studied. In addition to it, the concept of upgrade and updates in combinational form for the software system has been discussed. In certain circumstances while releasing patches to fix some bugs present in the software there can be introduction of known or unknown bugs arising due to installation of an infectious patch. Lastly, an idea of modeling vulnerability discovery for multiple versions under the assumption that newer version embeds a portion of code from its predecessor has been described in the present proposal.

Contents

1. Introduction 2. Software multi up-gradation modelling and related resource allocation problem 3. Software release time decision making under different environments 4. Understanding the role of patching in software testing 5. Software patch management: Modeling and analysis 6. Vulnerability discovery

modeling for software with multi versions. Conclusions and scope for future research. References.

03.   GROVER (Nishtha)
Multi-Attribute Decision Making Methods Under Intuitionistic Fuzzy Environment.
Supervisor : Dr. Mukesh Kumar Mehlawat
Th 24584

Contents

1. Introduction 2. A satisfaction degree based method for intuitionistic fuzzy multi-attribute decision making 3. Intuitionistic fuzzy multi-attribute group decision making method using extended preference relations with an application to critical path selection 4. Modified SIR approach for intuitionistic fuzzy multi-attribute group decision making with an application to supplier selection 5. An extended vikor method for intuitionistic fuzzy multi-attribute group decision making with an application to plant location selection 6. An extended topsis method for intuitionistic fuzzy multi-attribute group decision making 7. A generalized topsis method for intuitionistic fuzzy multi-attribute group decision making considering different scenarios of attributes weight information. Bibliography.

04.   SAVITA
On Some Reliability Systems Subject to Accelerated Life Testing.
Supervisor : Prof. Preeti Wanti Srivastava
Th 24587

Abstract
(Not Verified)

High reliability of modern-day items renders their testing under normal operating condition uneconomical. They are, therefore, tested under accelerated environmental conditions to induce early failures. Accelerated life tests (ALTs) can be conducted using constant-stress(CS) or stress that varies with time or mix of both. A ramp-stress(RS) results when stress is increased linearly with time. Reliability analyses of high reliability systems with different configurations under accelerated conditions help in reflecting component reliability after their assembly into an operational system. The system lifetime data includes its lifetime and the component causing its failure. Masking results when failure cause cannot be detected due to time-constraint, cost - constraint etc. The thesis comprises five chapters with Chapter 1 being introductory. Chapter 2 focuses on RSALT plans' formulation for a two-component parallel system with: Dependent components using time-censored completely masked data, and Independent as well as Dependent components using masking with no censoring. In Chapter 3, RSALT plans for a two-out-of-three reliability system with independent as well as dependent components and masking have been devised. Chapter 4 is on formulation of a RSALT plan for a bridge system comprising independent components with time-censoring and no-masking. Chapter 5 focuses on design of CSALT for a two-component parallel system with independent components subject to two stresses- temperature and voltage using masking. Stress levels - low, medium, high, have been used for each stress. The optimal number of stress combinations-three, have been obtained using fractional factorial design resulting in three test-chambers. Optimal plans in the chapters have been obtained using D-optimality criterion that consists in finding optimal stress rate in RSALT and optimal allocations in CSALT. The methods proposed have been illustrated using numerical examples and the proposed plans are found to be robust to small deviations in the true values of the design parameters.

Contents

1. Reliability systems subject to life testing experiments: An introduction 2. Optimal ramp – stress alt plans for a two – component parallel system 3. Optimal rsalt plans for a two-out-of-three systems 4. Design of ramp – stress alt plan for a bridge structure 5. Optimal two-stress alt models for a two-component parallel system under constant-stress loading with masking. Future scope. Appendix. Bibliography.