Abstract

The global network of today's businesses challenges the companies and their supply to balance speed, flexibility, receptiveness, quantity and quality. To address these challenges, a company largely depends on different aspects of the inventory management. One can run a business in a more profitable mode by using inventory management. The content of the present thesis pertains to the studies, in different aspects, in the important field of inventory management. This thesis consists of two parts viz., part I and part II. Part I addresses the issues of delay in payment policy whereas in part II we discuss problems related to machine breakdown and its maintenance under deterministic and probabilistic environment.

The thesis contains six main chapters and a concluding chapter. Chapter 1 is the introductory chapter where a brief literature survey has been presented.

The purpose of different studies embodied in part I (chapter 2, chapter 3 and chapter 4) is to determine the optimal retailer decision policy with two level of trade credit finance under different environments. Necessary conditions have been proposed and proved in each of these chapters to ensure the conditional optimality of the inventory cost function. In chapter 2, an inventory model for deteriorating items is developed. We have investigated the retailer inventory systems as a cost minimizing problem to determine the retailer optimal policy with five different cost functions depending upon supplier and retailer delay time. In chapter 3, a manufacturing system for probabilistic demand has been developed. We have used a continuous probability distributed demand and a two level trade credit policy to determine the retailer's optimal decision policy considering four different types of cost function. A probabilistic manufacturing system with rework of defective items under trade credit finance is discussed in chapter 4. In all the models numerical examples are provided to illustrate the theoretical results and sensitivity of important parameters are discussed.

The objective of the second part of the thesis (chapter 5, chapter 6 and chapter 7) is to determinate the optimal production run time, considering machine breakdown and its maintenance during the production cycle. The combined effect of screening error, production of defective items, rework process, random machine breakdown and its repair on the optimal production run have been studied in chapter 5. By proposing two maintenance policies namely corrective and preventive policies, we have, in chapter 6, studied the joint effect of the process deterioration, machine breakdown and its repair on optimal production run time. In this

chapter, we have assumed that the demand rate of items, machine failure time, corrective and preventive repair time follow a known continuous probability distribution. With the assumptions as in the previous chapter, we have, in chapter 7, developed a discrete manufacturing inventory system. Here, it is assumed that the demand rate of items, machine failure time, corrective and preventive repair time follow a known discrete probability distribution.

Keywords: Inventory control, Probabilistic inventory, Production process, Rework process, Trade credit, Permissible delay period, Stochastic demand, Breakdown, Imperfect quality, Process shifting, Deterioration, Order quantity/ Production lot size.