Abstract

In the present day economy, most of the people are conscious about the expenditure their daily needs. They usually try to apply the science in their daily life as far possible and try to get a financial benefit. Though the inventory management had come to meet up the special needs of Second World War, but nowadays, its necessity is felt almost everywhere all the branches of science as well as human society. Using inventory management science one can run a business in a more profitable manner. With this view point, many research papers have been published. But in this thesis, we are trying to give some modern views instead of traditional view of characterizing different inventory models. Some of the traditional vie about inventory management are: different parameters are constant, all the parameters involved in the inventory system are deterministic etc. But the modern views over it are all the parameters involved in the inventory system may not be deterministic. Keeping this idea in mind, we have discussed some inventory models in the probabilistic environment.

In chapter 2, An order level inventory model is developed for item that deteriorates in time when demand rate is a random function of time. The solution of the model is discussed both for infinite and finite time horizon. A numerical example is given to illustrate the derived results and sensitivity analysis is carried out.

In chapter 3, a probabilistic inventory model is developed for items that deteriorate at a constant rate and the demand rate depends linearly on the display stock and also the selling price and advertisement. Large number of items or goods displayed in the shelf space are often related with demand to induce more sales and profit. In addition, we assume that the rate of change of demand due to on-display stock is a random variable having a specific probability distribution. The solution of this model is discussed. Numerical examples are given to illustrate the derived result and sensitivity analysis is carried out.

In Chapter 4, a probabilistic EOQ model for deteriorating items with a permissible delay in payments for retailer and customer is developed by assuming that demand is a random variable. It is also assumed that the supplier will offer a delay period to the retailer for payment and the retailer also extends the trade credit policy to his her customer. Under these assumptions, we have constructed two separate models: one for discrete cycle time and another for continuous cycle time. To determine the global optimal ordering policies for both the models, we have developed and proved three separate theorems. Some already published results (for probabilistic inventory models) are special cases of our paper. Finally, numerical examples are presented to demonstrate the developed models and the solution procedure.

Chapter 5 deals a stochastic inventory model under the conditions that delay in payment is permissible. It is assumed that trade credit period is not fixed but varies with the ordering quantity. The demand during any scheduling period follows a probability density function. We have derived the total variable cost per unit time. The optimal ordering policy of the system can be obtained with the help of three theorems (proofs are provided). An algorithm to determine the optimal ordering policy with the help of

the theorems is developed and numerical examples are provided for explanation. Sensitivity analysis of all the parameters of the model is presented and discussed. Some-already published results are special cases of the results obtained in this paper.

In Chapter 6, an effort has been made to analyze the lot streaming technique in a multistage flow shop with a random planning horizon considering shortages. For several decades the lot streaming technique, used to split a processing batch into multiple transfer batches, has received considerable attention from researchers. All contributions assumed an infinite planing horizon and did not allow shortages. This paper extends the lot streaming technique by allowing shortages and considering planning horizons of random finite length . We develop a simulation heuristic to determine a near- optimal solution, and test it for planning horizons of normal or exponential length. A sensitivity analysis is also applied.

Lastly, Chapter 7 is devoted to give conclusion of the thesis along with a scope of future work in the context of the present study.

Keywords: Probabilistic inventory model; Deteriorating items; Time dependent random demand; Stock dependent random demand; Pricing; advertisement cost; Random demand; Trade credit; Permissible delay in payments. Lot streaming; Multistage flow shop; Random product life cycle; Shortages.