CHAPTER 9

CONCLUSION

In this thesis, we have constructed various inventory models under different environments to offer optimal inventory control decisions, each built on a different set of assumptions concerning the way the system being studied operates. The primary purpose of this thesis is to provide appropriate decision support tools in the form of mathematical models to minimize the inventory costs of the system for various industries like food industries, textiles, automobile, electronic components, etc.

Since sales team’s initiatives/promotional effort plays an important role to inspire the customers to buy more items that result in less inventory cost, therefore, in our model, we have considered the demand as a function of the initiatives of the sales team. It is commonly seen that higher selling price causes decrease in demand whereas lesser selling price has the reverse effect. Apart from price, the other marketing parameter which affects the demand is advertisement. Therefore, the more investment in advertising gives more profits for the company. Hence, in our models, we have concluded that the demand of an item is an increasing function of advertising parameter with decreasing value of selling price. In the marketing management policy, display stock level plays a very important role in different sectors. Thus, it is very clear that the demand rate increased rapidly if the stored amount is high and vice-versa. Therefore, we have considered the demand as stock dependent in our model.
In our models, we have presented the unit production cost is a function of production rate, which is formulated by incorporating costs of several factors such as raw material, labour, replenishment rate, advertisement and the rest of the manufacturing system. And the unit selling price is determined by a mark-up over the unit production cost. In our models, we have studied three types of continuous probabilistic distribution functions as (a) uniform distribution, (b) triangular distribution and (c) beta distribution. The total cost function is derived for each of these three distributions, and numerical comparison between the models is shown.

In the business transactions, the suppliers usually offer a permissible delay in payment to their retailers to attract more sales. Therefore, we have incorporated the concept of trade credit in our models. Also in our model, the holding cost is expressed as linearly increasing functions of time. This is very practical for the industries in which the holding cost is depending upon the time. In the present situation, Inflation and time value of money are also main factors. In keeping with this reality, these factors are incorporated in our models.

For the capacity of any warehouse is limited, it has to rent warehouse for storing the excess units over the fixed capacity of the own warehouse in practice. Therefore we have analysed a two-warehouse system in our models. For the case of perishable product, the retailer may need to backlog demand to avoid costs due to deterioration. Therefore, in our models, shortages are allowed and can be partially backlogged where the
backlogging rate is dependent on the time of waiting for the next replenishment.

For each model, we presented an easy analytical closed-form solution for the identified problems. Some theorems and computational algorithms have been framed to characterize the optimal solutions in some models. The necessary and sufficient conditions of the existence and uniqueness of the optimal solutions are also provided for each model. The proposed solution procedure of this thesis is simple and does not require tedious computation effort. Then for each model, numerical examples and sensitivity analysis along with graphical representations are given to illustrate the application and the performance of the proposed methodology.

We hope that this thesis will contribute to the ongoing research in the field of Inventory Management by extending our existing inventory models in various ways and develop some new ideas. There are several potential extensions from this thesis. One immediate probable extension could be to discuss the demand in stochastic environment. Other possible extensions of this work may be conducted by considering multi-items and quantity discounts. Furthermore, some major parameters of the model such as production rate, deterioration rate, holding cost and ordering cost may be fuzzy variables.