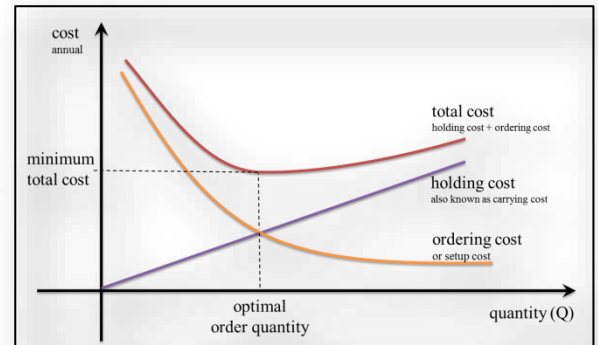## Computer Laboratory Session 11

Aim
To solve various **inventory**/production challenges

Objectives
1. To apply EOQ models
2. To use Reorder Point systems

Challenge – Production in a bakery
The Simple Simon Baker produces fruit pies for freezing and subsequent sale. The bakery, which operates 5 days per week, 52 weeks per year, can produce pies at the rate of 64 pies per day. The bakery sets up the pie production operation and produces until a predetermined number (Q) of pies has been produced. When not producing pies, the bakery uses its personnel and facilities for producing other bakery items. The setup cost for a production run of fruit pies is $500. The cost of holding frozen pies in storage is $5 per pie per year. The annual demand for frozen fruit pies, which is constant over time, is 5,000 pies.

Tasks
Determine the following:

a) The optimal production run quantity (Q)
b) The total inventory costs
c) The optimal number of production runs per year
d) The optimal cycle time (time between run starts)
e) The run length, in working days

Challenge – Ordering for a steel company
The purchasing manager for the Atlantic Steel company must determine a policy for ordering coal to operate 12 converters. Each convert requires exactly 5 tons of coal per day to operate, and the firm operates 360 days per year. The purchasing manager has determined that the ordering cost is $80 per order and the cost of holding coal is 20% of the average dollar value of inventory held. The purchasing manager has negotiated a contract to obtain the coal for $12 per ton for the coming year.

Tasks

a) Determine the optimal quantity of coal to receive in each order.
b) Determine the total inventory related costs associated with the optimal ordering policy (do not include the cost of the coal).
c) If 5 days of lead time are required to receive an order of coal, how much coal should be on hand when an order is placed?

Challenge – Tomato production and inventory

The Spruce Creek Vegetable Farm produces organically grown tomatoes that are sold to area grocery stores. The annual demand for Spruce Creek's tomatoes is 270,000 pounds. The farm is able to produce 305,000 pounds annually. The cost to transport the tomatoes from the farm to the stores is $620 per load. The annual carrying cost is $0.12 per pound.

Tasks

a) Compute the optimal order size, the maximum inventory level, and the total minimum cost.

b) If Spruce Creek can increase production capacity to 360,000 tomatoes per year, will it reduce total inventory cost?

Challenge – Tomato production and inventory

The Atlantic Paper Company produces paper from wood pulp ordered from a lumber products firm. The paper company's daily demand for wood pulp is a constant 8,000 pounds. Lead time is normally distributed, with an average of 7 days and a standard deviation of 1.6 days.

Tasks

a) Determine the reorder point if the paper company wants to limit the probability of a stockout and work stoppage to 2%.

Challenge – Uncertain demand and uncertain lead time

PM Computers assembles personal computers from generic components. It purchases its colour monitors from a manufacturer in Taiwan; thus, there is a long and uncertain lead time for receiving orders. Lead time is normally distributed, with a mean of 25 days and a standard deviation of 10 days. Daily demand is also normally distributed, with a mean of 2.5 monitors and a standard deviation of 1.2 monitors.

Tasks

a) Determine the safety stock and reorder point corresponding to a 90% service level.