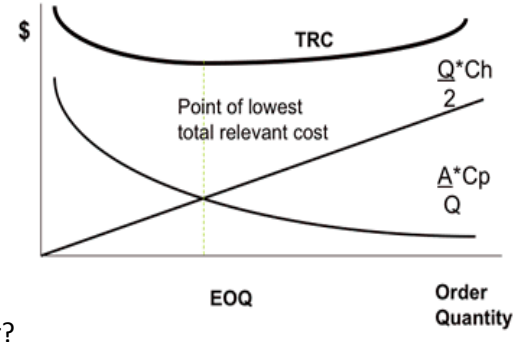
UNIT –III

INVENTORY PROBLEM

The primary function of inventory management is to determine:



(i) When to order?
(ii) How much to order?

When to Order?

This problem of inventory control deals with the point of time when the order for fresh inventory is to be given. The problem of 'when to order' is solved by fixing the appropriate re-order level of each type of inventory. It is determines by compromising the cost of maintaining these stocks and the disservice to the customer if this order are not delivered in time.

Re-order Level

'When to order' is an important query requires a suitable answer.
Buying and issuing the inventories are the foremost tasks of all types of organizations. When the inventories fall below a particular level as decided in advance, they are refilled with fresh procurement. But what should be the quantity of fresh stock is always an important question which requires a suitable answer. In short, the re-order level is the level of inventory at which the order for additional stock should be placed.
Re-order level = Average usage × Lead time
i.e. R = Au × L

How Much to Order?

After solving the problem of 'when to order' the next immediate issue is 'how much to order'. Considering overbuying can lead to unproductive use of working capital and under-buying leads to unwanted emergency orders and ultimately increases the workload of the purchase department, the issue of 'how much to order' is of vital significance.
Hence, a balance is achieved by selecting the right quantity for each order. This quantity in short is known as Economic Order Quantity (EOQ).
EOQ is an important technique of inventory management. The EOQ refers to the optimal order size that will result in the lowest total of order and carrying cost for an item of inventory given its expected usage, carrying cost and ordering cost. By calculating an economic order quantity, the firm attempts to determine the order size that will minimize the total inventory cost.

Inventory Costs

1.Ordering Cost: The cost of placing an order and obtaining the supplies is known as ordering cost. It includes cost related to the clerical work of preparing, calling, issuing, transportation, following and receiving orders, physical handling of goods, inspections and machine set-up cost. This cost does not depend or vary on the number ordered.
2.Carrying Cost: It is the cost which is incurred on account of inventory storage, handling, insurance, etc. from the date of receipt to the date disposal. It includes store-related expenses like salaries of staff, electricity expenses, handling, insurance, pilferage, breakage, obsolescence, depreciation, taxes and opportunity cost of capital.

EOQ Model with Price Discount

Price discount is nothing but reduction in the price offered by a supplier for purchasing a larger volume of an item. This could be in one step or multiple steps. Price discount decreases the unit price as well as Ordering cost. However, inventory carrying cost tends to increase with large order size in spite of reduction in unit cost. As a result of these, total cost may reduce or increase. Thus, the basic decision with Quantity Discount is whether a larger quantity should be ordered to take benefit of a unit price reduction or not.

The **inventory** control **problem** is the **problem** faced by a firm that must decide how much to order in each time period to meet demand for its products. The **problem** can be modeled using mathematical techniques of optimal control, dynamic programming and network optimization.

1.From the following calculate
(i) Re-ordering Level and **(ii)** Minimum Level

Minimum usage	100 units per week	Normal usage	200 units per week
Maximum usage	300 units per week	Re-order period	4 to 6 weeks

Solution:
(i) Re-ordering Level
*Re-ordering level= Maximum consumption * Lead Time [maximum]*
Re-ordering level= 300 * 6
Re-ordering level= 1,800 Units per week

(ii) Minimum Level
Minimum level= Reorder level – (Average consumption x lead time [Average])
Minimum level= 1,800 – (200 x 5)
Minimum level= 1,000 Units per week

2.Calculate Ordering Level, Minimum Level and Maximum Level from the following data:

Re-order quantity	1,500 units	Re-order period	4 to 6 weeks
Maximum consumption	400 uts per week	Average consumption	300 units per week
Minimum consumption	250 units per week		

Solution:

(i) Ordering Level
*Ordering level= Maximum consumption * Lead Time [maximum]*
Ordering level= 400 * 6
Ordering level= 2,400 Units per week

(ii) Minimum Level
Minimum level= Reorder level – (Average consumption x lead time [Average])
Minimum level= 2,400 – (300 x 5)
Minimum level= 900 Units per week

(iii) Maximum Level
*Maximum stock level= Reorder level – (Min consumption * Lead time [minimum]) + EOQ*
*Maximum stock level= 900 – (250 * 4) + 1,500*
Maximum stock level= 2,400 – (1,000) + 1,500
Maximum stock level= 2,900 Units per week

3. The following information is available in respect of component DP 5:

Maximum stock level	8,400 units
Budgeted consumption- maximum	1,500 units per month
Budgeted consumption- minimum	800 units per month
Estimated delivery period	Maximum 4 months and minimum 2 months

You are required to calculate Re-order level

Ordering Level
*Ordering level= Maximum consumption * Lead Time [maximum]*
Ordering level= 1,500 * 4
Ordering level= 6,000 Units per week

4. From the following date for the last twelve months, compute the Average Stock Level for a component.

Maximum usage in a month	300 units	Minimum usage in a month	200 units
Average usage in a month	225 units	Re-ordering quantity	750 units
Time lag procurement of material	Maximum 6 months and Minimum 2 months		

Solution:

Average Stock Level
Average Stock Level = Minimum Stock Level + ½ of EOQ
Minimum level= Reorder level – (Average consumption x lead time [Average])
*Re-ordering level= Maximum consumption * Lead Time [maximum]*

*Re-ordering level= Maximum consumption * Lead Time [maximum]*
Re-ordering level= 300 * 6
Re-ordering level= 1,800 Units per month

Minimum level= Reorder level – (Average consumption x lead time [Average])

Minimum level= 1,800 – (225 x 4)
Minimum level= 900 Units per month

Average Stock Level = Minimum Stock Level + ½ of EOQ
Average Stock Level = 900 + ½ (750)
Average Stock Level = 1,275 Units per month

5. Find out Minimum Stock Level, Maximum Stock Level and Ordering Level from the following particulars:
Minimum consumption 100 units per day Maximum consumption 175 units per day
Normal consumption 125 units per day Re-order quantity 1,500 units
Minimum period for receiving goods 7 days
Maximum period for receiving goods 15 days
Normal period for receiving goods 10 days

Solution:
(i) Ordering Level
*Ordering level= Maximum consumption * Lead Time [maximum]*
Ordering level= 175 * 15
Ordering level= 2,625 Units per week

(ii) Minimum Level
Minimum level= Reorder level – (Average consumption x lead time [Average])
Minimum level= 2,625 – (125 x 10)
Minimum level= 1,375 Units per week
(iii) Maximum Level
*Maximum stock level= Reorder level – (Min consumption * Lead time [minimum]) + EOQ*
Maximum stock level= 2,625 – (100 * 7) + 1,500
Maximum stock level= 3,425 Units per week