Summary

- The understanding of the nature of demand (that is its size and pattern) for the given inventory item is essential to determine an optimal inventory policy for that item. The size of demand refers to the number of units of the items required in each period (cycle or season). The size is not measured in terms of the number of units sold because the demand may remain unfulfilled due to shortage of sufficient stock or due to delay in delivery. The size of demand may be either deterministic or probabilistic

- In the **deterministic case**, the demand over a period of time is known with certainty. This can be fixed (static) or can vary (dynamic) from period to period. But in the **probabilistic case**, the demand over a period of time is not known with certainty but the nature of such demand can be described by a known probability distribution

- The known probability distribution may be either stationary or non-stationary from period to period. These terms are equivalent to static and dynamic demand. The pattern of demand is the manner in which inventory items are required by the customers. The demand for a given period of time may be satisfied instantaneously at the beginning of the period, or uniformly during that period. The effect of instantaneous and uniform demand reflects directly on the total inventory cost

- **Replenishment lead time:**
  Order cycle: the order cycle is the time period between two successive replenishments and is determined in the following ways:

  - **Continuous review:** this is also called perpetual inventory record, because the number of units of an item on hand is always known. In this case an order of fixed size is placed every time the inventory level reaches at a ore-specified level called order point or reorder level. This decision rule is also referred to as the two bin system, fixed order system or Q-system

  - **Periodic review:** in this case the orders are placed at equal intervals of time, but the size of the order may vary depending on the inventory on hand as well as an order at the time of the review. This decision rule is also referred to as the fixed order interval system or P-system

- **Lead time or (delivery lag):** when an order is placed, it may require some time before the delivery of the items ordered is reached. The time delay between placing an order and receipt of delivery is called delivery lag or lead time. In general, the lead time may be deterministic or probabilistic

- **Stock replenishment:** although an inventory may operate with lead time, the actual replenishments of stock may occur instantaneously or gradually. Instantaneous replenishment is possible when the stock is purchased from outside sources, while gradual replenishment is possible due to a finite production within the firm

- **Length of planning period:** the length of planning period defines period over which a particular inventory level will be maintained. This period may be finite or infinite depending on the nature of the demand

- The size of replenishment orders affects inventory level to be maintained at various stocking points. Large order quantities may reduce the frequency of orders to be

placed to procure inventory items and reduce the total ordering cost. This decision will however increase the cycle stock inventories and the cost of carrying inventories

- EOQ involves determining the optimal quantity to purchase when orders are placed.
  For example: Small orders result in low inventory levels and inventory carrying costs, frequent orders and higher ordering costs; while large orders result in higher inventory levels and inventory carrying costs and infrequent orders and lower ordering costs

- **EOQ model with constant rate of demand**
  In this model, demand is assumed to occur at a constant rate for an infinite time into the future. The objective is to select an inventory policy, that is to choose an economic order quantity Q* (EOQ) the ordering frequency (time when an order must be placed) in such a way that the total yearly inventory cost is minimized