

Mth601 Assignment

Student ID

Question 1:

Solution:

Solution:

Understanding the Problem:

This problem is a classic example of the Economic Order Quantity (EOQ) model, which helps businesses determine the optimal order quantity to minimize total inventory costs. In this case, we're determining the optimal production run size.

Variables:

- **D:** Demand rate (items per month) = 1000
- **S:** Setup cost per run (Rs.) = 200
- **H:** Holding cost per item per month (Rs.) = 20

Calculation:

1. Calculate the Economic Order Quantity (EOQ):

$$EOQ = \sqrt{(2DS / H)} = \sqrt{(2 * 1000 * 200 / 20)} = \sqrt{20000} = 141.42 \approx 142$$

2. Calculate Total Cost for Different Run Sizes:

We'll calculate the total cost for each run size and compare them to find the optimal one.

Run Size (Q)	Set-up Cost (S * D/Q)	Holding Cost (H * Q/2)	Total Cost
500	400	5000	5400
600	333.33	6000	6333.33
700	285.71	7000	7285.71
800	250	8000	8250

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3. Determine the Optimal Production Run Size:

From the table, we can see that the total cost is minimized when the run size is **500**.

Therefore, the optimal production run size is 500 items.

Explanation:

- **Set-up Cost:** This is the cost incurred each time a production run is started. It's calculated by dividing the annual demand by the run size and multiplying by the setup cost per run.
- **Holding Cost:** This is the cost of storing inventory. It's calculated by multiplying the average inventory level ($Q/2$) by the holding cost per item per month.
- **Total Cost:** This is the sum of the set-up cost and the holding cost.

The EOQ model helps us find the optimal run size that balances the set-up cost and holding cost, minimizing the total cost.

Question 2:**Solution:****Solution:****Understanding the Problem:**

The reorder point is the level of inventory at which a new order should be placed to avoid stockouts. We need to account for both lead time demand (demand during the lead time) and safety stock.

Variables:

- **d:** Daily demand = 500 tons
- **L:** Lead time (days) = 15
- **SS:** Safety stock (days' worth of demand) = 10

Calculation:**1. Lead Time Demand:**

Lead time demand = $d * L = 500 \text{ tons/day} * 15 \text{ days} = 7500 \text{ tons}$

2. Reorder Point (ROP):

$ROP = \text{Lead time demand} + \text{Safety stock}$

Safety stock = $d * SS = 500 \text{ tons/day} * 10 \text{ days} = 5000 \text{ tons}$

Therefore, $ROP = 7500 \text{ tons} + 5000 \text{ tons} = 12500 \text{ tons}$

Therefore, the reorder point is 12,500 tons.

Explanation:

When the inventory level reaches 12,500 tons, a new order should be placed to ensure that there is enough stock to cover the demand during the lead time and any unexpected fluctuations in demand.

