Answer on Question #65630 – Math – Differential Equations

A Company uses $2{,}500$ units during the course of the year, and its usage is relatively constant throughout the year. These units are purchased from a supplier 100 kilometers away for $Ksh.\,15$ each, and the lead time is 2 days. The holding cost per unit per year is $Ksh.\,1.50$ (or 10% of unit cost) and the ordering cost per order is $Ksh.\,18.75$. There are 250 working days per year for this company.

Question

a) What is EOQ?

Solution

Economic Order Quantity:

$$Q^* = \sqrt{\frac{2DK}{h}},$$

where D - annual requirement quantity, K - cost per order, h - yearly carrying cost per unit

We have

$D = 2500; \quad K = 18.75; \quad h = 1.5.$

$$EOQ = Q^* = \sqrt{\frac{2 \cdot 2500 \cdot 18.75}{1.5}} = 250\ units$$

Answer: $EOQ = 250\ units$

Question

b) Given the EOQ, what is the average inventory?

Solution

$$average\ inventory = \frac{TC}{N},$$

where

$$N - number\ of\ working\ days\ per\ year;$$

$$TC = Total\ cost = PD + K\frac{D}{EOQ} + h\frac{EOQ}{2}; \quad P = 15 \text{ is } cost\ per\ unit;$$
$$TC = 15 \cdot 2500 + \frac{18.75 \cdot 2500}{250} + \frac{1.5 \cdot 250}{2} = 37875;$$

$$average\ inventory = \frac{37875}{250} = 151.5.$$

Answer: $average\ inventory = 151.5.$

Question

c) In minimizing cost, how many orders would be made each year? What would be the annual ordering cost?

Solution

Number of orders:

$$N_1 = \frac{D}{EOQ} = \frac{2500}{250} = 10$$

Annual ordering cost:

$$K \cdot N_1 = 18.75 \cdot 10 = 187.5$$

Answer: 10; 187.5.

Question

d) Given the EOQ, what is the total annual inventory cost (including purchase cost)

Solution

$$TC = PD + K\frac{D}{EOQ} + h\frac{EOQ}{2} = 15 \cdot 2500 + \frac{18.75 \cdot 2500}{250} + \frac{1.5 \cdot 250}{2} = 37875$$

Answer: 37875.

Question

e) What is the time between orders?

Answer: the lead time $= 2\ days$

Question

f) What is the ROP(re-oder point)?

Solution

$$ROP = Average\ daily\ uage\ rate \times Lead\ time\ in\ days$$

$$ROP = \frac{2500}{250} \cdot 2 = 20\ units$$

When the inventory level reaches 20 units an order should be placed for material.
Answer: $20\ units$.