

QUESTION

The annual demand for a certain product is 6000 items. The stock holding cost is £30 per item per annum and the cost of placing an order is £2.25. Each item costs £50 to purchase. However, a discount of 2.5% is given if at least 500 items are purchased at the same time; alternatively, a discount of 5% is given if at least 1200 items are purchased together. Determine an optimal ordering policy.

ANSWER

We have $d = 6,000$, $h = 30$, $s = 2.25$ and $c = 50$. The ECQ value is

$$Q = \sqrt{\frac{2 \cdot \frac{9}{4} \cdot 6000}{30}} = 30$$

The optimal order quantities are 30, 500 or 1200.

The annual cost is

$$K = \frac{sd}{Q} + \frac{1}{2}hQ + cd(1 - \text{discount})$$

For $Q = 30$, $K = \frac{9}{4} \cdot \frac{6000}{30} + \frac{1}{2} \cdot 30 \cdot 30 + 50 \cdot 6000 = \text{£}300,900.00$

For $Q = 500$, $K = \frac{9}{4} \cdot \frac{6000}{500} + \frac{1}{2} \cdot 30 \cdot 500 + 300,000 \cdot \frac{97.5}{100} = \text{£}300,027.00$

For $Q = 1200$, $K = \frac{9}{4} \cdot \frac{6000}{1200} + \frac{1}{2} \cdot 30 \cdot 1200 + 300,000 \cdot \frac{95}{100} = \text{£}303,011.25$

Thus $Q = 500$ minimizes K .