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Assignment 7

Q1) $P = \$0.4$ per container
$C_o = \$80.00$ per order
$C_h = \$0.10$ per container per year
Total Cost = $T_C = \frac{C_o D}{Q} + \frac{C_h Q}{2} + PD$

a) Economic Order Quantity, $Q = \sqrt{\frac{2 C_o D}{C_h}}$

$$\Rightarrow \sqrt{\frac{2 \times 80 \times 80000}{0.1}}$$

$$EOQ;\ Q = \underline{\underline{11313.7085}}$$

b) No of order to place in year $= \frac{D}{Q} = \frac{80000}{11313.7085}$
$= \underline{\underline{7.071}}$

c) Time between orders $= \frac{Q \times 220}{D} = \frac{220}{7.071}$

Time between Order = $\underline{\underline{31.11}}$ days

d) Annual holding cost $H = \frac{Q C_h}{2} = \frac{11313.7085 \times 0.1}{2}$
$= \underline{\underline{565.885}}$

Annual Ordering Cost, $O = \frac{80 \times 80000}{11313.7085}$
$= \underline{\underline{565.685}}$

Annual Purchasing cost $PC = D \times D = 0.4 \times 80000$
$= \underline{\underline{32000}}$

Total Cost $TC = H + O + PC$
$= 565.685 + 565.685 + 32000$

Total Annual Stocking Cost $= \underline{\underline{\$ 33131.37}}$

Q2 $D = 10000$, $P = ₹5$, $C_o = ₹100$, $C_h = \frac{25}{100} \times 5 = ₹1.25$

a) EOQ, $Q = \sqrt{\frac{2 C_o D}{C_h}} = \sqrt{\frac{2 \times 100 \times 10000}{1.25}} = 1264.911$

b) Total inventory cost $= \frac{Q C_h}{2} + \frac{C_o D}{Q} + PD$

$$= \frac{1264.911 \times 1.25}{2} + \frac{100 \times 10000}{1264.911} + 5 \times 10000$$

$$= ₹\, 51581.139$$

c) Optimum number of order per annum $= \frac{D}{Q} = \frac{10000}{1264.911}$

$$= 7.906$$

d) Demand cost per period $d = \frac{D}{200} = \frac{10000}{200} = 50$

lead time $l = 5$

Reorder level $= dl = 50 \times 5 = 250$

Q3 Here $d = 50$ $\quad$ $C_h = ₹1.25$

$P = 200$ $\quad$ $D = 10000$

$C_o = ₹100$

Optimal order size: $Q_{opt} = \sqrt{\frac{2 C_o D}{C_h \left[1 - \frac{d}{P}\right]}}$

$$= \sqrt{\frac{2 \times 100 \times 10000}{1.25 \left[1 - \frac{50}{200}\right]}}$$

$$= Q_{opt} = 1460.593$$

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Q4 1) Demand D = No of 100 pound bags $= \frac{1000000}{100}$

$= 10000$

$C_h = \frac{35}{100} \times 50 = \$ 17.5$

$C_o = \$ 10$

2) First determine the optimal order size and total cost with the basic EOQ model

$$Q_{opt} = \sqrt{\frac{2C_oD}{C_h}} = \sqrt{\frac{2\times10\times10000}{17.5}} = 106.904$$

for $Q = 106.904$

$$TC = \frac{C_oD}{Q} + \frac{C_hQ}{2} + PD$$

$$= \frac{10\times10000}{106.904} + \frac{17.5\times106.904}{2} + 50\times10000$$

$$= \$ 501870.8243$$

Compute Q using lowest unit price

for $Q = 1000$

$$TC = \frac{10\times10000}{1000} + \frac{17.5\times1000}{2} + 40\times10000$$

$$= \$ 408850$$

Therefore optimal order size is 1000

Q5 $\bar{d} = 400$, $\sigma_d = 100$, $\overline{LT} = 7$ days, $\sigma_{LT} = 1$ day

for service level of 95% $z = 1.65$

$$ROP = \bar{d}\times\overline{LT} + z\sqrt{\overline{LT}\,\sigma_d^2 + \bar{d}^2\sigma_{LT}^2}$$

$$= 400\times7 + 1.65\sqrt{7\times100^2 + 400^2\times1^2}$$

$ROP = 3591.31$