Assignment – Inventory Management

Question 1

A retailer faces demand of 800 units per month for a product. Ordering cost S = ₹200 per order. Unit cost C = ₹100 and holding cost is 20% of unit cost. Find EOQ and show how EOQ changes if holding cost increases by 50% and ordering cost decreases by 50%.

Step 1 – Convert to annual terms:

Monthly demand = 800 units → Annual demand D = 800 × 12 = 9,600 units/year.

Ordering cost per order S = ₹200.

Unit cost C = ₹100. Holding rate = 20% → Annual holding cost per unit H = ₹20 per unit per year.

Step 2 – EOQ Formula: EOQ = √(2DS/H)

EOQ = √(2 × 9600 × 200 / 20) = √192,000 ≈ 438.53 → EOQ ≈ 439 units.

EOQ (Economic Order Quantity) is the order size that minimizes total cost of ordering and holding inventory. Larger orders reduce ordering cost but increase carrying cost; EOQ finds the balance.

Impact of changes:

1. Holding cost +50% → H = ₹30 → EOQ = √(2×9600×200 / 30) = √128,000 ≈ 358 units.

2. Ordering cost –50% → S = ₹100 → EOQ = √(2×9600×100 / 20) = √96,000 ≈ 310 units.

3. Both changes → EOQ = √(2×9600×100 / 30) = √64,000 ≈ 253 units.

Interpretation: Higher holding costs or lower ordering costs both reduce EOQ, meaning smaller and more frequent orders.

Question 2

A bookstore sells 5,000 copies per year of a bestseller. Ordering cost S = ₹100 per order, and carrying cost per book H = ₹5 per year. Find the optimal order quantity.

EOQ = √(2DS/H) = √(2×5000×100 / 5) = √200,000 ≈ 447 units.

Hence, the bookstore should order approximately 447 copies per order to minimize total inventory cost.

Explanation: Ordering around 447 copies each time balances ordering and carrying costs, reducing overall annual cost.

Question 3

A retailer sells a seasonal product at a selling price of $20 per unit and a cost of $12 per unit, with a salvage value of $5 per unit. Find the critical ratio and interpret its meaning.

Underage cost (Cu) = 20 − 12 = $8; Overage cost (Co) = 12 − 5 = $7.

Critical ratio = Cu / (Cu + Co) = 8 / (8 + 7) = 0.533 or 53.3%.

Interpretation: The optimal service level is 53.3%, meaning the retailer should stock enough inventory to satisfy demand in 53.3% of demand scenarios. Since understocking cost is slightly higher, it's better to order a little more than the median forecast.