MS-4702: Quantitative Techniques

INVENTORY MODEL: ECONOMIC ORDER QUANTITY

1. Shirley Company requires 40,000 shells for its signature product. The shells, which are purchased from outside suppliers, will be used evenly throughout the year. The cost to place one order is P 20, while the cost to carry the shells in inventory for one year is P 0.40.

   A) The optimal order quantity (economic order quantity).
      a. 8,000 shells   c. 2,000 shells
      b. 4,000 shells   d. 1,000 shells

   B) The number of times the company should place orders within a year.
      a. 80 orders   c. 20 orders
      b. 40 orders   d. 10 orders

   C) The average inventory.
      a. 8,000 shells   c. 2,000 shells
      b. 4,000 shells   d. 1,000 shells

   D) How much is the total annual *ordering* costs?
      a. P 800   c. P 200
      b. P 400   d. P 100

   E) How much is the total annual *carrying* costs?
      a. P 800   c. P 200
      b. P 400   d. P 100

2. ABC Company buys 5,000 microchips annually for its computer manufacturing business. The chips come in lots of 50 per box. The cost of receiving and placing an order is P 27,000, including handling charges of P 18,000. Annual carrying costs are 3% of the purchase price of P 25,000 per chip. The company maintains a safety stock of 50 chips. The delivery time is 18 days. How many boxes should be ordered each time an order is made?
      a. 12 boxes   c. 300 boxes
      b. 50 boxes   d. 600 boxes

3. Sir K subsidiary purchases 45,000 units of laundry soap per year. The company works 300 days per year. The average purchase lead time is 7 working days. Maximum lead-time is 10 working days.

   A) How many units should be maintained as *safety (buffer) stock*?
   B) What is the reorder point for bleaching soap?

4. The annual demand for a single product is 4,000 units. The cost to carry one unit is P 0.50 while cost per order amounts to P 10.00. If the average inventory is computed at 225 units, then how many units of safety stock are being maintained?
      a. 25 units   c. 200 units
      b. 50 units   d. None

5. Peach Company wishes to determine the amount of safety stock they should maintain for Product No. 333 to result in the lowest cost. Each stock-out costs P 75 and the carrying costs of each unit of safety stock is P 1. Product No. 333 will be ordered five times a year.

   Which of the following will produce the lowest cost?
      a. A safety stock of 10 units that is associated with a 40% probability of running out of stock
      b. A safety stock of 20 units that is associated with a 20% probability of running out of stock
      c. A safety stock of 40 units that is associated with a 10% probability of running out of stock
      d. A safety stock of 80 units that is associated with a 5% probability of running out of stock

Safety Stock (Stock-Out %)	Carrying Cost	+	Stock-Out Cost	= Total Costs
10 units (40%)	_____		_____	_____
20 units (20%)	_____		_____	_____
40 units (10%)	_____		_____	_____
80 units (5%)	_____		_____	_____

   A) Carrying Cost: P 1.00 (given)
   B) Maximum Stock-Out Cost: P 75 x 5 = P 375

LEARNING CURVE

6. A manufacturing job is subject to an estimated 80% learning curve. The first unit required 20 labor hours to complete.

    A) What is the cumulative average time per unit after four units are completed?
    B) What is the total time required to produce 2 units?
    C) How many hours are required to produce the second unit?

7. Orange Company expects a 90% learning curve. The first batch of a new product required 100 hours. The second batch should take
    a. 100 hours
    b. 90 hours
    c. 80 hours
    d. 45 hours

8. A particular manufacturing job is subject to an estimated 90% learning curve. The first unit required 50 labor hours to complete. What is the cumulative average time per unit after four units are completed?
    a. 50 hours
    b. 45 hours
    c. 40.5 hours
    d. 40 hours

9. A company made the first batch of a product in 100 hours. At 80% learning rate, the total time for the first four batches is
    a. 400 hours
    b. 320 hours
    c. 256 hours
    d. 204.8 hours

10. Mango Company manufactured the first batch of product in 10 hours. The second batch took an additional 6 hours. What percentage learning occurred?
    a. 100%
    b. 90%
    c. 80%
    d. 60%

11. St. Charles Electronics Products, Inc. finds that production is affected by an 80% learning effect. The company has just produced 50 units of output at 100 hours per unit. Costs were as follows:

Materials @ P 20	P 1,000
Labor and labor-related costs:	
Direct labor (100 hours at P 8)	800
Variable overhead (100 hours at P 2)	200
Total	P 2,000

The company has just received a contract calling for another 50 units of production. It wants to add a 50% markup to the cost of materials and labor and labor-related costs. Determine the contract price.
    a. P 1,600
    b. P 1,800
    c. P 2,400
    d. P 3,000

Direct Labor and VFOH

Units	Average	Total
50 u		P 1,000
100u		