**Chapter 16: Inventory Control Models**

**Practice Problems**

**MULTIPLE CHOICE**

Power Pumps produces a variety of commercial sump pumps. One of their models—Mighty Mo—is produced in a small plant in Missouri. Next year, Power Pumps anticipates on selling 2,000 units of the Mighty Mo. Each requires six rotors, which Power Pumps purchases from an overseas supplier. The cost of placing an order to this supplier is $250 while the unit cost of the rotor is $60. The holding cost for Power Pumps is 10% of purchasing price.

1. What would be the economic order quantity for these rotors?

|  |  |
| --- | --- |
| a. | 400 |
| b. | 600 |
| c. | 1,000 |
| d. | 3,000 |

ANS: C PTS: 1 DIF: Medium

2. How many times per year would Power Pumps have to place an order?

|  |  |
| --- | --- |
| a. | 4 |
| b. | 12 |
| c. | 15 |
| d. | 30 |

ANS: B PTS: 1 DIF: Easy

3. What would be the total annual inventory cost for this part?

|  |  |
| --- | --- |
| a. | $6,000 |
| b. | $7,500 |
| c. | $8,800 |
| d. | $9,600 |

ANS: A PTS: 1 DIF: Medium

Italia Aerospace Industries (IAI) produces parts for Boeing and Airbus. One of their most important parts is the stringer—a critical part of a commercial aircraft’s fuselage. In order to produce these stringers, IAI needs fasteners, which they purchase in huge quantities from a Japanese firm. Italia Aerospace Industries will require 200,000 fasteners for next year. The cost of placing an order is $2,000 because of legal requirements. The unit cost of a fastener is $26. The holding cost for IAI is 13.5% of purchasing price.

4. What would be the economic order quantity (round off) for these fasteners?

|  |  |
| --- | --- |
| a. | 13,786 |
| b. | 14,256 |
| c. | 15,097 |
| d. | 16,197 |

ANS: C PTS: 1 DIF: Medium

5. How many times per year would IAI have to place an order? (Round to two decimal places.)

|  |  |
| --- | --- |
| a. | 13.25 |
| b. | 15.17 |
| c. | 20.35 |
| d. | 27.40 |

ANS: A PTS: 1 DIF: Easy

6. What would be the total annual inventory cost for this part?

|  |  |
| --- | --- |
| a. | $40,453.11 |
| b. | $48,986.23 |
| c. | $52,990.57 |
| d. | $70,897.26 |

ANS: C PTS: 1 DIF: Medium

Neurogenetics is a biotech firm. Their latest breakthrough drug requires a special chemical, which is purchased in gallon quantities. For the upcoming year, Neurogenetics has determined it will require 2,400 gallons. Because this chemical in its natural form has been classified as toxic, it requires federal approval, and this makes the cost of placing an order expensive. It has been estimated that the cost of placing an order is $4,500. The cost of the chemical is $3,600 per gallon. Neurogenetics has a cost of holding the chemical at 15% of the purchase price.

7. What would be the economic order quantity (round off) in gallons?

|  |  |
| --- | --- |
| a. | 126 |
| b. | 180 |
| c. | 200 |
| d. | 234 |

ANS: C PTS: 1 DIF: Medium

8. How many times per year would Neurogenetics have to place an order?

|  |  |
| --- | --- |
| a. | 19.0 |
| b. | 13.3 |
| c. | 12.0 |
| d. | 10.3 |

ANS: C PTS: 1 DIF: Easy

9. What would be the total annual inventory cost for this part?

|  |  |
| --- | --- |
| a. | $82,500 |
| b. | $89,800 |
| c. | $100,000 |
| d. | $108,000 |

ANS: D PTS: 1 DIF: Medium

Perfect Perambulators makes upscale baby carriages. They have a subcontractor supply axles for the carriages. The annual demand for axles will be 39,000. The cost of processing an order is $560 per order. The unit cost of the axle is $38.80, and the cost of holding these axles is 12.5% of purchase cost.

10. What would be the economic order quantity (round off)?

|  |  |
| --- | --- |
| a. | 2,786 |
| b. | 3,001 |
| c. | 3,876 |
| d. | 6,002 |

ANS: B PTS: 1 DIF: Medium

11. How many times per year would Perfect Perambulators have a setup?

|  |  |
| --- | --- |
| a. | 8 |
| b. | 9 |
| c. | 11 |
| d. | 13 |

ANS: D PTS: 1 DIF: Easy

12. What would be the total annual inventory cost for this part?

|  |  |
| --- | --- |
| a. | $14,555 |
| b. | $17,890 |
| c. | $24,658 |
| d. | $30,764 |

ANS: A PTS: 1 DIF: Medium

Power Pumps produces a variety of commercial sump pumps. One of their models—Mighty Mo—is produced in a small plant in Missouri. Next year, Power Pumps anticipates on selling 2,000 units of the Mighty Mo. Each requires six rotors. Power Pumps has decided to build these rotors in house. The cost of a setup is $1,000 while the unit cost of the rotor is $70.50. They plan on a production rate of 40 rotors per day (they are operating 300 days per year) and will be using 25 per day. The holding cost for Power Pumps is 10% of purchasing price.

13. What would be the economic order quantity for these rotors?

|  |  |
| --- | --- |
| a. | 2,678 |
| b. | 2,845 |
| c. | 3,013 |
| d. | 4,126 |

ANS: C PTS: 1 DIF: Hard

14. How many times per year (round up) would Power Pumps have to have a setup?

|  |  |
| --- | --- |
| a. | 2 |
| b. | 4 |
| c. | 6 |
| d. | 9 |

ANS: B PTS: 1 DIF: Easy

15. What would be the total annual inventory cost for this part?

|  |  |
| --- | --- |
| a. | $13,450 |
| b. | $10,987 |
| c. | $ 7,966 |
| d. | $ 3,983 |

ANS: C PTS: 1 DIF: Hard

16. Italia Aerospace Industries (IAI) produces parts for Boeing and Airbus. One of their most important parts is the stringer—a critical part of a commercial aircraft’s fuselage. In order to produce these stringers, IAI needs fasteners, which they purchase in huge quantities from a Japanese firm. Italia Aerospace Industries will require 200,000 fasteners for next year. As part of a larger effort to control their system, IAI has decided to produce the fasteners in house. The cost of a setup will be $750. Since IAI will be producing 250 days a year, the production rate will be 800 fasteners per day and will use 400 per day. The unit cost of a fastener will be $27. If the holding cost for IAI is 13.5% of purchasing price, what would be the economic order quantity (round off) for these fasteners?

|  |  |
| --- | --- |
| a. | 12,830 |
| b. | 15,987 |
| c. | 28,206 |
| d. | 31,043 |

ANS: A PTS: 1 DIF: Hard

Neurogenetics is a biotech firm. Their latest breakthrough drug requires a special chemical, which is purchased in gallon quantities. For the upcoming year, Neurogenetics has determined it will require 2,400 gallons. Because this chemical in its natural form has been classified as toxic, it requires federal approval, and this makes the cost of placing an order expensive. So Neurogenetics is looking at making the chemical in house. The cost of the chemical would now be $3,900 per gallon. Each setup to produce the chemical would be $11,000. The production rate would be 100 gallons per day while the use would be 75 gallons per day. Neurogenetics has a cost of holding the chemical at 15% of the purchase price.

17. What would be the economic order quantity (round off) in gallons?

|  |  |
| --- | --- |
| a. | 524 |
| b. | 578 |
| c. | 601 |
| d. | 610 |

ANS: C PTS: 1 DIF: Hard

18. How many times per year (round up) would Neurogenetics have to have a setup?

|  |  |
| --- | --- |
| a. | 2 |
| b. | 4 |
| c. | 6 |
| d. | 9 |

ANS: B PTS: 1 DIF: Easy

19. What would be the total annual inventory cost?

|  |  |
| --- | --- |
| a. | $56,984 |
| b. | $67,902 |
| c. | $72,870 |
| d. | $87,875 |

ANS: D PTS: 1 DIF: Hard

Perfect Perambulators makes upscale baby carriages. They have had a subcontractor supply axles for the carriages. They have decided to manufacture these axles in house. The cost of a setup will be $1,300. They intend on producing 130 axles per day while using 100 axles each day. The unit cost of the axle is $50.00, and the cost of holding these axles is 12.5% of purchase cost.

20. What would be the economic order quantity (round off)?

|  |  |
| --- | --- |
| a. | 8,385 |
| b. | 8,764 |
| c. | 8,892 |
| d. | 8,912 |

ANS: A PTS: 1 DIF: Hard

21. How many times per year (round up) would Perfect Perambulators have to have a setup?

|  |  |
| --- | --- |
| a. | 3 |
| b. | 4 |
| c. | 5 |
| d. | 6 |

ANS: C PTS: 1 DIF: Easy

22. What would be the total annual inventory cost for this part?

|  |  |
| --- | --- |
| a. | $11,976 |
| b. | $12,093 |
| c. | $13,902 |
| d. | $15,002 |

ANS: B PTS: 1 DIF: Hard

23. Power Pumps produces a variety of commercial sump pumps. One of their models—Mighty Mo—is produced in a small plant in Missouri. Next year Power Pumps anticipates on selling 2,000 units of the Mighty Mo. Each requires six rotors, which Power Pumps purchases from an overseas supplier. The cost of placing an order to this supplier is $250 while the unit cost of the rotor is $60. However, if Power Pumps orders 2,000 rotors at a time, the cost will be lowered to $55. If the holding cost for Power Pumps is 10% of purchasing price, what would be the total ordering cost for these discounted rotors?

|  |  |
| --- | --- |
| a. | $6,000 |
| b. | $6,200 |
| c. | $7,000 |
| d. | $8,800 |

ANS: C PTS: 1 DIF: Medium

24. Power Pumps produces a variety of commercial sump pumps. One of their models—Mighty Mo—is produced in a small plant in Missouri. Next year, Power Pumps anticipates on selling 2,000 units of the Mighty Mo. Each requires six rotors, which Power Pumps purchases from an overseas supplier. The cost of placing an order to this supplier is $250 while the unit cost of the rotor is $60. However, if Power Pumps orders 3,000 rotors at a time, the cost will be lowered to $52. If the holding cost for Power Pumps is 10% of purchasing price, what would be the total ordering cost for these discounted rotors?

|  |  |
| --- | --- |
| a. | $6,000 |
| b. | $6,200 |
| c. | $7,000 |
| d. | $8,800 |

ANS: D PTS: 1 DIF: Medium

25. Italia Aerospace Industries (IAI) produces parts for Boeing and Airbus. One of their most important parts is the stringer—a critical part of a commercial aircraft’s fuselage. In order to produce these stringers, IAI needs fasteners, which they purchase in huge quantities from a Japanese firm. Italia Aerospace Industries will require 200,000 fasteners for next year. The cost of placing an order is $2,000 because of legal requirements. The unit cost of a fastener is $26. The holding cost for IAI is 13.5% of purchasing price. The supplier offers several quantity discounts. The first would reduce the price of the fastener to $24 if the order size were 25,000 fasteners. What would be the total inventory cost for this offer?

|  |  |
| --- | --- |
| a. | $52,991 |
| b. | $56,500 |
| c. | $63,500 |
| d. | $75,500 |

ANS: B PTS: 1 DIF: Medium

26. Italia Aerospace Industries (IAI) produces parts for Boeing and Airbus. One of their most important parts is the stringer—a critical part of a commercial aircraft’s fuselage. In order to produce these stringers, IAI needs fasteners, which they purchase in huge quantities from a Japanese firm. Italia Aerospace Industries will require 200,000 fasteners for next year. The cost of placing an order is $2,000 because of legal requirements. The unit cost of a fastener is $26. The holding cost for IAI is 13.5% of purchasing price. The supplier offers several quantity discounts. The second would reduce the price of the fastener to $20 if the order size were 50,000 fasteners. What would be the total inventory cost for this offer?

|  |  |
| --- | --- |
| a. | $52,991 |
| b. | $56,500 |
| c. | $63,500 |
| d. | $75,500 |

ANS: D PTS: 1 DIF: Medium

27. Acme Farm Supplies sells a variety of fertilizers. On average, they sell 100 bags a day. The lead time for ordering is 7 days. What is the reorder point?

|  |  |
| --- | --- |
| a. | 100 |
| b. | 500 |
| c. | 700 |
| d. | 1,000 |

ANS: C PTS: 1 DIF: Easy

28. Miskatonic University’s bookstore sells snacks to its students. The most popular snack is Leonard’s Cookies. On average, they sell 16 bags a day. If the lead time for this product is 4 days, what would be the reorder point?

|  |  |
| --- | --- |
| a. | 4 |
| b. | 16 |
| c. | 32 |
| d. | 64 |

ANS: D PTS: 1 DIF: Easy

29. Felix’s Groceries sells, on average, nine 2-liter bottles of soda every day. If the lead time is 7 days, what would be the reorder point?

|  |  |
| --- | --- |
| a. | 9 |
| b. | 18 |
| c. | 27 |
| d. | 63 |

ANS: D PTS: 1 DIF: Easy

30. Perfect Perambulators uses a subcontractor to provide handles. If they need 24 handles a day, and the lead time for ordering handles is 4 days, what is the reorder point?

|  |  |
| --- | --- |
| a. | 24 |
| b. | 48 |
| c. | 96 |
| d. | 108 |

ANS: C PTS: 1 DIF: Easy

31. Perfect Perambulators uses a subcontractor to provide handles. They need 24 handles a day, and the lead time for ordering handles is 4 days. After negotiations, the subcontractor is required to reduce the lead time to 1.5 days. By how much does this lower the reorder point?

|  |  |
| --- | --- |
| a. | 24 |
| b. | 60 |
| c. | 72 |
| d. | 96 |

ANS: B PTS: 1 DIF: Medium

32. Miskatonic University’s bookstore sells snacks to its students. The most popular snack is Leonard’s Cookies. On average, they sell 16 bags a day. If the lead time for this product is 4 days, with a standard deviation of 2 days, what would be the reorder point if Miskatonic wants a 95% service level?

|  |  |
| --- | --- |
| a. | 66.12 |
| b. | 70.58 |
| c. | 73.32 |
| d. | 83.16 |

ANS: B PTS: 1 DIF: Medium

33. Miskatonic University’s bookstore sells snacks to its students. The most popular snack is Leonard’s Cookies. On average, they sell 16 bags a day. If the lead time for this product is 4 days, with a standard deviation of 2 days, what would be the reorder point if Miskatonic wants a 99% service level?

|  |  |
| --- | --- |
| a. | 66.12 |
| b. | 70.58 |
| c. | 73.32 |
| d. | 83.16 |

ANS: C PTS: 1 DIF: Medium

34. Felix’s Groceries sells, on average, nine 2-liter bottles of soda every day. If the lead time is 7 days, with a standard deviation of 4 days, what would be the reorder point if Felix wants a 95% service level?

|  |  |
| --- | --- |
| a. | 63.00 |
| b. | 72.23 |
| c. | 80.41 |
| d. | 87.66 |

ANS: C PTS: 1 DIF: Medium

35. Felix’s Groceries sells, on average, nine 2-liter bottles of soda every day. If the lead time is 7 days, with a standard deviation of 4 days, what would be the reorder point if Felix wants a 99% service level?

|  |  |
| --- | --- |
| a. | 63.00 |
| b. | 72.23 |
| c. | 80.41 |
| d. | 87.66 |

ANS: D PTS: 1 DIF: Medium

36. Perfect Perambulators uses a subcontractor to provide handles. If they need 24 handles a day, and the lead time for ordering handles is 4 days, with a standard deviation of 2 days, what would be the reorder point if Perfect Perambulators wanted a 95% service level?

|  |  |
| --- | --- |
| a. | 96.00 |
| b. | 100.00 |
| c. | 102.58 |
| d. | 105.32 |

ANS: C PTS: 1 DIF: Medium

37. Perfect Perambulators uses a subcontractor to provide handles. If they need 24 handles a day, and the lead time for ordering handles is 4 days, with a standard deviation of 2 days, what would be the reorder point if Perfect Perambulators wanted a 99% service level?

|  |  |
| --- | --- |
| a. | 96.00 |
| b. | 100.00 |
| c. | 102.58 |
| d. | 105.32 |

ANS: D PTS: 1 DIF: Medium

38. Perfect Perambulators uses a subcontractor to provide handles. They need 24 handles a day. After negotiations, the subcontractor was required to reduce the lead time to 1.5 days, and they had a standard deviation of 1 day. What would be the reorder point if Perfect Perambulators wanted a 95% service level?

|  |  |
| --- | --- |
| a. | 36.00 |
| b. | 38.01 |
| c. | 38.85 |
| d. | 42.65 |

ANS: B PTS: 1 DIF: Medium

39. Perfect Perambulators uses a subcontractor to provide handles. They need 24 handles a day. After negotiations, the subcontractor was required to reduce the lead time to 1.5 days, and they had a standard deviation of 1 day. What would be the reorder point if Perfect Perambulators wanted a 99% service level?

|  |  |
| --- | --- |
| a. | 36.00 |
| b. | 38.01 |
| c. | 38.85 |
| d. | 42.65 |

ANS: C PTS: 1 DIF: Medium

40. Richard’s Stationary is the single office supplies business in a small town. Since several businesses moved into the local business park, sales have soared. The average sales of packages of paper runs 112 a day. The lead time is 27 days, with a standard deviation of 9 days. Both demand and lead time are normally distributed. What would be the reorder point (round up) if Richard’s Stationary wanted a 95% service level?

|  |  |
| --- | --- |
| a. | 2,430 |
| b. | 3,101 |
| c. | 3,321 |
| d. | 4,563 |

ANS: B PTS: 1 DIF: Medium

41. Richard’s Stationary is the single office supplies business in a small town. Since several businesses moved into the local business park, sales have soared. The average sales of packages of paper runs 112 a day. The lead time is 27 days, with a standard deviation of 9 days. Both demand and lead time are normally distributed. By how much would the reorder point increase (round up) if Richard’s Stationary wanted a 99% service level?

|  |  |
| --- | --- |
| a. | 21 |
| b. | 27 |
| c. | 32 |
| d. | 44 |

ANS: C PTS: 1 DIF: Medium

42. Rossum’s Universal Robots produces a household assistant robot. It requires a complex motherboard, which is supplied by a subcontractor. The daily demand for the motherboards are 20 units per day, with a standard deviation of 5 units. The lead time for this item is 5 days, with a standard deviation of 2 days. What should be the reorder point (rounded) if Rossum wants a 95% service level?

|  |  |
| --- | --- |
| a. | 100 |
| b. | 125 |
| c. | 153 |
| d. | 167 |

ANS: D PTS: 1 DIF: Hard

43. Rossum's Universal Robots produces a household assistant robot. It requires a complex motherboard, which is supplied by a subcontractor. The daily demand for the motherboards are 20 units per day, with a standard deviation of 5 units. The lead time for this item is 5 days, with a standard deviation of 2 days. What should be the reorder point (rounded) if Rossum wants a 99% service level?

|  |  |
| --- | --- |
| a. | 167 |
| b. | 196 |
| c. | 208 |
| d. | 232 |

ANS: B PTS: 1 DIF: Hard

Felix’s Groceries stocks boxes of chocolates. On average, they sell 25 boxes of chocolates a day, with a standard deviation of 4 boxes. The lead time is 5 days, and the review period is 21 days. Felix targets a service level of 95%.

44. What is the target inventory level (rounded)?

|  |  |
| --- | --- |
| a. | 567 |
| b. | 684 |
| c. | 726 |
| d. | 801 |

ANS: B PTS: 1 DIF: Hard

45. What is the average amount of safety stock (rounded)?

|  |  |
| --- | --- |
| a. | 22 |
| b. | 29 |
| c. | 34 |
| d. | 45 |

ANS: C PTS: 1 DIF: Hard

46. If the amount on hand at reorder time is 125 boxes, what should the order quantity be?

|  |  |
| --- | --- |
| a. | 327 |
| b. | 432 |
| c. | 559 |
| d. | 684 |

ANS: C PTS: 1 DIF: Hard

Rossum’s Universal Robots produces an upscale voice-activated robot toy, which also has a remote control. It generates $340 in revenue if the voice-activated component functions properly and costs Rossum $200 to manufacture. Those robots that are not sold during the peak holiday season will be subsequently sold at a discount of $240. The estimated demand for the upcoming holiday season is 29,000 units, with a standard deviation of 2,000 units.

47. What would be the service level?

|  |  |
| --- | --- |
| a. | 66.7% |
| b. | 77.8% |
| c. | 79.9% |
| d. | 85.0% |

ANS: B PTS: 1 DIF: Medium

48. What would be the optimal stocking level?

|  |  |
| --- | --- |
| a. | 27,480 |
| b. | 29,000 |
| c. | 30,520 |
| d. | 32,000 |

ANS: C PTS: 1 DIF: Medium

49. Richard’s Stationary is the single office supplies business in a small town. Since several businesses moved into the local business park, sales have soared. The average sales of pen sets run 20 a day, with a standard deviation of 5 sets. The lead time is 5 days, with a standard deviation of 3 days. Both demand and lead time are normally distributed. What would be the reorder point (rounded) if Richard’s Stationary wanted a 95% service level?

|  |  |
| --- | --- |
| a. | 100 |
| b. | 145 |
| c. | 200 |
| d. | 242 |

ANS: C PTS: 1 DIF: Hard

50. Richard’s Stationary is the single office supplies business in a small town. Since several businesses moved into the local business park, sales have soared. The average sales of pen sets run 20 a day, with a standard deviation of 5 sets. The lead time is 5 days, with a standard deviation of 3 days. Both demand and lead time are normally distributed. What would be the reorder point (rounded) if Richard’s Stationary wanted a 95% service level?

|  |  |
| --- | --- |
| a. | 100 |
| b. | 145 |
| c. | 200 |
| d. | 242 |

ANS: D PTS: 1 DIF: Hard