CPIM Production Mgmt Prep

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Practice Questions

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1. Based on the following manufacturing defect rate data, determine which quality tool is most appropriate for monitoring and detecting small shifts in the mean of the manufacturing process over time. Time Period Defect Rate (%) Quarter 1 0.5 Quarter 2 0.4 Quarter 3 0.7 Quarter 4 0.6

A. Check sheet
B. Cause-and-effect diagram
C. Scatter diagram
D. Statistical Process Control (SPC)

2. A manufacturing plant has implemented a new process improvement initiative where employees are encouraged to submit ideas for small changes that can enhance production efficiency and quality. What philosophy does this practice exemplify?

A. Top-down management strategies
B. Continuous process improvement
C. Short-term financial performance
D. Large-scale automation projects

3. An electric car manufacturer's sales data over a decade shows varying adoption rates in response to technological advancements and policy changes. What term best describes this changing adoption pattern?

A. Flexible
B. Consistent
C. Dynamic
D. Stable

4. The production department suspects forecast inaccuracies leading to excess inventory. Using the following data, calculate the tracking signal to identify if there is any demand bias in the sales forecast. Month Forecast Error MAD January -10 5 February -5 4 March 0 3 April 5 4 May -5 4 June 10 5 July 5 5 August -10 5 September 15 7 October -15 6 November 10 8 December -10 6

A. 2
B. -1.94
C. 0
D. 3.75

5. In inventory management, which of the following is most critical for making short-term inventory replenishment decisions?

A. Sales forecasts
B. Supply schedules
C. Historical sales data
D. Customer orders

6. A company producing electronic devices has found a consistent deviation between forecasted and actual sales, indicating bias in their sales forecast. What is the best course of action to address this issue?

A. Decrease production quantity
B. Remove seasonal factors from the forecast
C. Adjust the sales forecast
D. Increase the sales target

7. Which of the following is a reason companies utilize ERP systems for inventory management?

A. ERP systems do not require any training for employees
B. Integrated data management leading to improved accuracy
C. ERP systems are cheaper than manual inventory processes
D. ERP systems are easier to use than spreadsheets

8. Which of the following terms refers to the expenses associated with storing unsold goods?

A. Ordering Costs
B. Setup Costs
C. Stockout Costs
D. Holding Costs

9. Analyze the impact on an assembly line when a critical component runs out of stock. Identify which of the following is not a potential consequence when the component is unavailable.

A. Production delays
B. Increased equipment downtime
C. Quality inspections will decrease
D. Increased overtime

10. A retail store is planning inventory for winter coats. The management has determined a safety factor of 1.28 with the expectation of allowing two backorders annually. With a seasonal demand of 15,000 units, they order batches of 1,500 units each, and the lead time standard deviation is 100 units, with a lead time of two weeks. What should the safety stock be? Item Safety Factor Seasonal Demand Order Quantity Lead Time Std Dev (units) Lead Time (weeks) Winter Coats 1.28 15,000 1,500 100 2

A. 1,280
B. 1,500
C. 128
D. 100

11. In the XYZ inventory management system, which principle is best applied to manage "Z" category items?

A. Focus primarily on maximizing sales for these items
B. Reduce stock levels for cost efficiency
C. Maintain ample stock to avoid disruptions
D. Ensure stringent stock control to minimize loss

12. An organization is introducing a new product, with expected demand of 5000 units annually. Each order costs $50, and the annual holding cost per unit is $2. Calculate the Economic Order Quantity (EOQ) using the data below. Variable Value Annual Demand (D) 5000 units Order Cost (S) $50 per order Holding Cost (H) $2 per unit per year

A. 100 units
B. 250 units
C. 400 units
D. 500 units

13. In the framework of Sales & Operations Planning (S&OP), identify the key process that acts as the intermediary between demand forecasting and capacity planning by analyzing production efficiency. Demand Forecast Accuracy (%) Capacity Available (Units) Actual Output (Units) 90 1000 850 85 1200 1020 95 900 855

A. Master scheduling
B. Distribution planning
C. Production planning
D. Inventory management

14. Which of the following actions best represents the role of advanced logistics systems in a retail environment?

A. Optimize distribution routes
B. Schedule deliveries to a bottleneck distribution center
C. Maintain higher inventory levels at distribution centers
D. Utilize transport capacity efficiently

15. In a subscription-based service industry, what S&OP demand information input is crucial to forecast customer demand accurately for strategic planning?

A. Customer subscription renewal rates
B. Production lead times
C. Inventory levels
D. Product design specifications

16. In a modern warehouse management system, which RFID tag function relates closest to the concept of backflushing? RFID Tag Description 001 Monitors stock replenishment 002 Tracks goods movement 003 Automatically deducts dispatched items from inventory 004 Alerts for low inventory levels

A. Monitors stock replenishment
B. Tracks goods movement
C. Alerts for low inventory levels
D. Automatically deducts dispatched items from inventory

17. In a manufacturing facility experiencing sudden fluctuations in its production schedules due to an unexpected surge in orders, which of the following strategies could a production manager implement to stabilize the schedules and reduce system disruptions?

A. Only revise production schedules once per month
B. Extend the order time fence period
C. Increase the number of firm planned orders
D. Ignore fluctuations in order input

18. Given the resources below, calculate the equivalent weeks required to complete a construction project requiring 160 hours of labor. Resource Quantity Unit Workers 4 workers Work hours per day 8 hours Utilization 85% Efficiency 75% Total required hours 160 hours

A. 1.57 weeks
B. 2 weeks
C. 0.5 weeks
D. 3 weeks

19. Which of the following is not typically included with a shipment leaving a distribution center?

A. Human Resources Report
B. Packing Slip
C. Shipping Label
D. Delivery Instructions

20. Inputs to a demand forecast include all except which of the following?

A. Market trends
B. Economic indicators
C. Production schedule
D. Historical sales data

21. An order for 250 widgets is scheduled at Work center B. The setup time is 15 minutes, and the standard production time is 0.1 hours per widget. What is the total operation time for this order?

A. 24 hours
B. 10.5 hours
C. 250.5 hours
D. 25.25 hours

22. A printing press needs to produce 500 copies of a newspaper. The setup time for the press is 2 hours, and it takes 0.1 hours to print each copy. What is the total production time required for the batch of newspapers?

A. 24 hours
B. 52 hours
C. 50 hours
D. 25 hours

23. In supply chain management, Vendor-Managed Inventory (VMI) is a strategy to optimally manage stock levels. What is the primary purpose of VMI in improving the supply chain?

A. Facilitating more frequent customer purchases
B. Improving supply chain efficiency by allowing suppliers to manage inventory
C. Reducing the need for customer feedback on inventory levels
D. Maximizing product price margins for suppliers

24. Which department in an organization would typically provide data regarding the supplier performance metrics during a strategic supply chain planning meeting?

A. Finance
B. Production
C. Distribution
D. Procurement

25. A company is aiming to reduce its carbon footprint as part of its supply chain sustainability efforts. During stage 2 of adopting sustainability strategies, which tool can help the company gain cost advantages by effectively managing their carbon footprint?

A. Carbon footprint analysis
B. Life cycle analysis
C. Product life cycle management
D. Activity-based costing

26. What design approach focuses on minimizing environmental impact by reducing resource consumption and waste during the lifecycle of a product?

A. Sustainable Engineering
B. Zero Waste Design
C. Design for Environment (DFE)
D. Cradle to Cradle Design

27. Based on the quarterly financial data provided, determine the net profit for Q2 by calculating the difference between total sales and operational costs. Express your answer in thousands. Quarter Total Sales (in thousands) Operational Costs (in thousands) Q1 500 350 Q2 600 400 Q3 550 370 Q4 650 480

A. 200
B. 150
C. 100
D. 250

28. In the following phases of product development, which phase has the highest cost associated with it? Phase Cost Allocation (%) Research and Development 25% Prototyping 15% Manufacturing 35% Marketing 25%

A. Marketing
B. Manufacturing
C. Research and Development
D. Prototyping

29. Several supply chain projects have been evaluated based on their financial performance. One financial metric is defined as the ratio that divides the initial investment by the expected annual net cash income. Which metric is described by this calculation? Project Initial Investment Annual Net Cash Income Project A $500,000 $100,000 Project B $750,000 $150,000 Project C $1,000,000 $200,000 Project D $300,000 $75,000

A. Net profit margin
B. Return on Capital Employed (ROCE)
C. Inventory turnover ratio
D. Return on assets

30. Which of the following methods does NOT align with a push-based inventory distribution strategy in retail supply chain management?

A. Centralized forecasting and allocation plan
B. Products are distributed from central warehouse to stores
C. Stock levels are monitored for automatic replenishment
D. Inventory orders are based on individual store manager requests

Answer Key & Explanations

1. D — Statistical Process Control (SPC)
The correct answer is Statistical Process Control (SPC). SPC is used to monitor production processes, allows detection of small shifts in mean, and is math-based using control charts and range limits. Check sheets are for data collection, cause-and-effect diagrams identify causes of problems, and scatter diagrams are for analyzing relationships between two variables.

2. B — Continuous process improvement
Answer: Continuous process improvement The manufacturing plant's approach of involving employees to suggest small, incremental changes reflects continuous process improvement. This philosophy focuses on ongoing, small-scale improvements driven by workers directly involved with the processes.

3. C — Dynamic
Answer: Dynamic A dynamic adoption pattern reflects changes over time due to external factors like innovations and regulations, impacting consumer behavior and technology uptake. A stable adoption pattern retains the same shape over time, indicating constant consumer behavior despite external changes.

4. B — -1.94
To calculate the tracking signal, sum the forecast errors: (-10) + (-5) + 0 + 5 + (-5) + 10 + 5 + (-10) + 15 + (-15) + 10 + (-10) = -10. Calculate the MAD as the average of the provided MAD values: $$\frac{5+4+3+4+4+5+5+5+7+6+8+6}{12}$$ = 5.17. The tracking signal is $$\frac{-10}{5.17}$$ = -1.94. A negative tracking signal indicates a potential bias towards underestimation.

5. D — Customer orders
Answer: Customer orders In short-term inventory replenishment, the most critical data comes from customer orders, as they represent actual demand. Sales forecasts, supply schedules, and historical sales data can support long-term planning but are not as critical for immediate decisions.

6. C — Adjust the sales forecast
When bias exists in sales forecasts, it indicates persistent errors that lead to consistent over or under-estimation of demand. The best course of action is to adjust the forecast to improve its accuracy and reliability. Increasing the sales target or decreasing production does not correct the forecast, and removing seasonal factors is irrelevant if bias is the primary concern.

7. B — Integrated data management leading to improved accuracy
Answer: Integrated data management leading to improved accuracy ERP systems integrate various business processes, providing accurate, real-time data across departments, reducing errors compared to manual entry systems. Contrary to the distractors, ERP systems often require significant upfront investment, training for users, and they may not necessarily be 'easier' than spreadsheets, but they offer significant efficiencies and reductions in errors.

8. D — Holding Costs
Answer: Holding Costs Holding costs, also known as carrying costs, include expenses related to storing

unsold goods in a warehouse or storage facility. Ordering costs are typically associated with the process of purchasing inventory. Setup costs relate to preparing equipment or processes for production. Stockout costs involve the expenses incurred when inventory is unavailable to meet customer demand.

9. C — Quality inspections will decrease
Answer: Quality inspections will decrease Except for decreased quality inspections, all these options are potential consequences when a critical component is unavailable on an assembly line. Quality inspections might increase to ensure remaining processes meet standards or remain unchanged, but they typically do not decrease. Increased overtime and production delays occur as the workers take extra time to correct and compensate for missing parts, while equipment downtime increases due to halted operations.

10. C — 128
To calculate the safety stock, multiply the safety factor by the standard deviation of the lead time. Safety stock = $$1.28 \times 100$$ Safety stock = 128

11. C — Maintain ample stock to avoid disruptions
The XYZ inventory system classifies items based on sales volume and criticality. 'Z' items are considered low value or less critical but may have high volume. Therefore, maintaining ample stock of 'Z' items is important to avoid interruptions in operations, as the cost of stock-out scenarios outweighs the cost of maintaining stock.

12. D — 500 units
To calculate the EOQ, use the formula $$Q^* = \sqrt{\left(\frac{2DS}{H}\right)}$$. Given : D = 5000 units/year, S = $50/order, H = $2/unit/year. Substitute into the EOQ formula: $$Q = \sqrt{\frac{2 \times 5000 \times 50}{2}}$$. This simplifies to $$Q = \sqrt{250,000} = 500$$ units.

13. A — Master scheduling
Master scheduling is the process that coordinates S&OP by taking demand forecasts and translating them into a feasible production schedule that aligns with capacity limitations. Efficiency is calculated using: $$\text{Efficiency} = \frac{\text{Actual Output}}{\text{Capacity Available}} \times 100\%$$ Utilization is calculated using: $$\text{Utilization} = \frac{\text{Capacity Requirements}}{\text{Capacity Available}} \times 100\%$$

14. A — Optimize distribution routes
Answer: Optimize distribution routes Advanced logistics systems focus on coordinating deliveries to minimize transportation costs, strategically planning routes and schedules to maximize efficiency and reduce waste in the transportation network.

15. A — Customer subscription renewal rates
Answer: Customer subscription renewal rates In a subscription-based service industry, understanding customer retention and renewal rates is key to accurate demand forecasting. These rates provide insight into the steady demand for services, which is vital for S&OP. Production lead times and inventory levels are not as relevant in this context.

16. D — Automatically deducts dispatched items from inventory
The concept of backflushing in manufacturing is about automatically deducting components from inventory as items are produced. Similarly, the RFID tag function that automatically deducts dispatched items serves a similar purpose of streamlining inventory processes by eliminating manual adjustments.

17. C — Increase the number of firm planned orders
Answer: Increase the number of firm planned orders. By increasing firm planned orders, the production manager reduces the frequency of changes to the production schedule, minimizing system disruptions. Ignoring fluctuations may result in production inefficiencies, revising schedules less frequently can leave orders unoptimized, and extending the order time fence period might delay reaction to genuine changes.

18. A — 1.57 weeks
Calculate the daily labor capacity using the formula: $$\text{Daily labor capacity} = \text{Workers} \times \text{Work hours per day} \times \text{Utilization} \times \text{Efficiency}$$ Daily labor capacity = $$4 \times 8 \times 0.85 \times 0.75 = 20.4$$ hours Next, find the equivalent weeks: $$\text{Equivalent weeks} = \frac{160}{20.4} / 5 \approx 1.57$$ weeks Therefore, the project requires approximately 1.57 weeks.

19. A — Human Resources Report
Answer: Human Resources Report A shipment leaving a distribution center usually includes documents like packing slips, shipping labels, delivery instructions, and invoices. These documents ensure the shipment is managed properly but do not include internal reports like human resources reports, which are irrelevant to the shipping process.

20. C — Production schedule
Answer: Production schedule The production schedule is an output derived from the demand forecast and other planning activities. Inputs to a demand forecast generally include historical sales data, market trends, and economic indicators, which help predict future demand. The production schedule, however, is not an input to the forecast but rather an output developed based on the forecast.

21. D — 25.25 hours
Answer: 25.25 hours Operation time = Setup Time + Run Time Setup time = 0.25 hours (note need to convert to hours from minutes) Run time = Quantity ordered \times standard time per unit Operation time = 0.25 + (250 \times 0.1) = 25.25

22. B — 52 hours
To calculate the total production time, use the formula: Production time = Setup time + (Run time per unit \times Total units) Production time = 2 + (0.1 \times 500) Production time = 2 + 50 Production time = 52 hours

23. B — Improving supply chain efficiency by allowing suppliers to manage inventory
The correct answer is improving supply chain efficiency by allowing suppliers to manage inventory. VMI enables suppliers to maintain optimal inventory levels, reduce stockouts, and ensure timely replenishments, thereby enhancing the overall efficiency and effectiveness of the supply chain.

24. D — Procurement
The Procurement department is responsible for managing relationships with suppliers and evaluating their performance based on various metrics such as delivery reliability, quality, and cost. Finance focuses on cost analysis, Production provides capacity and scheduling data, and Distribution manages logistics and inventory data.

25. A — Carbon footprint analysis
Answer: Carbon footprint analysis In stage 2 of adopting sustainability strategies, carbon footprint analysis helps companies identify and manage emission sources, allowing for cost advantages related to sustainability. Life cycle analysis focuses on assessing environmental impacts throughout a product's life.

Product life cycle management integrates various stages of a product's lifecycle. Activity-based costing allocates costs to activities involved in production.

26. C — Design for Environment (DFE)
Design for Environment (DFE) is a practice that aims at minimizing the environmental impacts of a product through careful design. It focuses on reducing resource usage, emissions, and the ecological footprint of a product throughout its entire lifecycle.

27. A — 200
To calculate the net profit for Q2, apply the formula: Net Profit = Total Sales - Operational Costs. For Q2, Total Sales = 600, Operational Costs = 400. Net Profit = 600 - 400 = 200 Thus, the net profit for Q2 is 200 thousand.

28. B — Manufacturing
Answer: Manufacturing Manufacturing has the highest cost associated with it in a product development cycle, accounting for 35% of the total costs. Research and Development and Marketing each have 25%, while Prototyping accounts for 15%.

29. B — Return on Capital Employed (ROCE)
The metric calculated by dividing the initial investment by the annual net cash income is known as the Return on Capital Employed (ROCE). This ratio measures how effectively a company uses its capital to generate profit. In contrast, the inventory turnover ratio, return on assets, and net profit margin all involve different components in their calculations.

30. D — Inventory orders are based on individual store manager requests
In a push-based strategy, inventory distribution is centrally managed based on forecasts and planned allocations rather than individual store requests. This ensures consistent supply across all stores.

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