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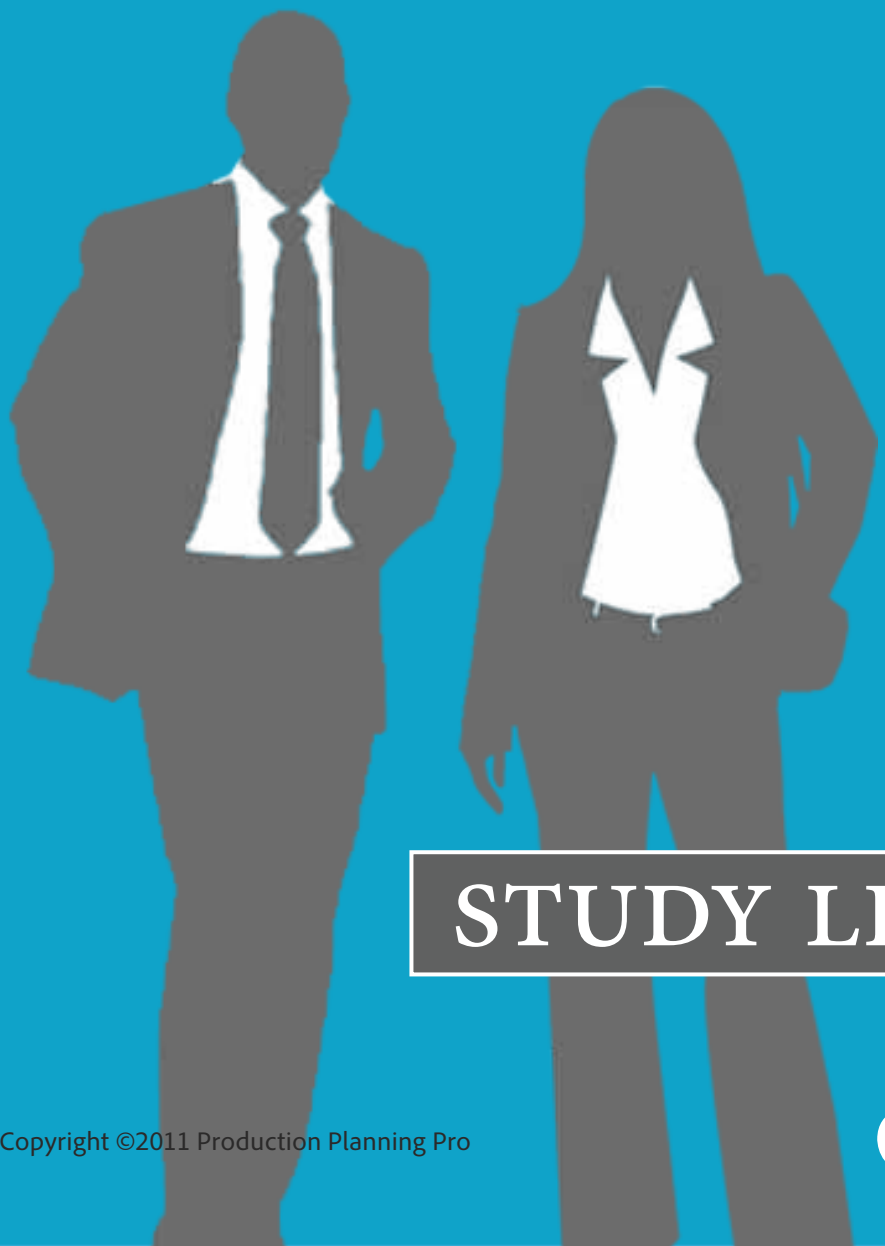
400 CPIM Practice Questions



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Ken & Peter
Production Planning Pro

Ken Gillette
Peter Murphy

Contents

Answer Sheets

BSCM Basics of Supply Chain Management

1	A	B	C	D	21	A	B	C	D	41	A	B	C	D	61	A	B	C	D
2	A	B	C	D	22	A	B	C	D	42	A	B	C	D	62	A	B	C	D
3	A	B	C	D	23	A	B	C	D	43	A	B	C	D	63	A	B	C	D
4	A	B	C	D	24	A	B	C	D	44	A	B	C	D	64	A	B	C	D
5	A	B	C	D	25	A	B	C	D	45	A	B	C	D	65	A	B	C	D
6	A	B	C	D	26	A	B	C	D	46	A	B	C	D	66	A	B	C	D
7	A	B	C	D	27	A	B	C	D	47	A	B	C	D	67	A	B	C	D
8	A	B	C	D	28	A	B	C	D	48	A	B	C	D	68	A	B	C	D
9	A	B	C	D	29	A	B	C	D	49	A	B	C	D	69	A	B	C	D
10	A	B	C	D	30	A	B	C	D	50	A	B	C	D	70	A	B	C	D
11	A	B	C	D	31	A	B	C	D	51	A	B	C	D	71	A	B	C	D
12	A	B	C	D	32	A	B	C	D	52	A	B	C	D	72	A	B	C	D
13	A	B	C	D	33	A	B	C	D	53	A	B	C	D	73	A	B	C	D
14	A	B	C	D	34	A	B	C	D	54	A	B	C	D	74	A	B	C	D
15	A	B	C	D	35	A	B	C	D	55	A	B	C	D	75	A	B	C	D
16	A	B	C	D	36	A	B	C	D	56	A	B	C	D	76	A	B	C	D
17	A	B	C	D	37	A	B	C	D	57	A	B	C	D	77	A	B	C	D
18	A	B	C	D	38	A	B	C	D	58	A	B	C	D	78	A	B	C	D
19	A	B	C	D	39	A	B	C	D	59	A	B	C	D	79	A	B	C	D
20	A	B	C	D	40	A	B	C	D	60	A	B	C	D	80	A	B	C	D

Answer Sheets

MPR Master Planning of Resources

1	A	B	C	D	21	A	B	C	D	41	A	B	C	D	61	A	B	C	D
2	A	B	C	D	22	A	B	C	D	42	A	B	C	D	62	A	B	C	D
3	A	B	C	D	23	A	B	C	D	43	A	B	C	D	63	A	B	C	D
4	A	B	C	D	24	A	B	C	D	44	A	B	C	D	64	A	B	C	D
5	A	B	C	D	25	A	B	C	D	45	A	B	C	D	65	A	B	C	D
6	A	B	C	D	26	A	B	C	D	46	A	B	C	D	66	A	B	C	D
7	A	B	C	D	27	A	B	C	D	47	A	B	C	D	67	A	B	C	D
8	A	B	C	D	28	A	B	C	D	48	A	B	C	D	68	A	B	C	D
9	A	B	C	D	29	A	B	C	D	49	A	B	C	D	69	A	B	C	D
10	A	B	C	D	30	A	B	C	D	50	A	B	C	D	70	A	B	C	D
11	A	B	C	D	31	A	B	C	D	51	A	B	C	D	71	A	B	C	D
12	A	B	C	D	32	A	B	C	D	52	A	B	C	D	72	A	B	C	D
13	A	B	C	D	33	A	B	C	D	53	A	B	C	D	73	A	B	C	D
14	A	B	C	D	34	A	B	C	D	54	A	B	C	D	74	A	B	C	D
15	A	B	C	D	35	A	B	C	D	55	A	B	C	D	75	A	B	C	D
16	A	B	C	D	36	A	B	C	D	56	A	B	C	D	76	A	B	C	D
17	A	B	C	D	37	A	B	C	D	57	A	B	C	D	77	A	B	C	D
18	A	B	C	D	38	A	B	C	D	58	A	B	C	D	78	A	B	C	D
19	A	B	C	D	39	A	B	C	D	59	A	B	C	D	79	A	B	C	D
20	A	B	C	D	40	A	B	C	D	60	A	B	C	D	80	A	B	C	D

Answer Sheets

DSP Detailed Scheduling and Planning

1	A	B	C	D	21	A	B	C	D	41	A	B	C	D	61	A	B	C	D
2	A	B	C	D	22	A	B	C	D	42	A	B	C	D	62	A	B	C	D
3	A	B	C	D	23	A	B	C	D	43	A	B	C	D	63	A	B	C	D
4	A	B	C	D	24	A	B	C	D	44	A	B	C	D	64	A	B	C	D
5	A	B	C	D	25	A	B	C	D	45	A	B	C	D	65	A	B	C	D
6	A	B	C	D	26	A	B	C	D	46	A	B	C	D	66	A	B	C	D
7	A	B	C	D	27	A	B	C	D	47	A	B	C	D	67	A	B	C	D
8	A	B	C	D	28	A	B	C	D	48	A	B	C	D	68	A	B	C	D
9	A	B	C	D	29	A	B	C	D	49	A	B	C	D	69	A	B	C	D
10	A	B	C	D	30	A	B	C	D	50	A	B	C	D	70	A	B	C	D
11	A	B	C	D	31	A	B	C	D	51	A	B	C	D	71	A	B	C	D
12	A	B	C	D	32	A	B	C	D	52	A	B	C	D	72	A	B	C	D
13	A	B	C	D	33	A	B	C	D	53	A	B	C	D	73	A	B	C	D
14	A	B	C	D	34	A	B	C	D	54	A	B	C	D	74	A	B	C	D
15	A	B	C	D	35	A	B	C	D	55	A	B	C	D	75	A	B	C	D
16	A	B	C	D	36	A	B	C	D	56	A	B	C	D	76	A	B	C	D
17	A	B	C	D	37	A	B	C	D	57	A	B	C	D	77	A	B	C	D
18	A	B	C	D	38	A	B	C	D	58	A	B	C	D	78	A	B	C	D
19	A	B	C	D	39	A	B	C	D	59	A	B	C	D	79	A	B	C	D
20	A	B	C	D	40	A	B	C	D	60	A	B	C	D	80	A	B	C	D

Answer Sheets

ECO Execution and Control of Resources

1	A	B	C	D	21	A	B	C	D	41	A	B	C	D	61	A	B	C	D
2	A	B	C	D	22	A	B	C	D	42	A	B	C	D	62	A	B	C	D
3	A	B	C	D	23	A	B	C	D	43	A	B	C	D	63	A	B	C	D
4	A	B	C	D	24	A	B	C	D	44	A	B	C	D	64	A	B	C	D
5	A	B	C	D	25	A	B	C	D	45	A	B	C	D	65	A	B	C	D
6	A	B	C	D	26	A	B	C	D	46	A	B	C	D	66	A	B	C	D
7	A	B	C	D	27	A	B	C	D	47	A	B	C	D	67	A	B	C	D
8	A	B	C	D	28	A	B	C	D	48	A	B	C	D	68	A	B	C	D
9	A	B	C	D	29	A	B	C	D	49	A	B	C	D	69	A	B	C	D
10	A	B	C	D	30	A	B	C	D	50	A	B	C	D	70	A	B	C	D
11	A	B	C	D	31	A	B	C	D	51	A	B	C	D	71	A	B	C	D
12	A	B	C	D	32	A	B	C	D	52	A	B	C	D	72	A	B	C	D
13	A	B	C	D	33	A	B	C	D	53	A	B	C	D	73	A	B	C	D
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20	A	B	C	D	40	A	B	C	D	60	A	B	C	D	80	A	B	C	D

Answer Sheets

SMR Strategic Management of Resources

1	A	B	C	D	21	A	B	C	D	41	A	B	C	D	61	A	B	C	D
2	A	B	C	D	22	A	B	C	D	42	A	B	C	D	62	A	B	C	D
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7	A	B	C	D	27	A	B	C	D	47	A	B	C	D	67	A	B	C	D
8	A	B	C	D	28	A	B	C	D	48	A	B	C	D	68	A	B	C	D
9	A	B	C	D	29	A	B	C	D	49	A	B	C	D	69	A	B	C	D
10	A	B	C	D	30	A	B	C	D	50	A	B	C	D	70	A	B	C	D
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14	A	B	C	D	34	A	B	C	D	54	A	B	C	D	74	A	B	C	D
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400 CPIM
Practice Questions

BSCM Basics of Supply Chain Management

Business-wide Concepts

Explanations for this section begin on PAGE 70.

1 A component has a fixed cost of $900 and a variable cost of $3.00 per unit. What is the average cost per unit if 3,000 are produced?

A $3.03
B $3.30
C $3.66
D $3.93

2 Forecasts are usually more accurate nearer in as opposed to farther out into the future. This is because:

A Near term holds less uncertainty
B More data is available near term
C The future is more dynamic in the near term
D The Delphi method allows experts to estimate market conditions

3 Forecasts will always have a significant margin of error yet they are still used in business. Why is this so?

A Forecasts provide insight into supply conditions
B Forecasts are the prelude to business planning
C Material requirements planning requires forecasting
D Master production scheduling cannot operate without a preliminary forecast

4 All of the following JIT principles can be used in an intermittent manufacturing shop EXCEPT:

A Preventive maintenance
B Employee empowerment
C Inventory reduction
D Continuous flow lines

5 Which manufacturing environment typically has the longest span time?

A Make-to-stock
B Make-to-order
C Engineer-to-order
D Assemble-to-order

6 Which of the following are considered a direct function in physical distribution?

A Kanban size
B Material handling
C Pull signals
D Manufacturing routers

7 Physical distribution best pertains to which of the following actions?

A Moving materials inside the factory
B Receiving goods on the dock
C Planning supplier delivery dates
D Projecting inventory levels

8 Which of the following is most likely to be an independent demand item?

A Subcontracted assembly for a copy machine
B Purchased component for a pallet stacker
C Manufactured subassembly in a computer
D Service part for an elevator

9 Production planning is generally a direct input into which of the following?

A Rough-cut capacity planning
B Master production scheduling
C Material requirements planning
D Customer order planning

10 Which of the following is most likely to be a dependent demand item?

A Torque wrench
B Purchased component
C Standard screws, nuts, and bolts
D End item shipped to customer

11 If a company needs to quickly increase production to meet a customer request, what is the easiest way to accomplish this?

A Contract temporary workers
B Hire more workers
C Work overtime
D Subcontract the work

12 A tracking signal will identify which of the following in a forecast?

A Density
B Bias
C Deviation
D Consolidation

13 A company's income statement will show which of the following?

A Inventory on hand
B Long-term debt
C Net cash available
D Cost of products sold

14 The ABC approach to inventory control is best described by which of the following?

A Stock ample "C" parts
B Stock ample "A" parts
C Always maintain a high-safety stock level
D Reduce the amount of "B" parts on hand

15 What is the law which states a small percentage of the population usually accounts for a large percentage of the outcome?

A Pareto's law
B Alfredo's law
C Newton's law
D Deming's law

16 When a company has taken on total employee involvement, what is the supervisor's primary responsibility?

A Coaching
B Controlling
C Mitigating
D Consoling

17 Product conformance can best be described as:

A Meeting specified requirements
B Providing highest quality solutions
C Adhering to company policies
D Engineering process changes

18 The main reasons companies invest heavily in scheduling is to:

A Achieve cost goals
B Properly load work centers
C Meet delivery dates
D Provide accurate promise dates

19 The term break even point is best described as:

A Product failure point
B Required capacity = available capacity
C Assets = liabilities
D Revenue = total cost

20 When operating within a Just-in-time manufacturing environment, waste is considered:

A Component scrap
B Any overhead process
C Operator overtime
D Any non-value added process

Demand Management

Explanations for this section begin on PAGE 72.

21 Demand for five periods has been 1000, 900, 450, 600, and 300. What is the mean?

A $450.00
B $550.00
C $650.00
D $900.00

22 When demand on a work center is caused by the next work center, and product is not made unless signaled by the next work center, this is known as a:

A ERP system
B Push system
C Flow system
D Pull system

23 The planned build schedule for manufacturing is best known as the:

A Strategic plan
B Material requirements plan
C Production plan
D Master production schedule

24 A company wants to produce hardware at a level rate and send 10 units to inventory. If their 6-month forecast reveals a total of 110 units demanded, what should be their monthly production rate?

A 20
B 10
C 16
D 18

25 Which of the following best describes the last step to developing a master production schedule?

A Resolve differences between the preliminary MPS and available capacity
B Design a preliminary MPS
C Check preliminary MPS against available capacity
D Check the MPS against the production plan to ensure they match

26 A product's demand over the past three months has been 360, 420, and 510. Calculate month four's forecast using a three-month moving average.

A 430
B 520
C 600
D 660

27 The material requirements planning system receives direct inputs from which of the following?

A Master production scheduling
B Purchasing
C Rough-cut capacity planning
D Capacity planning

28 A company's beginning inventory is 400 and their desired ending inventory is 500. The sales forecast over the next five months is 400, 450, 350, 500, 400. What should be their monthly level-loaded production rate?

A 420
B 400
C 440
D 500

29 Calculate a level-loaded monthly production quantity given a beginning inventory of 400, ending inventory of 200, and a three-month sales forecast of 500, 400, 800.

A 550
B 400
C 600
D 500

30 End items that are planned on a weekly basis and tied directly to the production plan are channeled through the:

A Detailed schedule
B Product family schedule
C Master production schedule
D Material requirements plan

31 The actual sales of a unit over the last 4 weeks have been 240, 220, 210, 250. With a MAD of 12, calculate the tracking signal for a part forecasted at 200 units per week.

A 12
B 10
C 8
D 14

32 Use a three=month moving average to project a forecast for month five.

Forecast: 150, 150, 150, 150
Demand: 170, 140, 210, 190

A 180
B 160
C 150
D 230

33 Calculate the Mean Absolute Deviation for the following data set:

Forecast: 200, 225, 250, 250, 225
Demand: 200, 210, 230, 220, 205

A 17
B 15
C 14
D 18

34 Tracking signals demonstrate a positive forecasting bias when they are:

A Less than one
B Greater than one
C Equal to one
D Equal to zero

35 A firms projected build schedule can best be described as:

A Master production Schedule
B Capacity plan
C Strategic plan
D Material requirements plan

36 When providing customers with accurate promise dates, what two scheduling techniques would a make to order operation utilize?

A Finite loading, Forward Scheduling
B Infinite loading, Forward scheduling
C Finite loading, Backward scheduling
D Infinite loading, Backward scheduling

37 When grouping like items together for planning purposes, a company is creating a:

A Phantom bill
B Planning bill
C Indented bill
D Projected bill

38 Inventory and planned production that is not yet allocated to orders is:

A Inventory allotment
B Available-to-promise
C Inventory quota
D Planned deficit

39 Companies implement time fences in order to:

A Increase forecasting accuracy
B Ensure on-time customer deliveries
C Provide stable supplier shipments
D Better manage schedule changes

40 The bill of material contains:

A Product components and subassembly descriptions
B Subassembly descriptions and labor requirements
C Product components and inventory requirements
D Subassembly descriptions and inventory requirements

Transformation of Demand into Supply

Explanations for this section begin on PAGE 75.

41 Lot-for-lot ordering rules based on net requirements will:

- **A** Order based on supplier preferences
- **B** Order in fixed intervals
- **C** Order only the amount needed
- **D** Order net requirements plus safety stock

42 Quick setup and changeover enhances customer satisfaction levels. All of the following are competitive advantages created by quick changeovers EXCEPT:

- **A** Reduced work in process
- **B** Improved quality
- **C** Improved maintenance
- **D** Reduced span times

43 Which of the following is true in regards to priority?

- **A** It involves maintaining the correct due dates on orders
- **B** It involves the accuracy of the forecast to meet demand
- **C** It refers to capacity requirements and production schedules
- **D** It refers to vendor due dates of incoming materials

45 Which of the following best describes the concept of capacity?

- **A** The amount of standard hours earned
- **B** The volume of inventory created
- **C** The rate of doing work
- **D** The quantity of work performed

44 A message to the planner regarding a problem that needs attention is known as a(n):

- **A** Error indication
- **B** Exception message
- **C** Acceptance notification
- **D** Order exception

46 A machining operation utilizes five machines working 14 hours a day, five days per week. What is the weekly available time?

- **A** 350
- **B** 400
- **C** 300
- **D** 250

47 A work cell has 275 hours per week of available time with a utilization rate of 80%. How many hours are actually being spent producing parts?

- **A** 120
- **B** 200
- **C** 220
- **D** 55

48 A work cell has 275 available hours, a utilization rate of 80% and an efficiency rate of 90%. What is the rated capacity for this cell?

A 198
B 212
C 164
D 85

49 Which characteristic best describes the frozen zone of a time fence?

A Costs for changing the production schedule are minimal
B Any change can be made to future orders
C Capacity and materials have been committed to specific orders
D Available capacity drives the ability to change the schedule

50 Which characteristic best describes the liquid zone of a time fence?

A Available capacity drives the ability to change the schedule
B Costly changes must be approved by upper management
C Capacity and materials have been committed to specific orders
D Any change can be made to the master production schedule within the production plan

51 Which of the following is NOT an input to the Material Requirements Plan?

A Master Production Schedule
B Production plan
C Inventory records
D Bill of materials

52 The amount of time needed for each order can be derived by adding which of the following:

A Run time, setup time, queue time, move time
B Run time, queue time
C Run time, setup time, queue time
D Run time, setup time

53 Achieving the plan with no more or less leftover best describes the concept of:

A Linearity
B Forecasting
C Detailed scheduling
D Heijunka

54 All of the following are benefits of subcontracting EXCEPT:

A Reduced cost
B Reduced overtime
C Reduced facility costs
D Reduced capacity requirements

55 Quickly growing work in process inventory is most likely attributable to which of the following?

A An increase in workers
B A bottleneck operation
C An increase in standard hours produced
D Machining efficiency

56 Which of the following would be correct in regards to bottlenecked operations?

A Throughput is controlled by the bottleneck
B Demand is less than capacity
C Capacity is greater than the downstream work cell
D Bottlenecks eventually fix themselves

57 What is the primary reason for which a firm would use operation splitting?

A Increase machinery effectiveness
B Reduce maintenance
C Reduce total span time
D Increase manpower efficiency

58 What is the primary reason for which a firm would use operation overlapping?

A Reduce manufacturing lead time
B Reduce maintenance
C Reduce cost of purchased parts
D Increase labor contribution

59 An order for 1,000 parts needs to be processed on two machines simultaneously. If both machines can be setup in 50 minutes, what is the elapsed operation time if each machine can produce four parts every two minutes?

A 1050
B 550
C 600
D 1200

60 A local manufacturer produces barstools consisting of a seat top, 4 legs, and 4 seat trims. Demand is slated at 1,000 completed units per week.

The capacity for seat tops is 1,200 per week, the capacity for legs is 3,200 per week, and the capacity for seat trim is 4,000. What is the manufacturer's capacity to produce barstools?

A 1200
B 1000
C 800
D 4000

Supply

Explanations for this section begin on PAGE 77.

61 Available capacity is determined by measurements and calculations. Measured capacity is derived from which of the following methods?

A Machine efficiency
B Historical data
C Machine utilization
D Floor stock inventory

62 A work cell has 5 machines running 7 days a week at 10 hours per day. Calculate the available time.

A 50 hours
B 70 hours
C 350 hours
D 35 hours

63 A work cell has 5 machines running 5 days a week at 8 hours per day. During the week, they produce for 170 hours. What is their utilization rate?

A 0.85
B 0.8
C 0.75
D 0.9

64 A work cell has 5 machines running 5 days a week at 8 hours per day. The cell is utilized 180 hours but produces 144 hours of standard work. What is the efficiency of this work center?

A 0.9
B 0.8
C 0.72
D 1.25

65 A work center has an order to process 450 units of part CP-M. It takes 30 minutes to setup and 5 minutes to run each piece. What is the total time required to complete the order?

A 35 hours
B 38 hours
C 28 hours
D 20 hours

66 All of the following are part of manufacturing lead time EXCEPT:

A Queue time
B Order time
C Wait time
D Move time

67 The primary role of the purchasing department in an organization is:

A Scheduling the suppliers plant so goods arrive on time
B Ordering parts at the absolute lowest cost
C Making sure the best possible service and prompt delivery are provided by the supplier
D Ordering to EOQ plus a safety stock factor determined by upper management

68 All of the following are crucial to selecting suppliers EXCEPT:

A Inventory turns
B Technical capability
C Financial stability
D Customer service levels

69 Price negotiations are determined greatly by the type of product being considered. Which of the following products could generally be negotiated?

A Made-to-order cabinetry
B Operating supplies
C Commodity items
D Standard electronic connectors

70 All of the following describe the advantage of a planner or buyer position EXCEPT:

A Improved coordination of shop floor requirements and the supplier
B Smooth flow of information between the supplier and the shop floor
C Improved flow of material through the shop floor
D Ability to match material requirements with supplier capability

71 The industry average for material purchases represents what percentage of product cost?

A 0.6
B 0.35
C 0.5
D 0.85

72 MRO inventory is best described as:

A The items used in production that are not part of the actual product
B Parts supplied and maintained solely by a third party
C Raw materials consumed during the production process
D Inventory in distribution or transit

73 All of the following are valid reasons for utilizing anticipation inventory EXCEPT:

A Peak season demand
B Price discounts
C Vacation shutdown
D Trade boycotts

74 What is the primary reason organizations purchase hedge inventory?

A Protect against surge demand
B Capitalize on quantity discounts
C Lock in low market prices
D Claim extended supplier warranties

75 All of the following are included in the cost of ordering EXCEPT:

A Holding costs
B Setup costs
C Lot sizing costs
D Finished goods inventory costs

76 All of the following will cause the EOQ concept to be invalid EXCEPT:

A Unlimited production run capacities
B Short shelf life items
C Products with uniform demand
D Products with volatile demands

77 A widget company wishes to maintain a safety stock of 200 units to help buffer a demand of 300 per week. If the lead time is 2 weeks, what is the order point?

A 700
B 800
C 400
D 100

78 In cases where there are small issues from inventory, transactions are expensive, ordering costs are small, and many items can be ordered together, which of the following should be used?

A Periodic review system
B Two-bin kanban system
C Small batch lot sizing
D Variable lot sizing

79 What is the major operating cost associated with warehousing?

A Labor costs
B System costs
C Capital costs
D Material costs

80 All of the following are causes of inventory record inaccuracy EXCEPT:

A Lean stockroom initiatives
B Unauthorized inventory transactions
C Poor transactional training
D Inexperienced material planners

MPR Master Planning of Resources

Demand Management

Explanations for this section begin on PAGE 79.

1 What is the mean absolute deviation of the following information?

A $4.00
B $0.20
C $0.50
D $6.00

2 Statistically speaking, one standard deviation equals approximately how many mean absolute deviations?

A 2
B 1.5
C 1.75
D 1.25

3 A tracking signal can be used in forecasting for what purpose?

A To show large positive or negative numbers and indicate an improper forecast for the item
B To indicate a trend in the forecast
C Tracking signals should be ignored except for high frequency
D None of the purposes are correct

4 A forecasting system would be required by which of the following demand types?

A Only independent demand
B Both independent demand and service part demand
C Only dependent demand
D Only service part demand

5 In which form are forecasts most accurate?

A Disaggregate forecasts are more accurate
B A forecast is more accurate further into the future
C Aggregate forecasts are generally more accurate than for a single item
D Forecasts are more accurate when they focus on smaller numbers

6 A given product had the following 4 monthly forecast errors. Calculate the MAD for Jan, Feb, Mar, and Apr if the errors were +200, -400, +300, and +100 respectively.

A 250
B 50
C 150
D 350

7 Use the information below to determine the mean absolute deviation (MAD) for the following four periods:

Forecast 100, 100, 100, 100
Demand 75, 50, 125, 150

A 37.5
B 42.5
C 25
D 0

8 How are service parts handled in an MRP system?

A As independent demand added to the inventory total
B As independent demand added to the parts gross requirements
C As dependent demand added to the parts gross requirements
D As dependent demand added to the inventory total

9 How many mean absolute deviations are needed in order to satisfy customer service at a 95% level?

A 2.06
B 2.26
C 2.51
D 1.66

10 What should the safety stock level be for a 95% service level if the sum of the forecast errors is 200 for four periods? (Round to nearest whole number)

A 62
B 103
C 206
D 141

11 Use the information below to determine the what the safety stock should be to achieve a 95% customer service level for five periods. (Round to nearest whole number)

Demand: 100, 150, 125, 100, 125
Forecast: 50, 125, 100, 125, 125

A 52
B 56
C 38
D 25

12 What purpose is served by the customer service measure of on time delivery?

A Evaluation of supplier performance
B Selecting the most cost effective mode of transportation
C Evaluation of manufacturing performance
D Determination of the forecast error

13 In what way does the rough-cut capacity plan differ from the resource plan?

A Lead times are offset in the rough-cut capacity plans
B The rough-cut capacity plan considers less production resources
C Rough-cut plans are displayed in months or quarters
D The rough-cut capacity plan is less detailed than the resource plan

14 Pegging can be used by the master scheduler to identify what information?

A Locations in need of safety stock
B Erroneous lead times
C A source requirement for a given item
D Constraints on the work center

15 Which of the following are directly evaluated by decisions concerning the master production schedule?

A Final assembly schedule
B Production activity control
C Both feasibility and need of resource availability and requirements
D Both capacity availability and long-range planning

16 In a company, the capacity required exceeds available capacity. Which off the following actions could be taken to solve the problem?

A Decide which orders to delay
B Subcontract
C Change the schedule
D Sell excess equipment

17 Which of the following is not a true statement in regards to the Final Assembly Schedule?

A It controls the production from shippable products to shipment
B It schedules the purchase of components not under MPS control which are needed for final assembly
C It is a statement of the exact set of end products to be built
D It controls the manufacturing from fabricated products to shippable products

18 Which of the following is not a way in which the master scheduler should adjust load profile?

A Shifting resources among work centers
B Adjusting requirements to different time periods
C Adjusting time fences
D Outsourcing production

19 In what way does the master scheduler consume the forecast outside the demand time fence?

A Computing the available-to-promise
B Using forecast when actual orders are less than forecast
C Multiplying the forecast errors by the actual orders
D Using actual orders when actual orders are less than forecast

20 Which of the following is not an objective of the master schedule?

A Maintain planning bills
B Changes are kept to a minimum
C A level-repeating schedule
D The schedule sums to the production plan

Sales and Operations Planning

Explanations for this section begin on PAGE 82.

21 For make-to-stock companies, a 100% service level implies huge inventory levels. In make-to-order companies, immediate delivery would imply:

A Supplier lead times of zero
B Substantial idle capacity
C Few engineering changes
D Significant expediting

22 In the business planning process, which of the following should come first?

A Rough-cut capacity plan
B Production planning
C Sales and Operations planning
D Master production schedule

23 Which of the following techniques is not useful for increasing capacity?

A Increase effective balancing of lines
B Increase queue time at critical work centers
C Form teams to increase output
D Increase throughput at bottlenecks

24 Which of the following is most likely to be stocked by a manufacturer in a make-to-order environment?

A Subassemblies
B Raw materials
C Finished goods
D Manufactured parts

25 Which of the following must be converted into dollars to allow the forecasting of cash flow in a make-to-order company?

A Schedule for final assembly
B Finished goods' carrying cost
C Percentages of standard yield
D Costs of critical work center

26 It is the responsibility of manufacturing to do which of the following once a company has agreed to the production plan?

A Meet the plan
B Improve the plan
C Change the master schedule to meet demand
D Create the capacity plan

27 In resource planning, a bill of resources is based on which of the following?

A The typical product lot size
B One unit of each product
C One unit of the typical product
D Each product's lot size

28 Outliers in the data of the forecast must be adjusted by what process?

A Double smoothing
B Exponential smoothing
C Filtering
D Trending

29 Why is forecast consumption important to master production scheduling?

A It keeps bias from creeping into the forecast
B It helps in elimination of poor data
C It provides supporting data to top management
D It monitors actual demand versus the forecast

30 During production planning, which of the following sources of demand should not be considered?

A Interplant transfer of parts
B Order backlog from customers
C Scheduled receipts
D Service part requirements

31 When the forecast is overstated which of the following would not be overestimated as a result?

A Component parts
B Factory load
C Subassembly parts
D Factory capacity

32 The purpose of a tracking signal is best defined as which of the following?

A Signaling that a specific job is behind schedule
B Signaling that a forecast is no longer valid
C Signaling that the MPS is overloaded
D Signaling that capacity is exceeded

33 Which of the following statements regarding a forecast is false?

A It is best to use forecasts which are closer to term
B Forecasts are good as planning tools only
C Aggregate forecasts are more accurate than for a single item
D Forecasts become more accurate the further in to the future they move

34 A given product had the following 4 monthly forecast errors. Calculate the MAD for Jan, Feb, Mar, and Apr if the errors were +300, -400, -200, and +500 respectively.

A 50
B 350
C 150
D 250

35 Which of the following best defines a backorder?

A Product which has been allocated but not issued to a manufacturing order
B Freight picked up on a return trip
C An unfilled customer order
D The last order on a shipment

36 Which of the following is the best definition for a data point which differs significantly from other data points?

A Skew
B Outlier
C Regression
D Signal

37 If exponential smoothing is used with an alpha factor of .20, what would be the forecast for April if the average was 100 units, and Jan, Feb, and Mar demand history was 130, 146, and 124 respectively?

A 116
B 106
C 114
D 100

38 Which of the following is the process by which the actual demand and the forecast are compared in the master schedule?

A Consuming the forecast
B A tracking signal
C Demand fencing
D Cumulative ATP

39 What is the best definition of a seasonal demand index?

A Alpha factor is greater than .5
B Ratio of demand above or below the average
C Weighs the most recent month's demand
D Beta factor to calculate seasonality

40 Which of the following problems with forecasting is the most critical for management?

A Short-term variations
B Controlling bias
C Forecast error
D Unpredictable trend

Master Scheduling

Explanations for this section begin on PAGE 84.

41 The MPS in a make to order company has a short promise lead time and long manufacturing lead times. Which of the following would be true of such a system?

A An MPS derived from a forecast on the long term horizon
B A mix of actual demand and forecast would generate requirements in the mid-term horizon
C Actual customer demand would provide the requirements in the short-term
D All of the choices are correct

42 Which of the following is not a change that can be made to the Master Schedule for the time horizon beyond the cumulative lead time?

A All changes caused by poor quality
B Any change caused by poor inventory accuracy
C Any change having a major impact on capacity
D All changes caused by bill of material changes

43 In a make-to-stock company, which of the following situations would not occur?

A Customer orders pulled from finished goods inventory
B Products exist in inventory, waiting for purchase
C An MPS stated in end items
D Products made to customer order

44 Which of the following is a negative aspect of the chase strategy in production planning?

A Capacity utilization will fluctuate
B Production levels will fluctuate with sales
C Resource usage will remain stable
D Inventory will remain stable

45 The Final Assembly Schedule is best defined as which of the following?

A It is the same as the Master Production Schedule
B It is an anticipated build schedule
C It is the same as available to promise
D It is the actual build schedule

46 Which of the following is not an effect of the level strategy of production planning?

A Production occurs at exactly the same rate as the sales forecast for each period
B Inventory will generally build
C The capacity usage remains stable
D The labor force remains stable

47 Which of the following effects are results of a company having an overloaded master schedule?

A Two effects will occur, delivery performance erosion and the decrease of cost per unit due to high utilization
B Two effects will occur, delivery performance will erode as well as work-in-process growing
C A single effect of delivery performance eroding will occur
D A single effect of cost per unit decreasing due to high utilization will occur

48 In determining the detail required for capacity planning, which considerations should be reviewed by management?

A Quality of the information versus the cost of acquiring it
B Training period for new employees
C Length of time to change capacity
D All of these choices are viable considerations

49 What is a bill of resources?

A Based on released orders, a display of past capacity requirements resources needed to manufacture one unit
B A list of the cumulative standard hours per unit
C A chart of the final assembly completions and planned order completions by date
D A listing of required capacity and key

50 A just-in-time environment requires a Master Production Schedule stated in which way?

A End items, units per month
B End items; units bi-weekly
C End items; units per week
D End items; units per day

51 Which of the following statements correctly describes the production-sales-inventory report?

A It does not show cumulative production variances
B It shows production lead times
C It is only presented in table format
D It represents either cumulative or per period data

52 What is a major advantage of a two-level MPS process?

A Simplified MPS process
B Products are planned as the market place demands
C Accuracy is improved
D The second level protects against errors at the first level

53 Which of the following resources is generally not considered to be critical?

A Common raw materials
B Skilled labor for key operations
C Financing in a highly-leveraged company
D Special components made from composites

54 Which of the following is a representation of available-to-promise?

A Cumulative data only
B The projected on-hand inventory balance
C The uncommitted portion of inventory
D The lead time necessary to produce

55 It is normal for the final assembly schedule to correspond to the MPS in which of the following environments?

A Assemble-to-stock
B Make-to-order
C Assemble-to-order
D Make-to-stock

56 Which of the following is not an input to the Master Production Schedule?

A Customer orders
B Inventory balances
C Material requirements plan
D Production plan

57 The lead time for a purchased part is 2 periods. If the MPS indicates a projected balance of zero in period 6, when would the planner place the replenishment order?

A Period 8
B Period 6
C Period 4
D Not enough information provided

58 Which of the following is not a correct assertion in regards to time fences?

A Changes can be readily made during the firm period
B Measurable assets have not been committed during the time period
C Some changes will be allowed by the slushy period but commitments to materials have generally been
D Timefences divide the planning horizon into firm, slushy, and free periods

59 During the production planning process, which of the following is not a consideration?

A Component requirements
B Capacity availability
C Manufacturing labor needs
D All of the choices are considerations

60 Which of the following is not a key element used to define available-to-promise?

A It is used in make-to-stock and assemble-to-order companies
B It is used for customer order promising
C It is uncommitted future inventory or capacity
D It is calculated from the MPS

Distribution Planning

Explanations for this section begin on PAGE 86.

61 Which of the following components is not part of Master Planning?

A Master scheduling
B Production and resource planning
C Outsourcing
D Demand management

62 Which of the following is not a consideration of top management when evaluating the production plan?

A Inventory build
B Potential outsourcing plans
C Work center capacity
D Production level by month

63 An examination of a company's production plan reveals that the production each month is the same and the inventory is fluctuating. What is this called?

A Chase strategy
B Capacity strategy
C Level strategy
D Inventory strategy

64 Which of the following is not a symptom of Master Scheduling problems?

A Late deliveries to customers
B Resources which are used inconsistently
C Forecasts which are always biased
D End of month crunch

65 At what point will a master production schedule be overloaded?

A When the MPS reflects more than what was originally planned
B When the MPS is equal to the forecast
C When the MPS capacity is greater than is realistic
D When the MPS is greater than has been produced in the past

66 Which of the following functions should be a part of the development of the production plan?

A Marketing
B Both
C Both manufacturing and finance
D Neither

67 Which of the following defines the term customer backlog?

A Orders received but not yet shipped
B Orders received but not entered into system
C Orders promised after the customer wants them
D Orders shipped but not yet billed

68 Which of the following describes the master production schedule?

A Final assembly schedule
B Manufacturing build plan
C Same as the production plan
D Equivalent of a forecast

69 Which of the following is not a viable solution for increasing the capacity?

A Expand the bottleneck work centers to increase throughput
B Form teams to address throughput
C Allow overtime or hire subcontractors
D Increase the queues to provide work centers with enough work

70 How should a forecast be expressed In order to be useful in master scheduling?

A Capacity hours
B Units of shipments
C Labor hours
D Dollars of shipments

71 Management of master schedule changes inside the firm zone must be authorized by which of the following?

A Senior manager
B Manufacturing supervisor
C Master scheduler
D Plant manager

72 Which of the following are inputs to the Sales and Operations Planning process?

A Financial resources required
B Anticipated demand and capacities
C New product design
D All of the choices are correct

73 Which of the following is not an output from the Sales and Operations Planning process?

A Production plan
B Sales plan
C Capacity plan
D Financial plan

74 If a company's master schedule is at the end item level what is the company's type?

A Engineer-to-order
B Assemble-to-order
C Make-to-stock
D Make-to-order

75 Why are planning bills referred to as pseudo bills?

A They are manufacturing bills not developed until the final assembly
B They are representative of bill structures of parts that cannot be built
C They theoretically facilitate capacity planning
D The are only modular bills of materials

76 In a plant, the load is constantly exceeding the capacity. Which of the following actions should be taken to solve this problem?

A Increase the inventory level
B Complete the easy jobs
C Only manufacture the most important jobs
D Change the master schedule

77 Which of the following benefits is not a result of master scheduling?

A Ensuring integration of business plans from each function
B The coordinated production plan being driven
C Management of inventory and backlog to appropriate levels
D Planning and commitment of resources to satisfy customers

78 When performing rough cut capacity planning, which of the following is not identified?

A Load-based work center capacity
B Personnel and material shortages
C Mid- to long-range capacity issues
D Lead time constraints

79 To meet the customer's order, a final assembly schedule is developed as the final schedule of what will be assembled. When should the schedule be completed?

A When the customer's order is received
B As the parts are ready for assembly
C At the last possible moment
D When the master production schedule is done

80 The Master Production Schedule is allowed to do which of the following when modular bills of material are used?

A Use phantom bills of material
B Use a final assembly schedule
C Be stated in fewer different units
D Not equal the production plan

DSP Detailed Scheduling and Planning

Planning the Management of Inventory

Explanations for this section begin on PAGE 89.

1 If a company is planning to educate and train a work force, where could highly-qualified instructors be found?

A Consulting firms
B Functional employees in the work force
C Training and development experts
D None of the sources listed are appropriate

2 Which of the following would not aid a company needing to dramatically increase capacity?

A Machine utilization
B Labor force
C Efficient preventive maintenance
D Strategic buffers

3 Which of the following is not an input from another system required by Capacity Requirements Planning?

A Work-in-process inventory
B Routings
C Resource plan
D All of the choices are required inputs

4 Which of the following terms refers to a system's ability to automatically trace the requirements for a given component up the bill structure to the source of the requirement?

A Single-level pegging
B Full pegging
C Manual pegging
D Order-level pegging

5 For a company which has just suffered a major product recall due to a safety issue, an engineering change will be instituted to fix the safety issue. How would it be implemented?

A Phase-in based on an effective date
B Phase-in for new products
C Immediate implementation and retrofit
D Run out based on inventory

6 Which of the following is a result of increasing the capacity at the bottleneck operation?

A An increase in queue behind the next work center
B An increase in capacity throughout the line
C An increase in work-in-process inventory
D An increase in throughput for the whole manufacturing line

7 Which of the following would not be a consequence of an unrealistic master production schedule?

A Work centers with unusually large queues
B Manufacturing orders not completed on time
C Long, time consuming MRP runs
D Excessive overtime

8 A component part has been ordered by a regulatory agency to cease in production in 6 months. Of the following implementation rules, which would be used in this scenario?

A Retrofit existing products in stock
B Implement immediately
C Implement with an effective phase-in date
D None of the above

9 When implementing an MRP system, which is the preferred method in the cut-over phase?

A Full simulation
B Conference room pilot
C Cold turkey/Big Bang
D None of these methods are used

10 In regards to pseudo bills of material, which of the following is a false statement?

A They are for transient assemblies
B They are never manufactured
C They facilitate planning
D All of the statements are false

11 Which of the choices below are reasons to use modular bills of material?

A Disentangle option combinations
B Segregate common from unique parts
C Both
D Neither

12 When working with a bill of materials, which the following are required components?

A All of the choices are required
B Each inventory item must be uniquely identified
C Product flow into and out of stock should be shown
D Components of an item must be clearly defined by identifying numbers

13 In a MRP system, which of the following is not a prerequisite or assumption?

A A master production schedule exists and is stated in bill of material terms
B The MPS forecast error is within 5%
C All inventory items are uniquely identified
D Every item goes into and out of stock

14 Which of the following is referred to by the designation MRP II?

A Explosion of planning bills
B Materials Requirements Planning-Phase II
C Manufacturing Resource Planning
D None of the choices are correct

15 A company had sales of $1.5M. Its cost of goods sold (at standard cost) for the same period was $300,000. Its inventory (at standard cost) was valued at $150,000. What is this company's inventory turnover?

A 2
B 5
C 10
D Not enough information

16 Who is responsible for a successful MRP system?

A The MRP software vendor
B The MRP system consultant
C The system's users
D The manufacturing director

17 A disciplined effort to compare the function performed by an item and its cost in an attempt to find a lower-cost alternative is called:

A Re-engineering
B Value analysis
C Item evaluation
D Supplier partnership

18 Which of the following is false in regards to MRP II system implementation?

A A great deal of work is required
B It is the number one business priority
C It is people intensive
D All of the choices are correct

19 Which of the following problems of writing your own ERP might encourage business to purchase ERP software instead?

A System limitations on future business plans
B Development time
C System errors
D All of the problems listed encourage software purchase

20 Which of the following are requirements expected of a project leader?

A Should be the best person for the job
B Must be full-time project manager
C Should be a member of the operating department
D All are correct

Planning Material Requirements to Support the Master Schedule

Explanations for this section begin on PAGE 91.

21 In regards to interlevel equilibrium, which of the following statements is false?

- **A** Gross requirements correspond to the planned order release of its parent
- **B** It requires partial explosions to maintain interlevel equilibrium
- **C** It is a regenerative MRP characteristic
- **D** All of the statements are true

22 Which of the following components are included in purchasing lead time?

- **A** Vendor lead time
- **B** Stocking time
- **C** Transportation time
- **D** All of the choices are correct

23 The purpose of the master production schedule should be to strive to maintain a balance between which of the following?

- **A** The finished end items and the raw materials
- **B** The forecast and the inventory
- **C** The load and the productive capacity in the short-term
- **D** All of the choices are maintained by the MPS

24 Which of the following is not provided by the MRP system to the shop floor control system?

- **A** How many must be built
- **B** When the product needs to be completed
- **C** How the product is built
- **D** What product must be built

25 Which of the following solutions is viable in an overload situation?

- **A** Alternate routings
- **B** Load factor adjustment
- **C** More frequent setups
- **D** Infinite capacity loading

26 Which of the following impacts occurs from the scrap factor in an MRP system?

- **A** It increases the planned order release of a given component
- **B** It decreases the projected on-hand balance
- **C** It increases the gross requirements of a given component
- **D** None of the effects are correct

27 What does the MRP use the bill of materials for during replanning?

- **A** Guidance of the explosion process
- **B** Determination of the number of components to order
- **C** Calculation of the inventory level for each part
- **D** Determination of the safety stock levels

28 In regards to the bill of materials, which of the following statements is true?

- **A** Only one set is required for the company
- **B** Multiple sets are required to satisfy all functions
- **C** The single-level format is best for analysis
- **D** The multi-level format is better for engineers

29 Which of the following results from lead time offset?

A Planned order receipt minus the lead time equals the planned order release date
B Materials are expedited to arrive prior to the date required by MRP
C Planned order release date minus the lead time equals the planned order receipt date
D The number of administrative days are set for the order to meet the lead time

30 In an MRP system, using safety lead time will cause which of the following to occur?

A Planning of order releases after the required due date
B Planning of order receipts prior to the required due date
C Planning of order releases based on the need date
D Planning of order receipts based on the need date

31 Which of the following action is not one taken by a planner?

A Release orders to the shop
B Generate purchase orders as required
C Reschedule the due dates of existing orders
D Update system planning factors

32 If the exception message "reschedule in" is generate by the MRP, which of the following out of limits conditions is indicated?

A Due date and need date are the same
B Due date of the order is prior to the need date
C Due date of the order is after the need date
D Due date and need date mean nothing in this example

33 Which of the following conditions exist if a message reading "reschedule out" occurs in the MRP system?

A Due date of the order is prior to the need date
B Due date of the order is after the need date
C Due date and need date of the order are the same
D Due date and need date are irrelevant to this example

34 Which of the following is a transaction which would cause a net change MRP system to replan a part?

A All of the causes would affect such a change
B Change in the lead time and bill of materials
C Unexpected part demand
D Write off of inventory

35 Which of the following inputs would an MRP system use?

- **A** Bill of materials, customer orders, and Master Production Schedule
- **B** Master Production Schedule, inventory status, and bill of materials
- **C** Master Production Schedule, forecast, and customer orders
- **D** Master Production Schedule, bill of materials, and Capacity Requirements

36 Which of the following is not a cause of nervousness in the MRP system?

- **A** MRP parameters changes
- **B** The planners assigned to a part are changed
- **C** Demand which is unplanned
- **D** Early release of planned orders

37 A company has just finished running their MRP system and a recommendation is issued ordering the same amount as the net requirement. What is the lot size rule in this scenario?

- **A** Fixed-order quantity
- **B** Lot-for-lot
- **C** Period-order quantity
- **D** Minimum lot size rule

38 Generating messages to the planner when out of limits conditions are met, all MRP systems operate as exception systems. Such an exception message would be generated in which of the following conditions?

- **A** Standard lead time for an end item will result in a late deliver
- **B** Planned orders have reached the lead time for ordering
- **C** Scheduled receipts due dates are later than the need date
- **D** All of these conditions would cause an exception message

39 If an inaccurate bill of material exists, which of the following conditions might occur?

- **A** Inaccurate capacity planning
- **B** Inaccurate quantity of raw materials ordered
- **C** Increase in the amount of scrap generated
- **D** Inaccurate forecast consumption

40 Of the following items, which would not have a low-level code of zero?

- **A** Items to be shipped to the customer from the warehouse
- **B** Items which are forecasted
- **C** Subassemblies awaiting rework orders
- **D** None of the items have low-level codes of zero

Planning Operations to Support the Priority Plan

Explanations for this section begin on PAGE 93.

41 Carrying inventory includes which of the following in its cost?

- **A** Inventory movement
- **B** Annual inventory tax
- **C** Inventory shrinkage
- **D** All of the choices are included

42 In the engineering change process, which of the following functions should be included?

- **A** Manufacturing and Engineering
- **B** Manufacturing, Engineering, Purchasing, and Finance
- **C** Manufacturing, Engineering, and Purchasing
- **D** All functions who can contribute to the process

43 A continuous manufacturing process would produce which of the following products?

- **A** Laundry soap
- **B** Oil
- **C** Prescription pills
- **D** Canned food production

44 What must a company do if they are required to have lot traceability of their product?

- **A** Have the ability to track product from vendor to customer for every step of manufacture
- **B** Have the ability to identify its vendors quickly
- **C** Have the ability to automatically trace how lot sizes were created
- **D** None of abilities listed are required

45 In regards to make-to-order products, which of the following statements is false?

- **A** Long lead time parts may be stocked
- **B** Product is produced after the order is received
- **C** The inventory for the product is in subassemblies
- **D** All of the statements are true

46 Which of the following is a way in which the MRP system is used to facilitate highly complex engineering change processes?

- **A** Establishing the new part's lead time
- **B** Ensuring capacity availability for the new part
- **C** Establishing necessary safety stock levels for the new part
- **D** Incorporating the new part into the planning process

47 How is an outbound stockpoint described in a Kanban scheduling system?

- **A** An inventory location at the customer site
- **B** A staging area for outbound shipments
- **C** A field warehouse near a large market
- **D** A plant floor location near the point of use

48 The acceptable tolerance of error associated with physical inventory is generally limited to which of the following?

- **A** It is independent from the company and its controls
- **B** One percent of the inventory value
- **C** No acceptable write-off exists in association with a physical inventory
- **D** It is dependent on the company and its controls

49 Using the data below, determine the reorder point.

On-hand balance = 200
Weekly usage = 200
Lead time = 3w
Safety stock = 100

A 300
B 800
C 200
D 700

50 Which of the following serves as the basis for capacity planning in a JIT manufacturing environment?

A Number of kanban cards in the system
B Labor hours assigned at each work station
C Line rate of output
D Due dates of the order

51 What is signified by 95% inventory record accuracy?

A System inventory records are perfect compared to physical counts 95 out of 100 times
B Inventory system records are "in tolerance" when compared to physical counts 95 out of 100 times
C Annual physical inventory will require only a 5% write-off
D A correct count of the inventory record

52 Of the following statements, which best describes the term "shelf life"?

A Amount of finished goods inventory left on the shelf for customer demand satisfaction
B Inspection time before a part is saleable
C Length of time a product can be in inventory before it becomes unusable
D Part life cycle

53 Which of the following is not a cause of stockroom inventory shrinkage?

A Received quantity less than ordered
B Theft
C Unrecorded scrap
D Shelf life expiration

54 Standard costs are generally established before actual production in a standard cost system. Using this system, how would management determine how well goals are achieved by production?

A High productivity per man hour
B Favorable variances from standard cost
C Low defects per 1,000
D Machine utilization above 90%

55 Which of the following is not a cost included as storage?

A Maintenance of warehouse
B Trailer preparations costs
C Maintenance of warehouse equipment
D People for handling material

56 When is inventory ordered under a two-bin system of inventory management?

- **A** Ordering varies with demand
- **B** When both bins are emptied
- **C** When the second bin is almost empty after the first bin is empty
- **D** When the first bin empties

57 For a company using the backflush method of inventory relief, when should inventory records be updated?

- **A** When a production order is generated for the parent
- **B** When the MRP system generates the planned order
- **C** When the item is moved to the warehouse
- **D** When the production counts are reported for the item

58 A company has short product life cycles and consequently, experiences significant obsolete inventory write-offs annually. Of the following methods, which of the following would not be an effective handling of the obsolescence?

- **A** Write off obsolete inventory as soon as it is identified
- **B** Write off an equal amount of the estimated annual obsolete inventory each month
- **C** Write off the obsolete inventory and dispose of the parts as they are identified
- **D** Maximize profits in the current year by waiting to write-off obsolete inventory until the next year

59 A change in market value causes a change in inventory. Which of the following items would not be impacted by this scenario?

- **A** Cash flow statement
- **B** Balance sheet
- **C** On-hand inventory balance
- **D** Income statement

60 Which of the following statements about inventory management objectives is true?

- **A** Maximize purpose of economic customer service and productivity, minimize inventory investment
- **B** Minimize customer service, maximize inventory investment and productivity
- **C** Maximize customer service, inventory investment, and productivity
- **D** All of the choices are false

Planning Procurement and External Sources of Supply

Explanations for this section begin on PAGE 96.

61 Which of the following statements is true if the due date and the need date are the same?

- **A** The order will not be shipped on time
- **B** The order is on schedule to be shipped on time
- **C** The lead time will be too long
- **D** The order will most likely be shipped on time

62 What must a planner do to change a planned order for a manufactured part into a scheduled receipt?

- **A** Run the MRP system in a net change mode
- **B** Release the order to the shop
- **C** Firm the planned order
- **D** Provide the order with a firm due date

63 Which of the following defines the order launching process?

- **A** Conversion of planned orders into scheduled receipts
- **B** Conversion of scheduled receipts into closed orders
- **C** Conversion of a planned order release into a planned order receipt
- **D** Taking an immediate manufacture an order from the customer

64 Timephasing is best defined by which of the following?

- **A** Orders and inventory expression by date
- **B** Forecasts expression by date
- **C** Future demand, supply, and inventories expression by date
- **D** Schedule expression by date

65 Which of the following is a benefit from phantom bills of material allowing for lot-for-lot assembly to the parent?

- **A** Setup time becomes less critical
- **B** Subassemblies do not consider capacity an issue
- **C** MRP does not require subassemblies to be stocked
- **D** Reduction of lead times

66 In regards to independent demand items, which of the following statements is true?

- **A** Neither
- **B** Both
- **C** They are controlled using MRP
- **D** They can be calculated from higher-level demand

67 Which of the following techniques are used when accounting for inventory?

- **A** Perpetual inventory records
- **B** LIFO
- **C** Periodic inventory
- **D** All of the choices are used

68 Which of the following is the purpose of primary lot sizing?

A Eliminating production cost variances
B Balancing the shop load
C Eliminating scrap on the shop floor
D Balancing the cost of setup with the cost of carrying inventory

69 Which of the following are true of the EOQ (Economic Order Quantity) formula?

A All of the statements are true
B It attempts to balance ordering costs with carrying costs
C It is a lot sizing method
D The carrying cost portion is considered a "management policy variable"

70 Which of the following statements is true if the LIFO method of inventory valuation is used during inflationary periods?

A Inventory value would be lower, cost of goods sold higher
B Inventory value would be higher, cost of goods sold higher
C Inventory value would be higher, cost of goods sold lower
D Inventory value would be lower, cost of goods sold lower

71 A company looking to hire a buyer experienced in MRO purchasing will likely keep what requirements in mind?

A Experience with mean reorder point
B Military reserve operations experience
C Experience with Maintenance, repair, and operating supplies
D Maximum repair process experience

72 A company is referring to which of the following when stating that their manufacturing cycle is two weeks?

A The time period necessary to change the machinery from one part to the next
B The period of time between materials procurement and shipment to customer
C The time period needed for final assembly completion
D The period of time from the manufacturing order release until shipment to the customer

73 When using a planning horizon, what is the minimum acceptable length of time?

A It is equal to twice the average manufacturing lead time
B It is dependent on the industry type
C It is equal to the longest cumulative product lead time
D It is equal to the longest cumulative product lead time

74 Which of the following is not included in manufacturing lead time?

A Queue time
B Procurement time
C Run time
D Setup time

75 Which of the following reasons would not justify the maintenance of safety stock in an MRP system?

A Using items for spare parts which are also used in assembly
B Having uncertain lead times for raw materials
C Component items manufactured in-house have had inventory errors
D All of these choices are correct

76 Level by level explosion of the MRP systems bill of materials occurs for which of the following reasons?

A To calculate the backward schedule
B To sum the higher-level requirements before netting the inventory
C To provide order identification by level
D To allow the planning bill of materials to calculate the requirements

77 Which of the following information is not required in order to make the necessary calculations in the MRP?

A Lot size
B Available capacity
C Lead time
D Inventory balance

78 Although the primary role of the MRP system is often assumed to be balancing supply and demand through the time phased netting process, which of the following is the other major function of MRP?

A As order due dates change, recalculate the forecasts
B Move the orders for which there is no capacity
C Provide messages regarding the scheduled receipts
D Maintain valid due dates for all open orders

79 Of the following choices, which is an objective of Capacity Requirements Planning?

A Maintenance of the priority of the order in relation to other orders
B Calculation of the materials needed to meet the schedule
C Determination of the machines needed to complete the MPS
D Providing feedback to the production plan regarding its reasonability

80 A planner using the MRP system can trace the planned order releases to the source of the requirement using which process?

A TAKT time
B Demand flow tracking
C FIFO
D Pegging

ECO Execution and Control of Resources

Execution of Operations

Explanations for this section begin on PAGE98.

1 Which of the following would not normally be part of a routing?

A Work centers involved in manufacturing
B Operations to be performed and their sequence
C The raw materials needed to produce
D All of the choices are included in routing

2 If a job is behind schedule, applying the critical ratio will produce which of the following?

A Equal to 1.0
B Greater than 1.0
C Less than 1.0
D Not enough data

3 Which of the following would result in a reduction of manufacturing lead time?

A All of the actions would reduce manufacturing lead time
B Reduce setup time
C Reduce move time
D Increase the operation time by working another shift

4 Of the following, which are usually included in the shop packet?

A Move tickets
B Work instructions
C Pick tickets
D All of the choices are included

5 What is shown in a job status report?

A Job priority of each work center
B Current labor costs of jobs
C Every work center's input and output
D Job completion plan and progress versus the plan

6 The Just-in-time philosophy includes which of the following?

A Kanban signals
B Eliminate setup times
C Zero inventory
D All of the choices are included

7 Which of the following is the best definition for a primary operation?

A A manufacturing operation found in a routing for part production
B The last operation in a job sequence
C The first operation in a job sequence
D None of the answers are correct

8 In which industry would it be valuable to maintain lot traceability from raw material to customer delivery?

A All choices are correct
B Auto industry
C Defense industry
D Medical industry

9 Why should an assembly operation line be balanced?

A To increase operator efficiency
B To maximizes assembly line output
C To minimizes inventory on the line
D None of the answers are correct

10 What is indicated by a critical ratio or 0.85?

A A job is 85% behind schedule
B A job is 15% ahead of schedule
C A job is 85% ahead of schedule
D A job is 15% behind schedule

11 In regards to manufacturing lead time, which of the following elements is usually the longest?

A Run time
B Queue time
C Setup time
D Move time

12 Which of the following is required for a shop order release?

A All of these requirements are necessary
B Tooling availability
C Order due date
D Parts availability

13 The following options each affect the queue time of a job at a work center. Which one is considered the main driver of queue time?

A Job priority
B Job lot size
C Setup times on various jobs
D Existing queue time at the work center

14 A bicycle company's consumer demand is 5,000 per week. Three operations are required: frames, wheels, and final assembly.

Frames are produced at 800 per week, wheel assemblies at 600 per week (1,200 wheels), and final assembly at 1,000 per week. What is this company's weekly factory capacity?

A 800
B 600
C 1,200
D 1,000

15 Of the following options, which best describes the dispatch list function?

A Calculates work center capacity
B Establishes necessary work center tooling based on job availability
C Lists the work center jobs to be run and the priority sequence
D Determines total run time by job

16 All of the following are job sequence rules for dispatching except:

A First come, first served
B Shortest process time
C Earliest job due date
D Highest machine utilization

17 A supplier has just notified the customer that the lead time for a scheduled part has increased. How best should the customer respond?

A Change system gross requirements
B Increase the safety stock
C Decrease capacity utilization
D Delay the system scheduled receipts

18 A company begins the second operation of a job before the first is completed since long runs of parts are made in a sequence of work centers. What is this scheduling method called?

A Overlapped scheduling
B Capacity overlapping
C Work center utilization
D Lead time offsetting

19 Which of the following descriptions best encompasses JIT philosophy?

A Deliveries occur only when needed
B If no value is added, eliminate it as waste
C Setups in less than one minute
D Priority control via Kanban

20 Which of the following obstacles would prevent Just-in-time implementation?

A Management not allowing employee involvement
B Too many projects rather than continuous improvement in the factory
C Limited education and training budget
D All of the obstacles are correct

21 Mixed model scheduling is best described by which of the following?

A A master schedule approach in a make-to-order environment
B A database system with user-friendly access
C A schedule which varies products and lot sizes so every model is made every day
D A regression analysis to schedule finite capacity

22 Which of the statements below is false in regards to the ship-to-WIP process?

A Traditional receiving process is bypassed
B Inspection is completed in small lots
C All of the statements are true
D A certified supplier can ship to the point-of-use

23 In regards to automation, the work should be simplified before implementation. When automating with robotics, what is usually considered a prerequisite?

A A job in which imaging is necessary
B A job which is highly repetitive and not suited for humans
C When direct labor is too expensive
D When a high-tech environment is needed

24 Which of the following defines linearity?

A The master schedule is not overloaded
B Single source supplier for each component
C Balanced line capacity from start to finish
D Production is set at a constant or level rate

Control of Operations

Explanations for this section begin on PAGE 101.

25 When parts are produced in the smallest possible lot sizes, which of the following benefits will occur?

A All of these will occur
B Space requirement reduction
C Lead time reduction
D Flexibility increases

26 In order for suppliers to properly accommodate the JIT purchaser, the supplier must receive:

A Purchase orders
B Future requirements
C Quoted contracts
D None of these

27 JIT calls for companies to continuously reduce their lot sizes. What is the most effective way to cut lot sizes?

A Cut the lot size to equal one week's production
B Cut the lot size in half but be sure inventory is on hand in case problems can't be resolved
C Cut the lot size in half and solve any problems that arise
D Reduce the lot size to one and identify constraints

28 Costs may be reduced in flow manufacturing once efficient operating practices are established. Which of the following actions would help flow manufacturing reduce costs?

A Stabilize operations
B Minimize transactions
C Minimize engineering changes
D All of these are appropriate actions to take

29 Which of the following best describes Kanban?

A A Just-in-time supplier delivery system
B A work group improvement process
C A Japanese form of statistical process control
D A pull system used to signal the previous operation that parts are needed

30 Of the following benefits, which are included in cellular manufacturing?

A All of the choices are included
B Reduced order flow time
C Lower setup time
D Lower material handling costs

31 In a Just-in-time environment, the ship-to-WIP is usually implemented as part of a project. Which best defines the ship-to-WIP process?

A Purchased materials are shipped to the point of use without inspection
B Material replenishment is driven by consumption
C No shop orders are produced for production
D Daily deliveries of materials arrive at the dock

32 When implementing a Just-in-time project, which of the following benefits will pass on to the customer?

A Higher-quality products
B Lower freight costs
C Smaller lot sizes
D More deliberate design process

33 Of the following benefits, which result from grouping machines in a U-shaped cell?

A All of the choices are correct
B Shorter leadt imes
C Reduced travel distances
D Lead times would be shorter

34 Which of the following exists in a focused factory?

A Increased paperwork to support the operation
B Plant layout by function
C Logical flows of materials through the factory
D Increased product variety

35 A focused factory contains which of the following?

A Increased inspection stations
B Department to department flow patterns
C Increased computer transactions
D Restricted product variety

36 For a Just-in-time manufacturer, which initial qualification is most important when assessing suppliers?

- **A** Available capacity
- **B** On-time delivery
- **C** Lowest pricing
- **D** Acceptable quality every time

37 In the Just-in-time pull system, which physical characteristic below is important for parts containers?

- **A** Designed to last in a permanent position at the work center
- **B** Appropriate sizing for work center production
- **C** Appropriate sizing for work center consumption
- **D** All of these

38 Use the information below to calculate the number of Kanban cards necessary for maintenance of production in a pull system.

Usage: 150 per week
Lead time: 1 week
Container size: 10 units
Safety stock: 0

- **A** 10
- **B** 50
- **C** 150
- **D** 15

39 Why might Just-in-time implementation make suppliers hesitate to participate?

- **A** Supplier prices may be reduced
- **B** More detailed measurements are needed
- **C** Schedules may fluctuate without protection from safety stock
- **D** The inventory will be pushed back to suppliers

40 At what point in the operation should tools be sharpened?

- **A** Immediately after use
- **B** During the internal setup
- **C** When the tool is pulled from the crib
- **D** Prior to use

41 What is poka-yoke?

- **A** Mistake proofing a process
- **B** Setups in less than 10 minutes
- **C** Lot size equal to one
- **D** Kanban sizing methodology

42 A company deducts component inventory when a finished good is received to stock. What is this process called?

- **A** Backflushing
- **B** Material issues
- **C** Allocation
- **D** Floor deduction

43 Which of the following is a reason that reduction of setup time is important in the implementation of a Just-in-time system?

A All of these are correct
B Allowing all products to be made all the time
C Increases in production output will occur
D Inventory is reduced by small lot sizes

44 Why must preventive maintenance must be completed to support flow manufacturing?

A Minimal maintenance parts inventories
B Operators have time to do PM
C Production lines will be stopped by emergency breakdowns
D Queues are available to PM time buffering

45 Which of the following areas will have simplified transaction activity as a result of a reliable Just-in-time system?

A Purchasing
B Quality control
C Shop floor tracking
D All of these are correct results

46 Which of the following controls component part demand in a Just-in-time plant?

A Supervisor of the department
B Capacity plan
C Subsequent operation (internal customer)
D Dispatch list

47 If a long term agreement exists with a supplier, which of the following would be provided?

A Joint benefit projects
B All of the choices are correct
C Special trucking considerations
D Elimination of paperwork and reduction of cost

48 The Just-in-time philosophy focuses heavily on queue reduction or elimination. Which of the following is generated by the reduction of queues?

A Reduced inventory investment
B Longer lead times
C Faster setup times
D Increased inventory investment

49 A company has an 8-hour shift with a time loss factor of 6% and 90% machine efficiency, what are the standard hours available?

A $6.77
B $5.69
C $6.99
D $7.21

Management and Communication

Explanations for this section begin on PAGE 104.

50 Calculate standard hours available in a 10-hour shift with a lost time factor of 12% and 95% machine efficiency (rounded to the nearest hundredth).

A 9.21
B 8.36
C 7.11
D 5.59

51 Of the following appropriate actions to take to alleviate overloaded shop floor conditions, which is considered a last resort?

A Revise the master schedule
B Use alternative machining centers
C Subcontract work outside the factory
D Schedule overtime

52 Machines = 2, Operations per shift = 3, Shifts per day = 1, Days worked per week = 5, Hours worked per shift = 12, Machine utilization = 90%, Operator efficiency = 80%

If the work center's weekly load is 90 hours, which of the following describes the work center?

A Overloaded
B Underloaded
C Level-loaded
D Not enough data

53 Use the information below to calculate the available weekly capacity rounded to the nearest standard hour:

Machines = 3, Operations per shift = 2, Shifts per day = 1, Days worked per week = 7, Hours worked per shift = 8, Machine utilization = 80%, Operator efficiency = 90%

A 142
B 121
C 86
D 70

54 Machines = 2, Operations per shift = 3, Shifts per day = 1, Days worked per week = 5, Hours worked per shift = 12, Machine utilization = 90%, Operator efficiency = 80%

Given the data above, which of the following describes the work center if the weekly load is 64 hours?

A Overloaded
B Underloaded
C Level-loaded
D Not enough data

55 Use the information below to calculate the work center's weekly available capacity rounded to the nearest whole standard hour.

Machines = 2, Operations per shift = 3, Shifts per day = 1, Days worked per week = 5, Hours worked per shift = 12, Machine utilization = 90%, Operator efficiency = 80%

A 104
B 92
C 98
D 86

56 Use the information below to calculate the available capacity with hours worked expanded to a 14-hour shift. Round to nearest standard hour:

Machines = 2, Operations per shift = 3, Shifts per day = 1, Days worked per week = 4, Machine utilization = 90% Operator efficiency = 80%

A 81
B 70
C 92
D 106

57 Calculate the available capacity to the nearest standard hour if the work week is expanded to 5 days of 10-hour shifts.

Machines = 4, Operations per shift = 2, Shifts per day = 1, Machine utilization = 90%, Operator efficiency = 80%

A 162
B 288
C 144
D 244

58 Alternate routing can be defined as which of the following?

A Routing which takes longer than the primary routing and produces a similar, but not identical part
B Similar routing to the primary routing which produces an identical item of lesser quality
C Routing less preferred to the primary routing which produces an identical item
D Routing for the supplier existing on the customer's file

59 Which of the following is considered a replacement in the manufacturing process for a normal step?

A Alternate operation
B Sequence
C Smoothing
D Alternate routing

60 Which of the following terms refers to a setup procedure that occurs as the machine is running?

A Gapped time
B External setup time
C Interoperation time
D Internal setup time

61 In regards to Just-in-time production, which of the following is false?

A It refers to waste elimination
B It is considered to be a pull system
C It only references delivery of products when needed
D All of the statements are true

62 Which of the following would not occur because of an increase to the capacity of a bottleneck work center?

A Reduced scrap
B Reduced work-in-process (WIP) inventory
C Shortened manufacturing lead times
D All of the choices would occur

63 What is the term used to refer to the period of time for retooling a machine center when the job is waiting?

- **A** Direct time
- **B** Wait time
- **C** Setup time
- **D** Move time

64 Which of the following methods is appropriate for relieving inventory?

- **A** All of these are appropriate
- **B** Post-deduction transaction
- **C** Pre-deduct transaction
- **D** Direct deduct transaction

65 Which of the following reasons would not exist for an unplanned issue?

- **A** Replacing material scrapped
- **B** Using material not listed on the bill of materials
- **C** Changing the picklist quantity
- **D** All of these are correct

66 Which of the following timelines would not be improved by online transaction processing?

- **A** Information updating to on-hand balances
- **B** Recording accurate quantities on receipts
- **C** Problem resolution
- **D** All of these are correct

67 A process needs 100 input units for the production of 95 units. What is the yield?

- **A** 0.05
- **B** 0.95
- **C** 1
- **D** 1.95

68 In regards to a limiting operation, which of the following descriptions is true?

- **A** It defines the capacity of the line
- **B** It's the operation with least capacity
- **C** It's the bottleneck
- **D** All of these are correct

Design Trade-offs

Explanations for this section begin on PAGE 106.

69 Which of the following statements is NOT true of a work center in which the input is equal to the output?

- **A** Slight increase in lead time
- **B** Constant backlogs
- **C** Constant lead time
- **D** All of the statements are true

70 Which of the following is not included in shop floor control functions?

- **A** Analysis of maintenance cost
- **B** Input/output control
- **C** Analysis of plant capacity
- **D** Analysis of plant load

71 Of the following statements, which is true of first-piece inspection?

- **A** Quality inspection after assembly of the first finished product
- **B** Component quality check after the setup
- **C** Inspection time built into the routing
- **D** Usually a bad piece is discovered

72 Which of the following definitions best fits floor stocks?

- **A** Factory held inexpensive parts for use without worker requisitions
- **B** Inventory held on the warehouse floor
- **C** Company stock traded for additional fringe benefits
- **D** Used components which have been moved to the floor

73 A flexible manufacturing system provides which of the following benefit pairs?

- **A** Rapid changes in output to meet demand and low initial investment
- **B** Low initial investment and reduced transportation time between lines
- **C** Rapid changes in output to meet demand and reduced transportation time between lines
- **D** Rapid changes in output to meet demand and increased worker involvement

74 Which of the following is a major benefit of a flexible machine center?

- **A** All of these are correct
- **B** Multiple products to be manufactured
- **C** Quick setups
- **D** Quick changeovers

75 Which of the following manufacture types is best for the use of flow control systems?

- **A** Discrete
- **B** Repetitive
- **C** Assemble-to-order
- **D** Engineer-to-order

76 Idle time is directly caused by which of the following?

- **A** Supplier quality dissatisfaction
- **B** Inaccurate forecasts
- **C** Lack of material
- **D** All of these are correct

77 What is the term used to refer to the responsibility of the supplier to provide total acceptable quality?

- **A** Total quality management
- **B** Quality at the source
- **C** Statistical process control
- **D** Total quality control

78 Which of the following is not included in the total time needed for an operation?

- **A** Run time of operation
- **B** Setup time
- **C** Wait time after completion
- **D** Tooling

79 In a Just-in-time manufacturing environment, the cost system should do all of the following EXCEPT:

- **A** Collect detailed labor cost
- **B** Record in and out transactions to a work cell
- **C** Performance measures should optimize total cost
- **D** All of these should be included in the cost system

80 Which of the following is not an influence on plant capacity?

- **A** Number of shifts
- **B** Number of released orders
- **C** Machine utilization
- **D** Operator efficiency

SMR Strategic Management of Resources

Understanding the Business Environment

Explanations for this section begin on PAGE 107.

1 Which of the following elements is not included in Quality of Work-life programs?

A Enhanced workplace democracy
B Senior manager decision-making
C Participative management
D Innovative rewards

2 In order to best use the lead capacity strategy, which of the competitive advantages below should a company focus on?

A Product design
B Delivery speed
C Quality
D Price

3 Which of the following should be the focus of senior managers within a horizontal organization?

A Making operations decisions
B Approving lower-level decisions
C Removing obstacles to improvement
D Ensuring consistent policies across units

4 If a company is maximizing their use of lead capacity strategy, which of the following would be their focus?

A Speed of delivery
B Product design
C Quality
D Price

5 Which of the following management attitudes can hinder the success of a SGIA?

A We think, they work
B Open communication about the business
C Respect for people, regardless of organization or job
D All of these

6 Of the following measurements, which is included when determining the cost of quality?

A Excess inventory
B Warranty and rework costs
C Returns and allowances
D All of these should be included

7 In Japan, which of the following is the reason for the 5 "W's"?

A To form the basis of the Japanese kieretsu
B To allow fishbone diagrams to be complete
C To help find the root cause of a problem
D To teach the work ethic for which they are famous

8 In which of the situations below would full absorption accounting be best suited?

A External reporting to the financial community
B Internal management decisions
C Measuring manufacturing performance
D Valuing the WIP

9 In which of the situations below would it be best to use direct costing?

A External reporting to the financial community
B Internal management decisions
C Valuing WIP
D Measuring company performance with other companies

10 Of the following structures of management, which is necessary for future global competition?

A Hierarchical
B Military
C Flat
D Hybrid

11 Which of the following is not one of Toyota's seven wastes?

A Processes
B Methods
C Movement
D Purchases

12 Which of the following is the source of the largest productivity gains in CIM converted manufacturing plants?

A Labor force reductions
B Inventory reductions
C Quality improvement
D Overhead reductions

13 Of the options below, which hinders the realization of benefits from computer-integrated manufacturing?

A Invalidity of traditional performance measures
B CIM is not part of the strategic plan
C Changes in cost patterns with CIM
D All of these

14 Which of the following is a benefit of group technology?

A Shorter manufacturing lead times
B Less work in process inventory
C New technology introduction
D All of these are benefits

15 What does the acronym CAM refer to?

A Computer-Aided Manufacturing
B Computer-Aided Master Plan
C Control-Assisted Manufacturing
D None of these

16 Which of the benefits below is a result of AS/RS carousels?

A Relatively low maintenance costs
B Relatively high return on investment
C Expansion flexibility
D All of these are correct

17 Of the statements below, which is true in regards to the Kanban system?

A Requires high quality throughout the facility
B Both
C Optimal when working with a stable schedule
D Neither

18 If a company misuses measurements in attempting to be competitive, they may contradict the company's goals. Of the following, which is used for measuring quality?

A Defects per million (DPM)
B Amount of errors in the bill of materials
C Amount of products received without rejection
D All of these are correct

19 If a company uses full absorption for accounting, which of the results below may occur?

A Both
B Neither
C Manufacturing could produce inventory and show good performance
D Manufacturing could show poor performance by producing only what is sold

20 Which of the following, if decreased, would increase overall factory flexibility?

A Setup times
B Work-in-process inventory
C Lot sizes
D All of these

21 When ensuring customer satisfaction, which of the following would be controlled by manufacturing?

A Product design
B Field service issues
C Customer specification conformance
D Reliability of the supplier

22 Which of the choices below is critical to the success of SPC implementation?

A Ensuring the operators understand the steps for correction
B Coloring the charts for the limits
C Understanding the mathematics
D Type of software used to gather data

23 Quality has two primary components. The first is quality of conformance, the second is:

A Quality of design
B Quality assurance
C Quality control
D Quality improvement

24 In accordance with the volume-variety matrix, firms with low variety and high volume are best suited to which of the following manufacturing scenarios?

A Job shop
B Continuous
C Line
D Batch

25 Which is not a function of supply chain management?

A Ensuring customer criteria is met in the product design
B Managing all materials and reducing costs
C Using supplier resources for new product creation
D Focusing suppliers on improvements

26 Of the descriptions below, which is the best match for the supply system concept of Total Cost of Ownership?

A Total cost of the delivery from suppliers
B Total of all costs in a supply chain
C Total cost of all assets in the supply chain
D Total of all acquisition costs

Developing Operations Strategy

Explanations for this section begin on PAGE 110.

27 Which of the following can manufacturing control?

A On-time delivery
B Field service issues
C Forecast targets
D State-of-the-art design

28 Which of the following should be used to measure an organization's flexibility?

A Number of different models produced
B Percent of sales from new products
C Number of skills per employee
D Number of setups under ten minutes

29 For a high-volume beverage bottling line, which technology below would be most appropriate?

A Automated transfer lines
B Automated guided vehicles
C Automatic storage and retrieval system
D Flexible manufacturing system

30 When a company produces a few high-volume products, their manufacturing process will most likely be:

A Batch-oriented
B Job-oriented
C Fixed line
D Project-based

31 In the design of a shop floor control system, which of the considerations below is most important?

A Simplification so little training is necessary
B Making sure the screens are easy to read
C Ensuring the factory people can manage their own operations
D Cost accounting's ability to report costs

32 Which of the following descriptions best fits the term forward integration?

A Implementation of all modules of an ERP system
B Owning elements of the production cycle towards the final customer
C Automation of the shipping functions
D Automation of the downstream operations

33 Of the following types of manufacturing environments, which should be used in conjunction with process costing?

A High volume of similar parts
B Assemble-to-order manufacturing
C Engineered jobs and standard jobs
D Low-volume job shop with different parts

34 How is activity based costing (ABC) different from other methods of costing?

A It allocates overhead based on the machine/labor method
B Allocation of overhead is ignored and only variable costs are calculated
C It tries to allocate overhead based on the drivers of those costs
D Costs are fully absorbed over the volume

35 Which of the following transactions are not typical for EDI?

A Invoice transactions
B Capacity availability
C Advanced shipping notices
D Purchase order quantity and date

36 Of the following techniques, which would best improve the delivery reliability of a company's supplier base?

A Long-term contracts with suppliers
B Easy-to-read MRP reports
C Improved supplier relations
D Electronic Data Interchange

37 Machine utilization is considered a poor manufacturing measurement because it fails to:

A Increase finished goods inventory
B Improve quality
C Increase raw materials inventory
D Increase WIP inventory

38 If a product design will see a dramatic increase in the amount of options and features, which of the following results will occur?

A Rise in material cost per unit
B Consistency in labor cost
C Increase in total cost per unit
D Decline in total cost per unit

39 Transcendent quality is best defined as which of the following?

- **A** Excellence at an acceptable price
- **B** Condition of excellence
- **C** Product-based quality
- **D** Fitness for use

40 Which of the following would help improve both delivery consistency and flexibility?

- **A** Increasing product variety
- **B** Waste reduction in the processes
- **C** Retaining a large specialty consulting firm
- **D** Hiring and developing specialists

41 Of the criteria below, which would be considered order winning for a commodity product?

- **A** Price
- **B** Product quality
- **C** Product design
- **D** Delivery speed

42 Which pair of company characteristics is optimal for use in a process-focused layout?

- **A** Wide product variety with low volume per product
- **B** Narrow product variety with low volume per product
- **C** Narrow product variety with high volume per product
- **D** Wide product variety with high volume per product

43 Of the terms below, which is not included in the product life cycle?

- **A** Growth
- **B** Decline
- **C** Leveling
- **D** Introduction

44 Which would be most suitable for developing solutions to complex business problems?

- **A** Small ad hoc teams
- **B** Self-directed work teams
- **C** Cross-functional teams
- **D** Quality circles

45 When designing products for manufacturability, which of the following will be a result?

- **A** Increased speed of market introductions
- **B** Increased available capacity
- **C** Reduced product features and options
- **D** Improved product quality

46 Of the activities below, which is the most important for a company's value chain?

- **A** Improving chain-wide performance
- **B** Reflecting the organization's values
- **C** Adding value to the customer
- **D** Best leverage of company assets

47 Of the choices below, which best describes the way in which cooperation between supply chain companies might create total inventory reduction?

A More inventory held by suppliers
B Faster communication
C Reduced flexibility
D Reduced resupply time

48 Which of the following causes is the primary reason that most companies now see global sourcing and selling as a practical option?

A Elimination of several tariffs
B Advancement of transportation and communication
C Global laws and treaties
D ISO9000 standards

49 Which of the following terms refers to the process of a supplier placing goods at a customer location without receiving payment until the goods are sold or used?

A Vendor-managed inventory
B Outsourcing
C Quick response
D Consignment

50 Which of the following terms refers to the process of linking final retail sales with production and shipping schedules going back through the supply chain?

A Point-of-use inventory
B Quick response program
C Virtual corporation
D Vendor-managed inventory

51 Which is the best reason for the establishing an alliance with another company in the supply chain?

A Using alliances for market penetration
B Reducing material acquisition costs
C Improving both company's performance
D Leveraging tangible assets

52 For a purchasing department, which of the following would help most in improving supplier reliability?

A Buyer and planner organization
B Long-term supply contracts
C Electronic data interchange
D Automated purchase requisitions

53 Which of the following is not an example of management support for Small Group Improvement Activities?

A Rewarding individual results
B Responsibility sharing and authority which encourages ownership
C Commitment training and development
D Quality commitment at all times

54 Of the following areas, which would have the greatest impact on a JIT employee's performance appraisal?

A Problem-solving skills
B Buffer stock reduction
C Actual versus standard labor
D Quantity produced

55 The judgment of delivery reliability performance can be accomplished using which of the following measures?

A Percentage of deliveries made on promise date to the customer
B Amount of times customer was called to change delivery
C Percentage of orders delivered with perfect counts
D All of these can be used

Implementing the Operations Strategy

Explanations for this section begin on PAGE 114.

56 For successful FMS implementation, which of the following is not a reason employees must be involved from the beginning?

A Workers will be more apt to accept the system and work with it
B Potential isolation of workers will improve work habits
C Job security will be perceived as weaker if they are not included
D All of these are true reasons

57 Which of the following reasons would cause a worker to reject system implementation despite the benefits the system has to offer?

A Neither
B Workers don't care today
C Both
D Lack of management commitment

58 Of the following, which is the most important element that an ERP system has to offer?

A Software to fit your business
B Data accuracy
C Educated, trained people
D Type of computer hardware

59 Of the following statements, which is false in regards to ERP systems?

A Neither
B Quality problems can be solved by providing scrap/yield information
C Both
D Setup time cannot be reduced

60 When implementing technology, which of the following describes the relationship a company should have with a technology vendor?

A Develop a trusting relationship
B Identify every detail in a contract
C Maintain an adversarial relationship to reduce cost
D None of these

61 In regards to Just-in-time implementation, which of the following statements are false?

A Management and labor conflicts must be overcome
B Communication between functions is very important
C Direct labor work force makes tactical decisions
D None of these are false

62 Of the following reasons, which is false concerning the fear of change employees feel towards a new system?

A People are obstinate
B Fear caused by lack of understanding
C Lack of control caused by change
D All of these are false

63 In the early stages of developing an employee involvement process, which reason demonstrates why a consultant would be hired?

A Providing education and training to management personnel
B Aiding in pitfall avoidance
C Providing guidance to begin
D All of these are correct

64 Of the following statements, which is true of factory automation?

A It should be used to replace workers
B It is an ongoing process, not a project
C It should be used for automation rather than simplification of the work process
D None of these

65 Cross-functional teams used in a large scale project will move forward only if consensus decision-making is used. Which of the following is not a part of consensus decision-making?

A Whole group understanding of the decision
B Individual ethics and moral attitudes are not violated by the decision
C The whole group tolerates the decision
D The whole group agrees with the decision

66 Of the following, which is the most critical in order to make ERP implementation successful?

A Extensive software training
B Outside ERP consultant
C Experienced plant manager
D Full-time project manager

67 Which of the following results will occur if work cells are introduced to the manufacturing floor?

- **A** Work-in-process inventory increase
- **B** Capacity reduction
- **C** Unfocused workforce
- **D** Manufacturing lead time reductions

68 If a company wishes to implement the necessary changes for global marketplace competition, which of the following is the best method for changing employee behavior?

- **A** Flatten the organization; remove supervision
- **B** Change the performance and reward system
- **C** Increase the training budget
- **D** Threaten them to change (Do it this way or else)

69 Which of the following is the first implementation and selection step for a Manufacturing Planning and Control system?

- **A** Developing a system vision
- **B** Conducting education
- **C** Preparing a request for proposal
- **D** Creating a conference room pilot

70 In a successful ERP project, which of the following is necessary?

- **A** Project charter providing the scope of responsibility
- **B** Software company consulting support
- **C** Full-time project manager
- **D** State-of-the-art client/server software

71 Which of the following is false in regards to a mission statement?

- **A** Provides a foundation for the strategic plan
- **B** It gives specific direction consistent with general goals of the company
- **C** Defines what the organization wants to be in the long run
- **D** Has no time limit

72 Why might Just-in-time implementation make suppliers hesitate to participate?

- **A** Schedules may fluctuate without protection from safety stock
- **B** More detailed measurements are needed
- **C** The inventory will be pushed back to suppliers
- **D** Supplier prices may be reduced

73 At what point in the operation should tools be sharpened?

- **A** When the tool is pulled from the crib
- **B** During the internal setup
- **C** Immediately after use
- **D** Prior to use

74 What is poka-yoke?

- **A** Mistake proofing a process
- **B** Setups in less than 10 minutes
- **C** Lot size equal to one
- **D** Kanban sizing methodology

75 Which of the following can be used to help achieve a zero-defect goal?

A Poka-yoke work methods
B Computerized ISO documentation
C Statistical sampling
D Well trained inspectors

76 A company deducts component inventory when a finished good is received to stock. What is this process called?

A Backflushing
B Material issues
C Allocation
D Floor deduction

77 Which of the following is a reason that reduction of setup time is important in the implementation of a Just-in-time system?

A Inventory is reduced by small lot sizes
B Allowing all products to be made all the time
C Increases in production output will occur
D All of these are correct

78 Which of the following is not an important consideration when selecting equipment to purchase for a lean manufacturing environment?

A Quick connect and disconnect capability
B Space available in the facility
C Single-purpose machinery
D Flexible and low cost

79 Which of the following areas will have simplified transaction activity as a result of a reliable Just-in-time system?

A Purchasing
B Quality control
C Shop floor tracking
D All of these are correct results

80 The Just-in-time philosophy includes which of the following?

A Kanban signals
B Eliminate setup times
C Zero inventory
D All of the choices are included

Answer Key

BSCM

PAGES 10–20

1	B	21	C	41	C	61	B
2	A	22	D	42	C	62	C
3	B	23	D	43	A	63	A
4	D	24	A	44	B	64	B
5	C	25	A	45	C	65	B
6	B	26	A	46	A	66	B
7	B	27	A	47	C	67	C
8	D	28	C	48	A	68	A
9	B	29	D	49	C	69	A
10	B	30	C	50	D	70	C
11	C	31	B	51	B	71	C
12	B	32	A	52	D	72	A
13	D	33	A	53	A	73	B
14	A	34	B	54	A	74	C
15	A	35	A	55	B	75	D
16	A	36	A	56	A	76	C
17	A	37	B	57	C	77	B
18	C	38	B	58	A	78	A
19	D	39	D	59	B	79	A
20	D	40	A	60	C	80	A

MPR

PAGES 21–31

1	B	21	B	41	D	61	C
2	D	22	C	42	C	62	C
3	A	23	B	43	D	63	C
4	B	24	B	44	D	64	C
5	C	25	A	45	D	65	C
6	A	26	A	46	A	66	B
7	A	27	C	47	B	67	A
8	B	28	C	48	D	68	B
9	A	29	D	49	D	69	D
10	B	30	C	50	D	70	B
11	A	31	D	51	D	71	A
12	C	32	B	52	B	72	D
13	A	33	D	53	A	73	C
14	C	34	B	54	C	74	C
15	C	35	C	55	D	75	B
16	B	36	B	56	C	76	D
17	A	37	A	57	C	77	B
18	C	38	A	58	A	78	A
19	B	39	B	59	A	79	C
20	A	40	B	60	A	80	C

Answer Key

DSP

PAGES 32–43

1	B	21	C	41	D	61	B
2	D	22	D	42	D	62	B
3	C	23	C	43	B	63	A
4	B	24	C	44	A	64	C
5	C	25	A	45	C	65	C
6	D	26	C	46	D	66	A
7	C	27	A	47	D	67	D
8	C	28	A	48	D	68	D
9	B	29	A	49	D	69	A
10	A	30	B	50	C	70	A
11	C	31	B	51	B	71	C
12	A	32	C	52	C	72	D
13	B	33	A	53	A	73	C
14	C	34	A	54	B	74	B
15	A	35	B	55	B	75	C
16	C	36	B	56	D	76	B
17	B	37	B	57	D	77	B
18	B	38	D	58	D	78	D
19	D	39	B	59	C	79	C
20	D	40	C	60	A	80	D

ECO

PAGES 44–55

1	C	21	C	41	A	61	C
2	C	22	B	42	A	62	A
3	A	23	B	43	A	63	C
4	D	24	D	44	C	64	A
5	D	25	A	45	D	65	C
6	D	26	B	46	C	66	B
7	A	27	C	47	B	67	B
8	A	28	D	48	A	68	D
9	B	29	D	49	A	69	A
10	D	30	A	50	B	70	A
11	B	31	A	51	A	71	B
12	A	32	A	52	A	72	A
13	A	33	A	53	B	73	C
14	B	34	C	54	B	74	A
15	C	35	D	55	D	75	B
16	D	36	D	56	A	76	C
17	B	37	C	57	C	77	B
18	A	38	D	58	C	78	C
19	B	39	D	59	A	79	A
20	D	40	A	60	B	80	B

Answer Key

SMR

PAGES 56–66

1	B	21	C	41	A	61	D
2	B	22	A	42	A	62	A
3	C	23	A	43	C	63	D
4	A	24	B	44	C	64	B
5	A	25	A	45	D	65	D
6	D	26	B	46	C	66	D
7	C	27	A	47	D	67	D
8	A	28	C	48	B	68	B
9	B	29	A	49	D	69	A
10	C	30	C	50	B	70	C
11	D	31	C	51	C	71	D
12	C	32	B	52	B	72	C
13	D	33	A	53	A	73	C
14	D	34	C	54	A	74	A
15	A	35	B	55	D	75	A
16	D	36	A	56	B	76	A
17	B	37	B	57	D	77	D
18	D	38	C	58	C	78	C
19	A	39	B	59	D	79	D
20	D	40	B	60	A	80	D

Answer Key with Explanations

BSCM: Business-wide Concepts

Questions for this section begin on PAGE 10.

1 B $3.30

To calculate the cost per unit, divide the fixed costs ($900) by the units produced (3,000) which is $0.30. Add the fixed cost to the variable cost to obtain the cost per unit ($3.00 + $0.30).

2 A Near term holds less uncertainty

Near term is much more predictable than long term. Companies are more adept at predicting and planning for next week as opposed to next year. As a result, near term forecasts tend to be more accurate.

3 B Forecasts are the prelude to business planning

Forecasts provide an estimate of what conditions will look like in the future. Despite the fact that they are often wrong, businesses can measure forecasting error in an attempt to improve the overall forecasting process.

4 D Continuous flow lines

Intermittent manufacturing is characterized by processing in batches, and large variation in design and order quantities. In this environment, every job could be made to customer order. The lack of product flow in this environment narrows applicable JIT principles.

5 C Engineer-to-order

Delivery time is the time elapsed from receipt of the customer order to the delivery of the final product to the customer. ETO companies will often have the longest delivery time due to the design and engineering time needed to create the product. Make-to-order companies will make a product from existing components after an order is received.

6 B Material handling

Physical distribution includes all activities associated with physically moving goods. Material handling is required to physically move the goods; the other options pertain to manufacturing.

7 B Receiving goods on the dock

Receiving is considered part of the physical distribution process. Physical distribution is defined as the physical movement of goods from suppliers to the beginning of production and from the end of production to the customer.

8 D Service part for an elevator

Independent demand is defined as demand for an item which is unrelated to the demand for another item. Service parts are forecasted independently of the production plan. Therefore, an elevator may have both independent and dependent demand.

9 B Master production scheduling

Production plans are developed at aggregate levels (monthly, product family levels). They are agreed upon management plans for manufacturing, shipping, and inventory/backlog. From these plans the master scheduler develops a detailed master schedule which focuses on weekly end product output.

10 B Purchased component

The APICS dictionary defines dependent demand as demand that is directly related to or derived from the bill of material structure for other items or end products. Thus, a purchased component would be part of a bill structure and demand would be related to the demand for other parts in that same structure.

11 C Work overtime

Surge capacity in the form of overtime is the fastest way to complete an expedited order. Temporary workers can be hired quickly, but quality would suffer due to the learning curve. Short-term subcontracting is generally not feasible.

12 B Bias

Bias occurs when the cumulative actual demand varies from the forecast on a consistent basis. Tracking signals provide mathematical methods to determine if the error is truly biased or if random error is taking place. Random error is self-correcting whereas bias is not.

13 D Cost of products sold

Cost of products sold is subtracted from the revenue to obtain a gross profit. Expenses are deducted from gross profit to arrive at a net income or loss. Generally, income statements reflect revenues and expenses of a company generating either a profit or loss.

14 A Stock ample "C" parts

ABC inventory control operates on the assumption that a company should allocate its limited resources to maintaining high priority items, or "A" items. Because "C" parts have much less value, it is important to have an ample amount in stock so as to not impact operations. By stocking more than enough "C" parts, less resources are spent managing low-priority items.

15 A Pareto's law

Pareto was an Italian economist who observed that 80% of the wealth was controlled by 20% of the population. This same observation can be applied to inventory classifications; usually 80% of the inventory dollars are invested in 20% of the parts.

16 A Coaching

Total employee involvement focuses on employee participation in the management decision-making process. Coaching is the primary role of supervision in this environment, as employees are encouraged to make smart business decisions without being told precisely what to do.

17 A Meeting specified requirements

The APICS dictionary defines conformance as an affirmative indication or judgment that a product or service has met the requirements of a relevant specification, contract, or regulation. Product conformance doesn't necessarily indicate a high level of quality.

18 C Meet delivery dates

Meeting delivery dates while utilizing manufacturing resources effectively is the primary objective of scheduling. Properly-loaded work centers, cost goals, and promise dates are secondary to delivering the product on time.

19 D Revenue = total cost

When a company breaks-even, their revenues equal their total costs. Volume less than break-even point results in a loss, whereas volume greater than break-even point results in profit.

20 D Any non-value added process

In JIT manufacturing, waste is considered any non-value added process or activity. These activities include overtime, scrap, paperwork approvals, wait times, or any other process that doesn't add value from the customer's perspective.

BSCM: Demand Management

Questions for this section begin on PAGE 12.

21 C $650.00

Mean is calculated by adding the period values and dividing the sum by the number of periods. 1,000 + 900 + 450 + 600 + 300 = 3,250. Divide 3,250 by 5 to arrive at a mean of 650.

22 D Pull system

Pull systems originate from a customer and signal each preceding operation. No work is performed on a product unless a signal for demand is generated, thus products are "pulled" through the manufacturing process.

23 D Master production schedule

The master production schedule is the planned build schedule for manufacturing. The production plan is the monthly aggregate plan to which the MPS rolls into.

24 A 20

110 units are demanded and the company wants to raise inventory by 10 units, thus the total requirement is 120 units. To produce these units over 6 months in a level manner, the company would need to produce 20 units per month.

25 A Resolve differences between the preliminary MPS and available capacity

The three steps to developing the MPS include starting with a preliminary schedule, checking the preliminary schedule against available capacity, and then resolving the differences between the preliminary schedule and available capacity.

26 A 430

A three-month moving average is calculated by adding the demand for three months (360, 420, and 510) and dividing by the number of data points (3). Therefore, month four's forecast would be 430.

27 A Master production scheduling

Once the master production schedule is finalized, it is input into the MRP system for use in calculating component demand. This process is known as "exploding."

28 C 440

The beginning inventory is 400 and the company wants to increase it to 500. The 5-month forecasted demand totals 2,100; with the 100 unit inventory increase the total to be produced is 2,200. Divide 2,200 by the 5 months to get the level-loaded monthly production rate, 440.

29 D 500

The beginning inventory of a small company is 400 units and they will be decreasing their inventory by 200 units over a three-month period. During which they plan to sell 1,700 units, so subtract the 200 from inventory to arrive at 1,500. They will need to produce 500 units a month.

30 C Master production schedule

The master production schedule covers weekly end-item production. This plan rolls directly up into the production plan to cover the monthly product groupings and families.

31 B 10

Tracking signals measure bias in a forecast. Because the forecast is consistently less than actual sales, there is negative bias present. To calculate the tracking signal, divide the sum of the forecast errors by the MAD. So, 40 + 20 + 10 + 50 = 120, divided by 12 = 10.

32 A 180

Three-month moving averages are found by taking the actual demand for the last three months divided by three. The calculation would be: (140 + 210 + 190) / 3 = 180.

33 A 17

MAD is calculated by adding the absolute value differences between the actual demand and the forecast, divided by the number of periods. The calculation would be: (0 + 15 + 20 + 30 + 20) / 5 = 17.

34 B Greater than one

Tracking signals measure the algebraic deviations of the actual demand to the forecast. They then divide those deviations by the MAD. If the deviations divided by the MAD are greater than one, the forecast is exhibiting positive bias. Likewise, negative bias would be present if the deviations are less than one.

35 A Master production Schedule

The APICS dictionary defines the master production schedule as the anticipated build schedule for those items assigned to the master scheduler.

36 A Finite loading, Forward Scheduling

Make-to-order environments use forward scheduling and finite loading in their operations. Forward scheduling assumes that materials are not ordered and work is not scheduled until a customer order is received. Because of this, the available capacity in each work center through which the product would move is considered prior to establishing a due date (finite loading).

37 B Planning bill

Planning bills are used for planning purposes; they are an artificial grouping of components used to simplify forecasting and scheduling. Products are not built from planning bills.

38 B Available-to-promise

Available-to-promise is the portion of inventory and planned production not already committed to orders. ATP allows accurate delivery promises to be made to the customer.

39 D Better manage schedule changes

Because change is invariably going to occur in the master schedule, time fences are implemented to help manage the associated costs. The frozen zone is usually only changed with senior management approval as the associated cost is very high. The liquid zone can be changed as needed as resources have not been committed. Lastly, the slushy zone requires negotiated trade-offs between marketing and manufacturing; if capacity is available the change is usually made.

40 A Product components and subassembly descriptions

The bill of material contains all of the components used to manufacture an end item. In addition, the subassemblies at differing stages of production are described. Labor is defined in standard hours and is referenced in the routing. Inventory is not maintained on a bill of material.

BSCM: Transformation of Demand into Supply

Questions for this section begin on PAGE 15.

41 C Order only the amount needed

Lot-for-lot ordering rules will order just the amount needed based on the net requirements.

42 C Improved maintenance

While improved maintenance is usually necessary for improved changeover, it is not created by quick setup. Improved flow, reduced lead and span times, and improved quality are all benefits of quick changeover and setup.

43 A It involves maintaining the correct due dates on orders

Priority refers to the system's ability to maintain the true due dates for orders. Planning systems constantly evaluate the true due dates for released orders and will expedite or reschedule out the orders.

44 B Exception message

An exception message provides the planner with a notice that a problem needs attention. These exceptions could be late orders, orders not needed, order rescheduling, and several other factors.

45 C The rate of doing work

Capacity is concerned with the rate of doing work. The APICS dictionary defines capacity as the capability of a worker, machine, work center, plan, or organization to produce output per period of time.

46 A 350

Available time is calculated by multiplying the number of machines (5) by the number of hours they are available each day (14) by the number of days each week (5). The result would be 14 x 5 x 5, or 350.

47 C 220

Utilization rate measures the percentage of time the machines are actually producing parts. The hours actually worked can be calculated by multiplying the utilization percentage (80%) by the number of hours available (275), which equals 220 hours.

48 A 198

Rated capacity is calculated by multiplying available hours (275) by the utilization rate (80%) by the efficiency rating of the work cell (90%). 275 x 80% x 90% = 198.

49 C Capacity and materials have been committed to specific orders

The costs of making changes in the frozen zone are high and usually require senior-level authorization. The frozen time fence should have the least changes made because capacity and materials have already been committed to specific orders.

50 D Any change can be made to the master production schedule within the production plan

The liquid zone is characterized by mostly forecast orders and changes can readily be made without an impact to the bottom line. The master scheduler can make changes in this zone with little to no concern for schedule impacts.

51 B Production plan

The production plan is an input into the master production schedule (MPS), not to MRP. All other answer options listed are required inputs to MRP.

52 D Run time, setup time

The time needed for each order can be calculated by adding run time and setup time. Setup time is a fixed time component and run time would be represented by a time per unit run. These would be combined to calculate the total time per job.

53 A Linearity

Linearity is used with Just-in-time to measure the achievement of the plan. The goal is to ensure that just the demand is produced and no extra parts are manufactured as this would be a waste of overproduction.

54 A Reduced cost

Subcontracting as needed to support manufacturing has many benefits; reducing overall cost is not recognized as one of them. Many times the additional cost of subcontracting is worth it if the product cannot be made otherwise.

55 B A bottleneck operation

A bottleneck work center is defined as one where the required capacity is greater than the available capacity. When this occurs, WIP inventory grows, thus work must be scheduled at a pace equal to the bottleneck work center.

56 A Throughput is controlled by the bottleneck

Bottlenecks occur when the required capacity is greater than the available capacity. This condition causes a build up of WIP in front of the work center. Bottlenecks do not disappear on their own; action must be taken to increase the capacity at the work center.

57 C Reduce total span time

Operation splitting is defined as splitting the lot size over multiple machines. As such, this reduces the total span time. For example, a lot that is split over two machines essentially has cut the span time in half.

58 A Reduce manufacturing lead time

Operation overlapping can be used to expedite an order as it allows the next operation to begin even when the whole lot has not been completed through previous operations. The lead time is reduced by the amount of overlapped operation time.

59 B 550

Elapsed operation time = setup time + run time per piece divided by the number of pieces per machine. So, 50 + [2 x (1,000 / 4)], which equals 550.

60 C 800

The capacity for the legs is 3,200 per week. Since each barstool takes 4 legs, only enough legs for 800 tables can be produced. The bottleneck operation determines the throughput.

BSCM: Supply

Questions for this section begin on PAGE 18.

61 B Historical data

Measured capacity is based on historical data as this shows what the machine or operator has produced in the past.

62 C 350 hours

Available time is the total number of hours a work center can be used. So, 5 x 7 x 10 = 350 hours.

63 A 0.85

Utilization = hours actually worked divided by available hours. 170 hours spent producing divided by 200 available hours = 85% utilization.

64 B 0.8

Efficiency = standard hours of work produced divided by hours actually worked x 100%. Therefore, 144 hours of standard work produced divided by 180 hours actually worked x 100% equals 80% efficiency.

65 B 38 hours

Required time equals setup time and run time. For this example, the required time equals 30 minutes setup plus (450 pieces x 5 min./piece) run time = 2280 minutes or 38 hours.

66 B Order time

Order time is part of the overall lead time of a product; however, manufacturing lead time includes queue time, setup time, run time, wait time, and move time.

67 C Making sure the best possible service and prompt delivery are provided by the supplier

The primary role of the purchasing department in an organization is making sure the best possible service and prompt delivery are provided by the supplier. They also aim to buy goods and services in the right quantity and quality at the right price.

68 A Inventory turns

When selecting a supplier all factors listed should be considered. Other factors to consider are capacity, price, and credit terms

69 A Made to order cabinetry

Price negotiations are usually made for items which are made to specification and could be purchased from many sources.

70 C Improved flow of material through the shop floor

The planner/buyer position is used to increase coordination between the factory and supplier. One method to improve communication is to remove extra steps between the buyer and planner. This improvement will allow materials to flow more smoothly into the factory, but will not improve the flow through the factory.

71 C 0.5

In most companies today, material purchases represents 50% or more of the product cost.

72 A The items used in production that are not part of the actual product

MRO's are items used in production but are not part of the product delivered to the customer. These items would include tools, cleaning solvents, scrap parts, and supplies.

73 B Price discounts

Inventory accumulated due to price discounts would be considered lot size inventory. Anticipation inventory is accumulated in "anticipation" of future demand.

74 C Lock-in-low market prices

Hedge inventory is purchased by companies when market prices are low. Companies will watch for commodities traded in open markets to drop in price; once prices fall the company will buy enough inventory to satisfy their target customer service level.

75 D Finished goods inventory costs

The cost of ordering includes all costs associated with executing orders to suppliers and within the factory.

76 C Products with uniform demand

EOQ assumptions are usually applicable for finished goods with independent and consistent demand. However, EOQ assumptions break down in many real-world cases. As an example, deliverables with a wide fluctuation in demand are not good candidates for EOQ.

77 B 800

Order point = demand during lead time + safety stock. The calculation would be:
Order point = (300 x 2) + 200 = 800.

78 A Periodic review system

The periodic review system is best used when inventory issues are low, transaction costs are high, ordering costs are low, and many items can be ordered together. For example, grocery stores order by evaluating what's on the shelf. Because there are so many transactions in a grocery store, they are expensive and they only sell one or two of an item during each transaction at the register.

79 A Labor costs

Labor is the number one warehouse operating cost, therefore measuring and evaluating productivity is highly effective.

80 A Lean stockroom initiatives

An unsecured stockroom is one of many issues that can cause inventory record inaccuracies. Lean stockroom initiatives are not regarded as a cause for inventory record inaccuracies.

MPR: Demand Management

Questions for this section begin on PAGE 21.

1 B $0.20

MAD equals the sum of the absolute errors divided by the number of errors. In the above example 100 / 500 = .2

2 D 1.25

One standard deviation equals 1.25 MAD.

3 A To show large positive or negative numbers and indicate an improper forecast for the item

Tracking signals serve the major purpose of pinpointing forecast errors. Proper forecasting methods show trends toward zero but irregular numbers are exposed by tracking signals.

4 B Both independent demand and service part demand

Both independent demand and service part demand require forecasting. To do so, dependent demand is calculated by MRP.

5 C Aggregate forecasts are generally more accurate than for a single item

Aggregating data into larger numbers will make a forecast more successful. Also, forecasts attempting to predict the long range future will be less accurate.

6 A 250

The mean absolute deviation is calculated by dividing the sum of the absolute error by the number of observations. In this case, the absolute sum of the forecast errors is 1000 divided by the number of observations which is 4 or 1000/4 = 250.

7 A 37.5

MAD = the sum of the absolute values of the deviation/numbers of occurrences. Therefore, MAD = absolute value of [(100 – 75) + (100 – 50) + (100 – 125) + (100 – 150)] / 4, or 37.5.

8 B As independent demand added to the parts gross requirements

Service parts are an independent demand item as they are added to the part's gross requirements.

9 A 2.06

The 2.06 MAD level provides a 95% probability of having what the customer ordered.

10 B 103

The mean absolute deviation is 50, (200 / 4). The MAD for a 95% service level is 2.06, so 50 x 2.06 = 103.

11 A 52

The absolute sum of the forecast errors equals 125/5 periods = a MAD of 25. The MAD value for 95% = 2.06 so 25 x 2.06 = 51.5 or 52.

12 C Evaluation of manufacturing performance

For most companies, a key measurement is the ability of manufacturing to deliver to customers on time and while the measure is not singular for manufacturing performance, it is significant in ensuring customers satisfaction. Clearly, measurements of on-time delivery would not be used to determine forecast error or select the most cost-effective mode of transportation. Evaluating suppliers is also not immediately related to the measure although as a supplier metric, on-time delivery would be a measured at some point.

13 A Lead times are offset in the rough-cut capacity plans

More detailed than resource plans, rough-cut capacity plans consider more production resources and are disaggregated to days or weeks. On the other hand, resource plans are in months or quarters.

14 C A source requirement for a given item

Providing an upward linkage of components to end requirements, pegging assists the master scheduler by analyzing MRP exception messages to identify the source requirement of specific problem items. Safety stock, constrained work centers, and lead times are not related to pegging.

15 C Both feasibility and need of resource availability and requirements

Both feasibility and need of resource availability and requirements are evaluated directly by the MPS. On the other hand, long-range plans, final assembly, and production activity control are not addressed by the MPS.

16 B Subcontract

Orders cannot be completed sooner unless the capacity is increased. Subcontracting or adding equipment is an option to rectify the situation.

17 A It controls the production from shippable products to shipment

The final assembly schedule only specifies production, not shipment.

18 C Adjusting time fences

Shifting resources to work centers, moving requirements to different time periods, and outsourcing production are all ways the master scheduler should adjust load profile but adjusting time fences is not an option for load profile adjustment.

19 B Using forecast when actual orders are less than forecast

Beyond the demand time fence, forecasts are consumed by using the actual orders only if they exceed the forecast requirements.

20 A Maintain planning bills

The objective of the master schedule is to keep a level repeating schedule, to minimize changes to the schedule, and to push changes to future periods to keep them from disrupting the schedule. Therefore, it should sum to the production plan. Planning bills are not maintained by the master schedule.

MPR: Sales and Operations Planning

Questions for this section begin on PAGE 24.

21 B Substantial idle capacity

To make immediate delivery, a make-to-order company must have substantial idle capacity in order to take every order and immediately manufacture the product. No engineering changes should occur and a significant level of inventory is needed for response to be quick.

22 C Sales and Operations planning

In the business planning process, Sales and Operations planning should come first. From the Sales and Operations process comes the production plan which, in turn, provides input to the master production schedule. The rough cut capacity plan is done to check if the MPS is realistic.

23 B Increase queue time at critical work centers

No change will occur to the capacity level at the work center by increasing the queue time at critical work centers. Actually, this change will likely cause a decrease in capacity as the work center will become more cluttered.

24 B Raw materials

Raw materials necessary to or common in a product in a make-to-order company are often kept on hand to shorten the time necessary to make products in order to reduce the lead time.

25 A Schedule for final assembly

An actual build schedule in a make-to-order environment is the final assembly schedule and represents the final products which have been sold to customers. When converted to dollars, this information yields an accurate measure of future cash flow.

26 A Meet the plan

When an agreement is reached for a production plan by the Manufacturing, Marketing, and Finance areas, then manufacturing "hits the plan" which will give necessary guidance to all departments and prevents important steps and requirements from being left out or forgotten.

27 C One unit of the typical product

A bill of resources bases capacity measures on one typical unit of product and from this the product family's projected output is multiplied by the bill of resources. This extends the required resources for manufacturing the product family.

28 C Filtering

Data points which randomly occur outside the normal series of data are outliers and they must be adjusted in a process called filtering or else data will be skewed. This will make the future forecast less accurate.

29 D It monitors actual demand versus the forecast

The forecast is reduced by the actual demand as it occurs when forecast consumption is used. Then, the master scheduler is able to monitor the actual orders versus the forecast. Additionally, the demand is not doubled with forecast demand and actual demand.

30 C Scheduled receipts

The production planning process should consider all sources of demand, including the customer order backlog, service parts requirements, and interplant demand as demand has an impact on the production plans.

31 D Factory capacity

Unfortunately, the forecast is such an integral planning component, it's overestimation has an impact on many areas of the business. The future factory load is planned on the forecast and consequently the resulting master production schedule will also be overestimated and cause the MRP system to plan for too many component parts and subassemblies. However, the capacity, calculated from the production ability of the factory, would not be affected by this type of error.

32 B Signaling that a forecast is no longer valid

When monitoring the forecast quality, a tracking signal is used and helps monitor by calculating the sum of the variations of the forecast and the actual values and divides this result by the MAD of the variations.

33 D Forecasts become more accurate the further in to the future they move

As numbers are aggregated, forecasts tend to be more accurate and it is therefore easier to predict a total sales number for a company than the individual units supporting the sales. Business planning needs forecasts but, as actual demand varies, companies must be able to quickly adjust. Additionally, the closer to term forecasts are, the more accurate they will be.

34 B 350

The mean absolute deviation is calculated by dividing the sum of the absolute error by the number of observations. In this case, the absolute sum of the forecast errors is 1,400 divided by the number of observations which is 4 or 1,400 / 4 = 350.

35 C An unfilled customer order

In the Apics Dictionary, ninth edition, a backorder is defined as "an unfilled customer order or commitment. A backorder is an immediate (or past due) demand against an item whose inventory is insufficient to satisfy demand."

36 B Outlier

According to the APICS Dictionary, Ninth Edition, any data point which differs significantly from other data points for a similar phenomenon is an outlier.

37 A 116

old forecast + alpha (actual demand – old forecast) = new forecast.

Feb forecast = 100 + .2 (130 – 100) = 106, then (Mar forecast) 106 + .2 (146 – 106) = 114, then (Apr forecast) 114 + .2 (124 – 114) = 116.

38 A Consuming the forecast

The APICS Dictionary, Ninth Edition, states that consuming the forecast is "the process of reducing the forecast by customer orders or other types of actual demand as they are received." In forecast consumption, a problem begins when the actual demand is significantly different from the forecast. Logical decision rules must be created on how to handle the over or under forecast situation.

39 B Ratio of demand above or below the average

Estimating how much demand exists above or below the average demand of a product during a season, the seasonal demand index aids companies in planning inventory.

40 B Controlling bias

Controlling bias is the most critical problem for management. It is often easier to live with large errors (large MAD) if it's necessary to reduce bias. The consistent deviation of the forecast in one direction is bias and if it is not corrected and allowed to continue, the bias weakens the foundation for the business plan.

MPR: Master Scheduling

Questions for this section begin on PAGE 26.

41 D All of the choices are correct

Because customer orders are not far enough into the future to plan capacity needs, some forecast of demand would be required.

42 C Any change having a major impact on capacity

The only problem to the MPS beyond cumulative lead time of a product is an impact on capacity. The master scheduler would require notification if large orders were booked which caused any major capacity constraints.

43 D Products made to customer order

Products are pulled from finished goods inventory in a make-to-stock company instead of being produced to customer order. As such, end item is the statement format for the MPS.

44 D Inventory will remain stable

When the production levels fluctuate, labor, capacity usage, equipment usage, and other resource usage will fluctuate as well. Positively however, inventory will remain stable.

45 D It is the actual build schedule

Subject to change, the MPS is the anticipated build schedule while the FAS is the actual build schedule and is committed to as late as possible.

46 A Production occurs at exactly the same rate as the sales forecast for each period

When the level strategy is applied, the production rate is stable and fluctuations in demand are absorbed by inventory.

47 B Two effects will occur, delivery performance will erode as well as work-in-process growing

While the cost per unit produced may decrease in a cost accounting sense, the actual costs will reduce the profit due to inefficiency of work-in-process, longer lead times, and possibly lost business.

48 D All of these choices are viable considerations

When determining whether to use a rough-cut capacity plan or a detailed capacity plan, all of these choices are viable considerations.

49 D A listing of required capacity and key resources needed to manufacture one unit

Displaying required capacity and key resources needed to manufacture, a bill of resources deals with one unit of a product or family.

50 D End items; units per day

A just-in-time environment needs a MPS stated in a rate as units per day.

51 D It represents either cumulative or per period data

The PSI is shown in graph form as well as table form. Production lead times are not shown in this type of report but cumulative production variances can be shown and can represent either cumulative or per period data.

52 B Products are planned as the market place demands

Allowing for assemble-to-order firms to plan products based on percentages to be sold without forecasting all possible end item configurations, the two-level MPS approach enables planning which reflects the market place demand.

53 A Common raw materials

Common raw materials are not a critical resource but special components, particularly if they require rare materials such as composites, could be. Additionally, in a company with a high debt load, it could be very difficult and/or expensive to finance resources. Lastly, required skilled labor for key operations is a critical resource.

54 C The uncommitted portion of inventory

The uncommitted portion of inventory is the available-to-promise or ATP. ATP is more than just cumulative data.

55 D Make-to-stock

The final assembly schedule does not require separation in a make-to-stock company as products are stocked in their final assembled form for delivery to the customer.

56 C Material requirements plan

MRP would not be an input to the MPS, instead, the MPS is into the MRP.

57 C Period 4

If the projected balance drops below zero the planner will need to place the replenishment order according to the lead time. In this case, the planner would need to place the order in period 4 in order to support period 6 within the 2 period lead time.

58 A Changes can be readily made during the firm period

Free periods allow easy changes while slushy periods allow only minor changes over time. The third time fence, firm, does not allow for any changes unless the highest management level approves them due to significant cost impacts.

59 A Component requirements

In production planning capacity is checked at a rough-cut level and manufacturing labor needs may be determined. Component availability however, would not be determined as MRP would handle this. Component availability would only be checked at the production planning level if it were a scarce component.

60 A It is used in make-to-stock and assemble-to-order companies

Used with assemble-to-order and make-to-order companies, available-to-promise commits uncommitted portion of a company's inventory or planned production.

MPR: Distribution Planning

Questions for this section begin on PAGES 29.

61 C Outsourcing

The four activities included in Master Planning are forecasting, order service, production and resources planning, and master scheduling. Demand management is also a part of Master Planning and includes both order service and forecasting.

62 C Work center capacity

Because the production plan is handled by top management and is not a detailed plan, work center capacity would not be evaluated in this type of planning. Possible outsourcing, inventory build, and production level by month would all be evaluated by top management per the plan.

63 C Level strategy

Fluctuation in demand is allowed to be absorbed in the inventory by a level strategy and production can be maintained at a flat or level rate monthly.

64 C Forecasts which are always biased

The symptoms of a problem with the Master Schedule are varied and include disruptions on the plant floor, late deliveries, unplanned overtime, excessive work-in-process, constant expediting, late deliveries to customers, frequent schedule changes, and end of month crunch. Forecast bias however, is not caused by a master schedule problem.

65 C When the MPS capacity is greater than is realistic

A MPS should be realistic or the production cannot be properly planned. When planned production exceeds the factory's ability to produce an overloaded schedule occurs.

66 B Both

When developing a production plan it should be cross functional as the production plan is the main tool used to run the business.

67 A Orders received but not yet shipped

A customer order backlog is the orders received but not yet shipped and should be constantly monitored against competition or else backlog may be the result of an inaccuracy or inefficiency in the business.

68 B Manufacturing build plan

The planned build schedule for manufacturing is the master production schedule but it is not the same as a final assembly schedule and it is not equivalent to a forecast. Instead, the master production schedule estimates future demand by using the forecast. The production plan is actually used as input for the master schedule and is therefore not a definition of the overall schedule.

69 D Increase the queues to provide work centers with enough work

There are many ways to expand the capacity. All of the above ways work except increasing the queues which will only exacerbate the problem and, by increasing the amount of work on the floor, will actually decrease the throughput.

70 B Units of shipments

Items, quantities, or dates must be the measurement used in expressing a forecast.

71 A Senior manager

A senior manager such as the President or Vice President of Manufacturing or Sales should change the schedule for orders inside the firm zone as such alterations will have major cost and schedule ramifications. If the approval process is not streamlined and rapid, necessary changes may never take place.

72 D All of the choices are correct

Input is required from all of the above choices in order for Sales and Operations Planning to be successful and coordinate at the highest levels before plan execution begins.

73 C Capacity plan

The following plans are developed and implemented by various functional organizations after the Sales and Operations Planning process is completed: Sales plan (Sales and Marketing), Backlog projection (General Manager), Production plan (Manufacturing), Financial plan (Finance), New product development plan (Engineering), and Inventory projection (General Manager).

74 C Make-to-stock

If the end item level is scheduled by a company, usually it is a make-to-stock company that ships stock to the customer. The food industry and consumer electronics industry are examples of make-to-stock companies in which the inventory needed is calculated statistically based on the customer service levels desired for each class of inventory.

75 B They are representative of bill structures of parts that cannot be built

Pseudo bills aid in planning by assigning percentages to product options which are not being built.

76 D Change the master schedule

Rescheduling jobs is the only solution when the master schedule is consistently overloaded as the right people must help to alleviate the overload. Once the error is corrected, policies should be developed to prevent repetition of the problem. Sales and marketing personnel should aid in the reschedule and can contact customers about changes.

77 B The coordinated production plan being driven

The purpose of a master production schedule is to integrate plans from each function, commit resources to satisfy customer demands, drive the detailed capacity and material requirement plans, create accountability within the company, and manage the inventory and backlog level. The purposes are varied but one thing it does not do is drive the production plan.

78 A Load-based work center capacity

Mid- to long-range capacity planning is provided by rough-cut capacity planning and detailed capacity requirements planning is provided by work center planning. Additionally, rough-cut capacity planning identifies material shortages for critical materials and labor shortages for key skills. However, rough-cut capacity planning is a high-level planning process for such resources so it may limit the execution of the manufacturing plan.

79 C At the last possible moment

During the final assembly process while making a finished product, MPS focuses on the anticipated build schedule of common products and the actual configuration of the product is done only when the product is ordered by a customer. Therefore, products are kept in the most common form until the last possible moment in order to meet customer specifications.

80 C Be stated in fewer different units

When a modular bill of material is used, the MPS is allowed to be stated in fewer units and the MPS process is then facilitated as it is stated in the units which are sold, not in the units which are built. For example, instead of trying to MPS every chair built, the MPS is for the generic parts of the chair and once it is purchased by a customer with specific options the chair is scheduled for assembly.

DSP: Planning the Management of Inventory

Questions for this section begin on PAGE 32.

1 B Functional employees in the work force

Instructors from the work force are the most qualified instructors because they are responsible for teaching employees to train others. Supervisors from specific departments are best in training personnel.

2 D Strategic buffers

The shop's capacity to produce can be positively impacted by increases in machine utilization, efficient preventive maintenance, and efficient labor forces. Capacity would not be increased by strategic buffers but, if properly placed, they will prevent the loss of capacity at bottleneck work centers.

3 C Resource plan

Input is required from a variety of systems for Capacity Requirements Planning and these inputs include: work-in-process inventories to allow calculation of the existing load, routings to allow calculation of each work center's capacity, the scheduled receipts to plan for orders already committed, and the planned orders for future load.

4 B Full pegging

According to the APICS dictionary, full pegging is "the ability of a system to automatically trace requirements for a given component all the way up to its ultimate end item, customer, or contract number."

5 C Immediate implementation and retrofit

Immediate implementation and retrofitting of any units existing in stock or the field must occur when a safety issue exists. Phasing in is not an option.

6 D An increase in throughput for the whole manufacturing line

The slow point of the entire line is the bottleneck operation, if an increase of capacity occurs there it effects the entire line as well as allowing throughput to increase. Only if the bottleneck is moved to the location of a queue behind the next work center will it increase but the queue will not grow if the increased flow through the bottleneck exceeds the next work center's ability to accommodate the increased flow.

7 C Long, time consuming MRP runs

MRP run length is dependent on the bill of material complexity as well as the number of parts, not an unrealistic MPS.

8 C Implement with an effective phase-in date

A substitute would need to be phased-in as the discontinued product is phased out over 6 months allowing for the existing inventories to be used.

9 B Conference room pilot

When running a small, segregated part of the manufacturing process the conference room pilot approach is best to test the procedures, training, and software in a "live" mode. If this test run is successful than the whole system should be cut-over.

10 A They are for transient assemblies

Transient assemblies are used when creating phantom bills of material.

11 C Both

For disentangling options and separating common from unique parts when planning, modular bills are used.

12 A All of the choices are required

All three items should be included if the bill of material is well-structured as they allow for a clear state of completion.

13 B The MPS forecast error is within 5%

Input for the MRP system comes from the MPS and is assumed to be realistic. The MPS would be impacted by the forecast error.

14 C Manufacturing Resource Planning

MRP II stands for Manufacturing Resource Planning and includes all business planning software in a closed-loop system.

15 A 2

The inventory turnover rate is best calculated by dividing the cost of goods sold by inventory. It's important to note that both inventory values are at standard cost, so pricing variations are eliminated with this method.

16 C The system's users

Users of the MRP system are responsible for making it work. The steering committee may be chaired by the manufacturing director who would receive reports from the users.

17 B Value analysis

Value analysis is the function of comparing what an item does versus how much it actually costs with the goal of finding a cheaper alternative.

18 B It is the number one business priority

The MRP II project is secondary to running the business.

19 D All of the problems listed encourage software purchase

Writing internal software contradicts an 18-month implementation schedule, may malfunction, and may not take into account the future of the company.

20 D All are correct

A member of the operating department must be used as a project leader or else they will not have a full understanding of the business and its day-to-day operational problems. Additionally, the person must be full-time and always monitoring the status of the business.

DSP: Planning Material Requirements to Support the Master Schedule

Questions for this section begin on PAGES 35.

21 C It is a regenerative MRP characteristic

In net change MRP, interlevel equilibrium is when the system rebalances and explodes down from the changed item.

22 D All of the choices are correct

Included in purchasing lead time are order preparation, quoting, supplier lead time, transportation time, and stocking time.

23 C The load and the productive capacity in the short-term

The MPS generally ensures that entered load for the plant balances with the plant's production ability. Input and output are balanced by the master scheduler.

24 C How the product is built

The MRP provides all of the above except for the routing file which maintains how the product is built.

25 A Alternate routings

Additional capacity must be found in an overload situation in order for the work required to be produced. Although routing may not be the best operation, there may be alternate routings to use to increase the throughput.

26 C It increases the gross requirements of a given component

Gross requirements are increased for given components in order to account for projected loss during manufacturing.

27 A Guidance of the explosion process

During the MRP planning process, explosions are guided by the bill of materials. MRP is told by low-level coding on the bill of materials when demand should be accumulated for netting in order to guide the part specific explosions.

28 A Only one set is required for the company

A primary rule concerning the bill of materials states that there be only one set of company product structures. Unique needs determine how each function is sorted and viewed.

29 A Planned order receipt minus the lead time equals the planned order release date

In MRP, lead time offset is a technique used when a planned order receipt in one time period requires the release of that order in an earlier time period based on item lead time.

30 B Planning of order receipts prior to the required due date

When safety lead time planning occurs, releases happen earlier than required by the requirements plan. Then their receipt is scheduled earlier than the required due date. Along with safety stock, these methods both protect against uncertainty.

31 B Generate purchase orders as required

A smooth flow of parts in a factory is the responsibility of the planner who releases orders, expedites parts, reschedules dates, maintains the system planning factors, reconciles errors, attempts crisis prevention, and provides expertise around system enhancements. They are usually not responsible for generating purchase orders.

32 C Due date of the order is after the need date

The MRP system needs the due date and the need date in order to identify the out of limits conditions. A message to reschedule the orders to an earlier need date will appear if the due date of an order is later than the need date.

33 A Due date of the order is prior to the need date

A "reschedule out" message indicates an order which is not required until after the due date and provides a change to delay parts not yet needed which in turn will keep inventories low.

34 A All of the causes would affect such a change

Any change affecting any MRP system inputs causes the part to be replanned, including the bill of materials, the inventory quantity, the lead time, safety stock, lot sizes, etc.

35 B Master Production Schedule, inventory status, and bill of materials

The inventory status, the bill of materials, and the Master Production Schedule are used by the MRP system as the primary inputs. It is the MPS which uses the forecasts and the customer orders. An input not used in the MRP system is the capacity requirements planning system.

36 B The planners assigned to a part are changed

Minor nervousness might be caused by the change of a planner for a particular part but the MRP system will truly become nervous only as parameters change, such as unplanned demand, or the early release of orders.

37 B Lot-for-lot

The quantity ordered is equal to the net requirement for the part in a lot-for-lot lot sizing rule. This rule maintains an inventory level of zero.

38 D All of these conditions would cause an exception message

Not all of the exception messages in an MRP system will be used. The commonly occurring messages are for due dates which do not equal need date after the filtering process, notification that an order should be released, and notification that an order will be delivered late.

39 B Inaccurate quantity of raw materials ordered

The bill of material is used by the MRP system in calculating the required quantity of raw materials so inaccuracies in the bill of materials will cause inaccurate orders of raw materials.

40 C Subassemblies awaiting rework orders

Independent demand items forecasted are zero level parts and would be shipped from warehouses to customers. This does not include subassemblies awaiting rework.

DSP: Planning Operations to Support the Priority Plan

Questions for this section begin on PAGE 38.

41 D All of the choices are included

All of the above are included in the cost of carrying inventory. Movement of inventory includes handling costs and inventory shrinkage includes losses due to damage and pilferage.

42 D All functions who can contribute to the process

Cross-representation exists in the engineering change process as multiple changes affect a variety of functions including accounting, sales, finance, quality, manufacturing, and engineering. All team members must understand the impact of the change as such decisions are far reaching throughout the company.

43 B Oil

Equipment sequenced in steps is used in continuous production and is set up according to the way the product is manufactured. Because material flows continuously in this process, change and material setups do not often occur.

44 A Have the ability to track product from vendor to customer for every step of manufacture

In many industries it is required that products are traced for potential recall from vendor to manufacturer to warehouse to customer.

45 C The inventory for the product is in subassemblies

A stock of subassemblies to be assembled describes assembled-to-order products. The maintenance of any inventory would be with long lead time and of common parts.

46 D Incorporating the new part into the planning process

The MRP aids in the engineering change process by establishing the date at which a new part will start (the old part stops on the previous day). The effectiveness of possible dates is planned by the MRP system to enhance the changeover and this process eliminates the need to manually watch the parts.

47 D A plant floor location near the point of use

Kanban signaling is used with a variety of visual devices. The designation of an outbound stockpoint location occurs near the point-of-use in the factory where material waits until it is pulled to the next operation.

48 D It is dependent on the company and its controls

Rules of acceptability vary depending on individual company management, resources, and controls.

49 D 700

To calculate the reorder point add the demand during lead time and the safety stock or 3(200) + 100 = 700.

50 C Line rate of output

Line rate determines the amount of product to be produced in a JIT manufacturing environment. As a result, line output is the measurement used for planning purposes and the output pulls the input to the line.

51 B Inventory system records are "in tolerance" when compared to physical counts 95 out of 100 times

According to Cycle Counting for Record Accuracy, a 95% record accuracy means that for every 100 counts physically taken, 95 were within an acceptable error factor.

52 C Length of time a product can be in inventory before it becomes unusable

Particularly critical in food and pharmaceutical industries, shelf life refers to the time a part is usable from inventory before it becomes unstable.

53 A Received quantity less than ordered

No shrink will occur, even if less is ordered, as long as the received quantity is equal to the amount which was physically "put away."

54 B Favorable variances from standard cost

Favorable variances should exist because actual cost will be less than the standard cost. Although other answer choices also may contribute to favorable variances, they are not determined by standard cost.

55 B Trailer preparations costs

All of the above are included in storage costs except for the cost of trailer preparations which includes backing them to the dock for loading, road preparations, and/or movements within the yard.

56 D When the first bin empties

When the first bin is emptied, in the two-bin system, the inventory is ordered and any product left in excess is placed in the second bin after refilling the first bin.

57 D When the production counts are reported for the item

The method of backflushing records inventory usage without requiring maintenance of all the issue transactions. In this method, all the component parts of the assembly or subassembly are deducted by exploding the bill of materials by the production count for the assembly.

58 D Maximize profits in the current year by waiting to write off obsolete inventory until the next year

An equal monthly write-off must be charged against income accrual as obsolete inventory must be reserved for as it is identified or, based on an annual estimate. After the write-off, disposal of parts can occur but the write-off may also occur simultaneously with the time of disposal.

59 C On-hand inventory balance

When the value of inventory falls the company's income feels an impact as the inventory valuation is set at the lower cost of the market. Consequently, the company's financial statements such as the income statement, the balance sheet, and the cash flow statement are all impacted. However, the on-hand inventory balance will not change.

60 A Maximize purpose of economic customer service and productivity, minimize inventory investment

A well-rounded inventory management objective would be to maintain excellent customer service while sustaining minimum inventory levels. Higher productivity will occur if these objectives are achieved.

DSP: Planning Procurement and External Sources of Supply

Questions for this section begin on PAGE 41.

61 B The order is on schedule to be shipped on time

In the MRP system, corresponding due dates and need dates mean the order is scheduled for on time completion. However, in a dynamic environment, change may separate the dates as the data reflects only the moment when the MRP system balanced supply and demand.

62 B Release the order to the shop

When a transaction is completed a planned order becomes a scheduled receipt. The shop is then informed of the order's release.

63 A Conversion of planned orders into scheduled receipts

A planned order is converted into a scheduled receipt which reflects the lead time offset by the process of order launching.

64 C Future demand, supply, and inventories expression by date

Time-phasing is considered a technique of expressing future demand, supply, and inventories by time period. It is a key to empowering MRP as a tool.

65 C MRP does not require subassemblies to be stocked

Phantom assemblies do not have to go into and out-of-stock which creates the benefit of not having to generate orders for each assembly. Also, pick-lists do not have to be generated in order to withdraw from stock. Much administrative work is eliminated by using phantom assemblies.

66 A Neither

If demand for items is unrelated to the demand for others items, independent demand exists. For items such as this, demand is usually generated from forecasts of actual orders such as service items.

67 D All of the choices are used

All of the items listed above are used. LIFO is a valuation technique and the other two are techniques used to track inventory.

68 D Balancing the cost of setup with the cost of carrying inventory

In order to determine the economic lot size, calculate the lowest total cost point where the cost of setup equals the cost of carrying inventory.

69 A All of the statements are true

It is difficult to quantify the carrying costs which are usually set by management and based on available empirical data. Consequently, obsolescence is included such as warehousing, taxes, scrap, interest, material handling, and more.

70 A Inventory value would be lower, cost of goods sold higher

When an inflationary period occurs the LIFO method uses the earliest costs to value the inventory, these are lower so higher costs are charged to the cost of sales and this usually lowers profits.

71 C Experience with Maintenance, repair, and operating supplies

Experience with part purchasing and operating supplies to support maintenance and repair operations would be required for this position.

72 D The period of time from the manufacturing order release until shipment to the customer

The time period between the release of the manufacturing order and the shipment to customer is referred to as the manufacturing cycle time. In a "make-to-stock" company it is the time from order entry to finished goods.

73 C It is equal to the longest cumulative product lead time

The planning horizon must have future due dates that allow for manufacturing lead time and procurement lead time. To allow this, it must be at least as long as the cumulative product lead time.

74 B Procurement time

Manufacturing lead time includes move time, order time, wait time, and inspection time but not purchasing lead time.

75 C Component items manufactured in-house have had inventory errors

Protecting against running out of parts in manufacturing, safety stock should be used when lead times are uncertain for the supply of parts. Demand fluctuates when parts double in use between spare and assembly so safety stock provides protection from uncertain demand related to spare parts but does not protect against errors in inventory records. In order to determine these errors cycle counting, and corrective action would be required.

76 B To sum the higher-level requirements before netting the inventory

Requirements are accumulated by the MRP at the highest levels and then are worked down through the bill of materials. Consequently, when the part's low-level code is reached, at the lowest structural level, the total requirements are accumulated. The MRP can then net out the inventory to project a net requirement which will be used to plan the orders and balance supply and demand.

77 B Available capacity

Specific input is necessary for the MRP system to calculate and balance supply and demand. Included in the input is part lead time, the inventory balance, and the lot size to order. The MRP system does not evaluate the available capacity as it actually completes such calculations under the assumption of infinite capacity availability.

78 D Maintain valid due dates for all open orders

The two primary functions of MRP are to maintain order priority in open orders and produce planned orders needed to maintain balance of supply and demand; both of these purposes ensure that necessary orders are the first to be worked on.

79 C Determination of the machines needed to complete the MPS

Because it is highly detailed, the Capacity Requirements Planning does not provide feedback to the production plan, nor does it determine materials needed. It examines in detail each machine and the load on the capacity of those machines. Maintenance of the priority of the orders is handled by the MRP system.

80 D Pegging

Pegging is a process used to relate all the gross requirements for a part to all the planned order releases. Pegging may also relate gross requirements to other sources of demand that generated the requirements.

ECO: Execution of Operations

Questions for this section begin on PAGES 44.

1 C The raw materials needed to produce

In addition to run time and setup time, routings include sequenced operations to be performed as well as the work centers involved in manufacturing. Routings may also include testing and quality operations. The necessary raw materials for production are part of the bill of materials.

2 C Less than 1.0

The critical path is calculated by dividing the time remaining until a job due date by the amount of time remaining to complete the job. A ratio of one means the job is on schedule, greater than one means the job is ahead of schedule, and less than one means the job is behind schedule. If the job is past its due date a negative value will be calculated.

3 A All of the actions would reduce manufacturing lead time

All of the actions would reduce lead times. Some choices, however, are more effective than others.

4 D All of the choices are included

A shop packet is a printed set of documents created for a specific production order that usually includes the bill of materials, pick tickets, routing, work instructions, production reporting tickets, move tickets and other supporting documents.

5 D Job completion plan and progress versus the plan

In a job status report, one can see actual job progress compared to the date of completion.

6 D All of the choices are included

The Just-in-time process includes all of the answers above. The philosophy of JIT is simple – inventory is waste and by eliminating waste you expose the hidden costs of carrying inventory.

7 A A manufacturing operation found in a routing for part production

If an operation is normally part of the routing, it is a primary operation.

8 A All choices are correct

Few industries wouldn't benefit from lot tracing as it helps reduce the cost of recall and therefore reduces unwanted publicity.

9 B To maximizes assembly line output

Line balancing maximizes the assembly lines' output by smoothing the completion time of each operation. This technique will minimize the work-in-process and eliminate any bottlenecks in the line.

10 D A job is 15% behind schedule

A critical ratio of 1.0 means the job is on schedule, <1.0 means the job is ahead, and >1.0 means the job is behind. In this example, a ratio of 0.85 indicates that 15% of the job is behind schedule (1 – 0.85 = .15, or 15%).

11 B Queue time

On average, only 10% to 20% of manufacturing lead time is actual operation time. The remaining time is mostly attributed to queue time, or the time that the part sits before being worked.

12 A All of these requirements are necessary

Before an order can be released to the shop floor, the components and tooling should be available, as well as the required due date. Without these, an order shouldn't be released as the job cannot be worked.

13 A Job priority

Job priority has the highest impact on the work center queue time. Existing queue time can be eliminated if a job's priority is high enough to bypass all other jobs waiting at the work center.

14 B 600

The factory can only produce as fast as its bottleneck operation. Thus, this company can only build 600 bicycles as they are limited by the amount of wheel assemblies they can produce each week.

15 C Lists the work center jobs to be run and the priority sequence

Each work center is provided with jobs according to the dispatch list. Jobs are then sequenced and displayed to manufacturing in the optimal order.

16 D Highest machine utilization

There are dozens of job sequencing parameters that attempt to establish job priority. The best rules will establish and sequence priority based on the order due date, not on machine utilization.

17 B Increase the safety stock

If a supplier increases the customer lead time, the safety stock should increase accordingly as lead time extensions add uncertainty to the planning process.

18 A Overlapped scheduling

Overlapped scheduling occurs when the parts begin running on subsequent operations prior to the previous operation's completion. The more repetition involved in a job, the more often this sort of scheduling would occur. Careful selection of machining software is required to accomplish such an effort.

19 B If no value is added, eliminate it as waste

Just-in-time focuses on waste elimination of anything not adding value for customers.

20 D All of the obstacles are correct

In addition to a variety of others, all of the choices listed are obstacles to successful JIT deployment.

21 C A schedule which varies products and lot sizes so every model is made every day

Mixed model scheduling instructs the factory to build every model ever day so the production mix matches the sales for the day. This technique is very helpful in flow manufacturing down an assembly line.

22 B Inspection is completed in small lots

The ship-to-WIP process eliminates major operational costs by removing steps with no value. Among these are inspection, traditional receiving, and stocking; the product is simply delivered to the point of use.

23 B A job which is highly repetitive and not suited for humans

Robotics replace jobs in which the a human would become bored, compromise accuracy, or risk injury. It's especially appropriate for such jobs that are highly repetitive. If judgment calls or flexibility are required for the job, robotics should not be used.

24 D Production is set at a constant or level rate

When resources are produced at a consistent rate or consumed at a level rate, linearity occurs.

ECO: Control of Operations

Questions for this section begin on PAGE 47.

25 A All of these will occur

All of these benefits will occur when smaller lot sizes are used. Additionally, loss caused by quality problems will also be reduced. Still, cost will not necessarily be kept down unless the setups and changeovers are quick.

26 B Future requirements

Certified suppliers must offer effective services without storing inventory. As such, future requirements must be accurate in order for the schedule and purchase of raw materials to be effective. The supply chain can then focus on reducing total inventory.

27 C Cut the lot size in half and solve any problems that arise

When lot sizes are cut in half problems may arise. Once the problems generated by the first lot size reduction are addressed, reduce the lot sizes again for more problems to surface. This is the "one less at a time" process of gradually reducing lot sizes.

28 D All of these are appropriate actions to take

Operations should be evaluated and simplified by flow manufacturing implementation. As a result the schedule will be both stabilized and maintained, engineering changes will be reduced, and unnecessary transactions will be eliminated.

29 D A pull system used to signal the previous operation that parts are needed

Kanban is a pull system which uses cards for work centers to signal the previous operation that parts are needed. Kanban systems are typically used when the machines can't be linked physically to one another.

30 A All of the choices are included

All of the above are benefits of cellular manufacturing. Additionally there will be less work in process, improved quality, and improved job satisfaction.

31 A Purchased materials are shipped to the point of use without inspection

The ship-to-WIP process ships purchased materials directly, without inspection, to the point of use. Usually, this happens when a certified, quality vendor has products that don't require inspection.

32 A Higher quality products

JIT reduces the waste linked to producing a product. Root cause analysis also helps to eliminate waste. Freight costs can rise if frequent JIT deliveries are required. Smaller lot sizes do not always occur when JIT is implemented. Design processes need to be less deliberate and faster in order for waste to be eliminated.

33 A All of the choices are correct

By grouping dissimilar machines into a U-shaped work cell, the distance a part has to travel is reduced. Queues are greatly reduced or eliminated which helps cut down on WIP inventory.

34 C Logical flows of materials through the factory

Normally, a smaller variety of products are run down a logical flow in a focused factory. This technique creates a repetitive process on the production line and restricts the variety of parts produced in order to achieve simplified flow.

35 D Restricted product variety

The line flow in a focused factory has a variety of products which are restricted in order to create a less complex production line. Fewer transactions and inspections are necessary to implement this technique.

36 D Acceptable quality every time

The Just-in-time supplier must be able to provide consistent quality. This level of quality is crucial for lean companies but very difficult to achieve. Inconsistent quality creates erratic production lines. Late delivery is preferred to inconsistent quality as it is easier to troubleshoot.

37 C Appropriate sizing for work center consumption

The pull system will struggle to be successful without mobile parts containers properly sized for work center consumption and lot size calculated work.

38 D 15

The number of Kanban cards is calculated using the following: y = [DL(1 + alpha)/a], where y = Number of kanban cards, D = Demand per unit of time, L = Lead time, a = Container capacity. Thus, Y = [150(1)(1 + 0) / 10] = 15.

39 D The inventory will be pushed back to suppliers

Inventory may be pushed back to suppliers during Just-in-time implementation; note that this only moves the inventory instead of eliminating it. Both the suppliers and the manufacturers are impacted as the inventory must ultimately be paid for.

40 A Immediately after use

Check a tool immediately after use to verify it is sharp enough for the next job, otherwise a problem may arise due to the delay created by the unplanned time spent sharpening the tool right before the next job.

41 A Mistake proofing a process

Poka-yoke is a mistake proofing technique applied to a process. Parts may be assembled specifically to allow finishing only when all parts are included or so a fixture only fits one way with no manipulation.

42 A Backflushing

Receiving a product into finished goods inventory or at an operation count point is referred to as backflushing. In this process, the system deducts components from inventory based on the finished goods quantity times the bill of materials for the product.

43 A All of these are correct

Setup time reduction creates a strong opportunity to improve existing operations. This reduction allows for smaller lots to be produced, which is another focus of JIT. By producing only what is needed for the customer, the total amount of inventory on hand is drastically reduced.

44 C Production lines will be stopped by emergency breakdowns

Flow manufacturing must get support from preventive maintenance as unplanned downtime shuts down not only the machine but the entire line. This maintenance is increasingly critical as the number of machines connected to the line without buffer inventory increases. In flow manufacturing, inventory does not really exist to buffer machine emergencies.

45 D All of these are correct results

The Just-in-time operation greatly simplifies paperwork, transaction processing, and tracking of operations. When material flow is reliable and fast, WIP tracking is not needed. VMI can handle purchasing by paying for parts as they are consumed so invoices and purchase orders are no longer necessary. QC will also experience increased simplicity because multiple inspections, and the corresponding paperwork, are no longer necessary.

46 C Subsequent operation (internal customer)

Demand in a Just-in-time plant would pull parts from previous operations and can use a variety of visual devices to signal a feeding work center for needed parts.

47 B All of the choices are correct

Simple supplier agreements are best. Such agreements outline unique partnership arrangements and might reference cost reduction projects, personnel contacts for communication ease, containers, and trucking. Such arrangements allow both parties to benefit.

48 A Reduced inventory investment

Organizations are enhanced by a reduction in queue times that result in shorter lead times, reduced inventory investment, reduced cost, and quick quality feedback. Faster setup time is not an effect of the small queues within this system.

49 A $6.77

8 hours x .94 (100% – 6%) = 7.52 hours (due to lost time). Multiplying 7.52 by 90% efficiency equals 6.768 or 6.77.

ECO: Management and Communication

Questions for this section begin on PAGES 51.

50 B 8.36

Standard hours would be calculated as: 10 hours x .88 x .95 = 8.36.

51 A Revise the master schedule

Because the MPS manages the manufacturing business, many other areas are directly tied to it, such as customer due dates and component delivery schedules. Changing the MPS creates confusion and increases cost, and should only be considered when no alternatives to alleviate overload exist.

52 A Overloaded

Since this work center has 86 available hours of capacity (2 machines x 1 shift x 5 days x 12 hours x .90 utilization x .80 operator efficiency = 86), this work center is overloaded at 90 hours.

53 B 121

Weekly capacity: 3 machines x 7 days x 8 hours per day x .80 machine utilization x .90 operator efficiency = 121 standard hours.

54 B Underloaded

Since this work center has 86 available hours of capacity (2 machines x 1 shift x 5 days x 12 hours x .90 utilization x .80 operator efficiency = 86), this work center is underloaded at 64 hours.

55 D 86

Calculate the available capacity as follows: 2 machines x 1 shift x 5 days x 12 hours x .90 utilization x .80 operator efficiency = 86.4, or 86.

56 A 81

Calculate available capacity as follows: 2 machines x 1 shift x 14 hours x 4 days x .90 machine utilization x .80 operator efficiency = 80.64, or 81 hours.

57 C 144

Calculate available capacity as follows: 4 machines x 1 shift x 5 days x 10 hours x .90 machine utilization x .80 operator efficiency = 144 hours.

58 C Routing less preferred to the primary routing which produces an identical item

Since some machinery may be more variable or take longer, the primary routing is preferred over the alternate routing. Still, there is merit in the fact that an identical part is produced to the quality specification via the alternate routing.

59 A Alternate operation

In order to complete work when normal operations are not running, an alternate operation is used.

60 B External setup time

If a machine is down while setup occurs, that time period is referred to as internal setup time. When the machine is operating during setup, the time period is considered to be external setup time.

61 C It only references delivery of products when needed

Although a common misconception is that this type of production is a "delivery of material as needed" system, it is actually a method of waste elimination and worker involvement. Work is also pulled through the factory based on demand.

62 A Reduced scrap

Additional work can flow out of WIP with a capacity increase at the bottleneck work center. Both WIP and lead times decrease as a consequence. Scrap may be lowered as damage is sometimes caused by a factory's excess parts but not as a direct result.

63 C Setup time

Setup time is the period when a machine is being re-tooled for the next job. When a job waits at a work center after completion before removal, this is referred to as wait time.

64 A All of these are appropriate

All of the choices are appropriate although pre-deducting transactions are not preferred. Post deduction transactions occur when an order is closed. Direct deduction transactions occur as materials are issued or received. Pre-deduction transactions occur with bill of materials explosion.

65 C Changing the picklist quantity

Unplanned issues occur when inventory is not on the picklist.

66 B Recording accurate quantities on receipts

Subject to error due to the human factor, quantities on receipts can never be perfect. Both of the other choices will improve through online processing.

67 B 0.95

Yield = ratio of useable output for process input. The output is 95 from 100 input so 95 / 100 = .95 or 95%.

68 D All of these are correct

Bottlenecks are the same thing as a limiting operation, or an operation with the least amount of capacity. When this operation exists, the line is scheduled so capacity matches but can't exceed the operation with least capacity.

ECO: Design Trade-offs

Questions for this section begin on PAGES 54.

69 A Slight increase in lead time

Constancy occurs in both backlogs and lead time when input equals output.

70 A Analysis of maintenance cost

Production activity does not have maintenance cost analysis as a function, however, it is included in as a maintenance and financial function.

71 B Component quality check after the setup

First-piece inspection is the quality check which occurs when the first piece is completed after the setup.

72 A Factory held inexpensive parts for use without worker requisitions

Production parts to be used by workers that are held on the floor are called floor stocks. Because parts are normally not expensive, requisitions are not used.

73 C Rapid changes in output to meet demand and reduced transportation time between lines

A flexible manufacturing system provides benefits change flexibility but requires a high initial investment.

74 A All of these are correct

All of the benefits listed are derived from a flexible machine center. The only real negative effect is investment.

75 B Repetitive

Because of its schedules and production rates, repetitive manufacturing is best for the use of flow control as production will be fed at planned production rates.

76 C Lack of material

Idle time, also known as downtime, is the time period in which either machines or people are not working due to a variety of reasons.

77 B Quality at the source

Source quality must be at 100% or delivery to the customer is compromised. Total quality management helps control such concerns, and a vendor may also utilize statistical process control to monitor output. Ultimately, quality at the source is the best answer.

78 C Wait time after completion

All of the choices are included in an operation's duration except for wait time after completion of a job.

79 A Collect detailed labor cost

Since JIT is about simplification, costs only need to be gathered in and out of the cell in total. Detailed labor data requirements are reduced as labor becomes a very low ratio of cost in the JIT production environment.

80 B Number of released orders

Machine and operator efficiency and the number of worked shifts are used to calculate capacity. It is not necessary to take into account the number of released orders as they only indicate an overload.

SMR: Understanding the Business Environment

Questions for this section begin on PAGES 56.

1 B Senior manager decision-making

QWLs are processes by which an organization attempts to unlock the creative potential of its people by involving them in discussions affecting their work lives. Enhanced Workplace Democracy uses the following concepts to generate a shared power: self-management of individuals, empowered workplace, and company ownership.

2 B Delivery speed

A firm that pursues the lead capacity strategy adds capacity prior to surges in demand. This adds additional cost to the operation, but increases flexibility and delivery speed which are both important during periods of market growth.

3 C Removing obstacles to improvement

Decision-making extends to the local operating units inside a horizontal organization, and the local level makes fast and flexible operating decisions which help maintain competition. Senior managers in turn work to remove obstacles to rapid decision-making.

4 A Speed of delivery

A firm that pursues the lead capacity strategy adds capacity prior to surges in demand. This adds additional cost to the operation, but increases flexibility and delivery speed which are both important during periods of market growth.

5 A We think, they work

The "we think, they work" attitude is detrimental to creating a trusting and open environment. The other two choices would help support SGIA.

6 D All of these should be included

All of the above costs are necessary to determine the cost of quality as well as the costs of down time, scrap, and others.

7 C To help find the root cause of a problem

The 5 "Why's" is a concept whereby Japanese managers ask why 5 times in order to identify a problem's root cause. By the fifth why, they believe they will find the actual cause of a problem which they can then solve.

8 A External reporting to the financial community

In the accounting methodology of full absorption, the product applies, or absorbs, all fixed costs. This method is used for external reporting to shareholders, banks, and more.

9 B Internal management decisions

Direct costing, also known as variable costing, will apply only the variable cost to products. Then costs are reviewed and the margin contribution is determined for the fixed costs. In terms of internal management tools, full absorption accounting would not be an appropriate choice.

10 C Flat

"Flat" organizations will have a reduced number of management layers and will place responsibility further down the organization's chain. Decision-making will be quick, as will the customer response.

11 D Purchases

Purchases is not included on the list. The Toyota company uses the JIT philosophy and considers the following to be the seven wastes of a company: processes, methods, movement, product defects, wait time, overproduction, and inventory.

12 C Quality improvement

People are still necessary for CIM, but often a higher level of technical skill is required. In CIM, labor costs may be reduced due to attrition or from additional business, but layoffs would not have a positive impact. New technology means that overhead costs would increase. In CIM, the largest productivity gains occur in improvement of quality.

13 D All of these

All of the obstacles above must be dealt with in order for the benefits of CIM to be realized. New measurements are necessary as traditional methods are no longer appropriate.

14 D All of these are benefits

All of the benefits listed above result from group technology. Still, these benefits cant be realized unless personnel support and mastery of the technology exists.

15 A Computer-Aided Manufacturing

CAM stands for Computer-Aided Manufacturing and deals with using computers to assist in product manufacturing.

16 D All of these are correct

All of the benefits above come from an AS/RS carousel as they are less complex and require a lower investment than larger scale AS/RS systems. As a result, the investment return rates are often higher and maintenance is lower.

17 B Both

Signal cards for authorization and conveyance are used in the Kanban system to control the facility's operations. Production only occurs when necessary and if quality is low the line may be shut down.

18 D All of these are correct

It is necessary to achieve compatibility with overall objectives when choosing company quality measurements. Listed were just a few generally accepted methods of measuring quality.

19 A Both

Under the full absorption method, a rate is established at which a unit of production absorbs burden (overhead). If the plan rate of sale is 10 and manufacturing produces 10, then the overhead will be absorbed. If, however, only 4 are sold and only 4 are manufactured, then manufacturing will only absorb 40% of the standard rate.

20 D All of these

All of the choices would increase the flexibility of the factory if they were decreased. For example, a decrease in setup time would eliminate the need for "spreading" costs over large lots.

21 C Customer specification conformance

Manufacturing is responsible for producing parts to the customer's specification. Despite the fact that design issues may hamper manufacturing from achieving this, they are ultimately responsible for the quality of the manufactured part.

22 A Ensuring the operators understand the steps for correction

SPC will not succeed unless operators comprehend how to respond when variations occur. Mathematics is not required but understanding how to use the software is essential.

23 A Quality of design

The two major components of quality: Quality of conformance – quality defined by the absence of defects. Quality of design – quality measured by the degree of customer satisfaction with a product's characteristics and features.

24 B Continuous

Volume-variety matrices are used to chart the relationship between product volume and product variety. If high volume exists in conjunction with low variety, the company will use a continuous manufacturing process similar to oil refineries or chemical processing plants which operate around the clock.

25 A Ensuring customer criteria is met in the product design

Ensuring the customer's criteria is incorporated into the product's design falls within the realm of Quality Function Deployment. The other choices are all supply chain management functions.

26 B Total of all costs in a supply chain

The supply system concept of Total Cost of Ownership refers to the total of all the costs associated with every activity of the supply stream. A minor portion of the total cost is usually the acquisition costs, as well as some indirect costs such as warehousing, insurance, inspection, and handling.

SMR: Developing Operations Strategy

Questions for this section begin on PAGES 59.

27 A On-time delivery

Of the choices above, only on-time delivery can be controlled by manufacturing. This is accomplished by managing scheduling and producing quality parts to the customer due dates. The other three choices are not controlled by manufacturing.

28 C Number of skills per employee

Flexibility measurement corresponds directly to the amount of jobs different employees can perform. This allows the company to do more with its existing workforce.

29 A Automated transfer lines

On automated transfer lines, parts are transferred rapidly via fixed sequence to each manufacturing operation. AS/RS might be better suited to the warehouse shipping operation once the beverage has been bottled.

30 C Fixed line

High-speed fixed lines are used in such companies as production is less expensive due to a high level of automation. This automation ultimately minimizes the associated labor costs.

31 C Ensuring the factory people can manage their own operations

The shop floor control system must be designed to accommodate daily personnel operations. Employees should be trained so they understand how the system processes information and how they can use this information to enhance their operations. This should be done without the assistance of a cost accountant.

32 B Owning elements of the production cycle towards the final customer

According to APICS, the term forward integration is "the process of buying or owning elements of the production cycle and the channel of distribution forward toward the final customer." Companies will often control an entire chain in order to effectively compete with others on the basis of quality.

33 A High volume of similar parts

When a manufacturing company produces large volumes of similar parts, process costing is a good match. This is because costs (actual or standard) accumulate over a month and are then averaged over the total units produced.

34 C It tries to allocate overhead based on the drivers of those costs

ABC costing accumulates costs based on the activities performed, then uses the same cost drivers to allocate the overhead to products, customers, markets, etc. This option is far more realistic than using labor or machine hours as a cost basis.

35 B Capacity availability

Capacity availability is not a standard transaction for EDI. All other options listed have standard transmission formats and are very common.

36 A Long-term contracts with suppliers

Long-term contracts are the best way to improve relations with suppliers, especially single sourced suppliers. Confidence, trust, and commitment result from long-term contracts. While the other three choices may help, contractual commitments will yield the best results.

37 B Improve quality

The measure of machine utilization is outdated and was utilized by traditional manufacturers who assumed that utilization of assets was critical for keeping part costs down. However, machine utilization encourages constant running of the machine which produces inventory and decreases time available for quality improvement.

38 C Increase in total cost per unit

It is normal for the total unit cost to increase if marketing increases product options and features since production cost will increase unless complete product redesigns occur.

39 B Condition of excellence

Transcendent quality is an ideal or condition of excellence. Industry leaders such as Audi and Rolex have gained an excellent reputation for quality.

40 B Waste reduction in the processes

Waste reduction in processes improves cycle time and reduces variability. This in turn improves flexibility and delivery consistency by ensuring the process is completed correctly each and every time.

41 A Price

Commodity products come from a variety of sources and are easy to find. Therefore, price is the order winning criteria, not delivery speed or quality of design.

42 A Wide product variety with low volume per product

A company should be less complex and have less capital intensive technologies in order to use the process focused strategy. Such companies are usually called job shops.

43 C Leveling

The four phases of the product life cycle are introduction, growth, maturity and decline.

44 C Cross-functional teams

Usually cross-unctional teams are used in complex problem-solving as this type of problem will cross functional boundaries. The other choices normally concern themselves with simpler problems specific to departments.

45 D Improved product quality

According to the APICS Dictionary, designing for manufacturability is the "simplification of parts, products, and processes to improve quality and reduce manufacturing costs."

46 C Adding value to the customer

The focus of a company should be providing value to the customer when planning activities as they will only pay for those which add value to their own business.

47 D Reduced resupply time

The cooperation of supply chain companies bolsters the continual exchange of information about demand, supply problems, market trends, and more. As a result, a reduction of resupply time occurs, handoffs are eliminated or at least minimized, and the supply time is reduced. Faster communication does not necessarily translate to inventory reduction.

48 B Advancement of transportation and communication

Expansion in global sourcing and selling is directly related to transportation and communication improvements. Although the internet allows for global commerce, it wasn't until transportation companies utilized this rapid communication to move goods quickly and efficiently worldwide.

49 D Consignment

According to the APICS Dictionary, consignment is the "process of a supplier placing goods at a customer location without receiving payment until after the goods are used or sold." VMI programs may use consignment but often companies will have their own VMI without needing consigning inventory. This is especially true for internet suppliers remotely managing inventory.

50 B Quick response program

Retailers link all of the supply chain's suppliers through quick response programs to the point-of-sale system at the retailer. This system utilizes both point-of-sale scanning and electronic data interchange. Additionally, it may involve direct shipments from the factory rather than the distribution network.

51 C Improving both company's performance

Both companies must benefit from an alliance or it will not succeed. Either party should expect their performance to improve by helping the other.

52 B Long-term supply contracts

Supplier reliability will occur when long term contracts are put in place to offer major benefits to the supplier. This is done by improving planning for a variety of aspects such as labor, materials, and capacity.

53 A Rewarding individual results

Team results are more important than those of the individual and should be the focus of rewards. Although most companies focus on individual longevity, teambuilding is essential.

54 A Problem-solving skills

The most important concept for a JIT employee is to balance different jobs and problem solve for each as teams must target and solve problems as they occur without supervisor intervention. (Perotin, Just-In-Time Is Just-A-People System, APICS Reprints).

55 D All of these can be used

There are many ways to measure the performance of delivery reliability. The major concern is that they are compatible with the company's unique goals.

SMR: Implementing the Operations Strategy

Questions for this section begin on PAGES 63.

56 B Potential isolation of workers will improve work habits

Any change as significant as FMS will receive higher acceptance and achieve better success with worker involvement from the beginning. Workers have the expertise to offer on equipment, layout, and ergonomics.

57 D Lack of management commitment

Management commitment is required for successful system implementation. Training and education will help to show workers the benefits of the system.

58 C Educated, trained people

System implementation won't be successful without education and training to achieve the highest level of performance.

59 D Setup time cannot be reduced

With the information provided by ERP systems about manufacturing operations, individuals become more productive. However, setup times won't be reduced and quality problems are not solved – only information is provided.

60 A Develop a trusting relationship

When starting a relationship with a technology vendor, both parties should focus on building trust in order to establish a long-term relationship.

61 D None of these are false

Just-in-time implementation must focus on creating a new attitude where direct labor is emphasized. For most companies, conquering the "we think, you work" attitude is a challenge.

62 A People are obstinate

Fear of change will decrease if education and training aid in employee understanding and enable workers to feel in control.

63 D All of these are correct

The purpose of a consultant is to aid in education and training of employees, serve as an organizational guide, and help the company to avoid pitfalls they anticipate based on prior experience.

64 B It is an ongoing process, not a project

The process of factory automation is an improvement technique which is ongoing and focused primarily on quality improvement and increased flexibility. Although workers may be replaced, this is not the focus. This process will be much easier if the work process is simplified first.

65 D The whole group agrees with the decision

The entire group does not have to agree with decision in this style of decision-making but they must all understand and tolerate the decision with no ethical or moral violations.

66 D Full-time project manager

A full-time project manager is usually necessary in order for ERP implementation to be successful. Focus and responsibility in a well-trained project manager helps the project so much so that an external consultant may not be required.

67 D Manufacturing lead time reductions

Introducing work cells to the manufacturing floor causes a reduction in lead times but increases capacity due to a reduction in queue times. Although workforce training is required, high levels of focus are realized when such cells are implemented.

68 B Change the performance and reward system

A reward system based on performance measurement will have the greatest effect on changing employee behavior. Standards for performance measurement must be carefully set, however, as they will determine which areas of performance employees focus on most. Additionally, existing team and bonus based reward systems will require restructuring.

69 A Developing a system vision

The first step for selecting and implementing a manufacturing planning and control system is typically creating a vision for the system. This vision should involve everyone in a common understanding of what the system needs to accomplish. Buy-in for the project should also be built into the vision.

70 C Full-time project manager

A full-time project manager always exists for any successful ERP project as it is a high cost effort which requires careful managing.

71 D Has no time limit

Mission statements have a time limit that keeps them task oriented. All of the other statements were true.

72 C The inventory will be pushed back to suppliers

Inventory may be pushed back to suppliers during Just-in-time implementation; note that this only moves the inventory instead of eliminating it. Both the suppliers and the manufacturers are impacted as the inventory must ultimately be paid for.

73 C Immediately after use

Check a tool immediately after use to verify it is sharp enough for the next job, otherwise a problem may arise due to the delay created by the unplanned time spent sharpening the tool right before the next job.

74 A Mistake proofing a process

Poka-yoke is a mistake proofing technique applied to a process. Parts may be assembled specifically to allow finishing only when all parts are included or so a fixture only fits one way with no manipulation.

75 A Poka-yoke work methods

Zero defects can be achieved if work methods are mistake-proofed. Although inspectors must be well-trained and statistical sampling can be used, problems will only be caught when they reoccur. Effective documentation is also necessary but only works after the fact.

76 A Backflushing

Receiving a product into finished goods inventory or at an operation count point is referred to as backflushing. In this process, the system deducts components from inventory based on the finished goods quantity times the bill of materials for the product.

77 D All of these are correct

Setup time reduction creates a strong opportunity to improve existing operations. This reduction allows for smaller lots to be produced, which is another focus of JIT. By producing only what is needed for the customer, the total amount of inventory on hand is drastically reduced.

78 C Single-purpose machinery

A lean manufacturing environment must have flexible equipment that easily adapts to a variety of parts. Quick changeovers will occur and machine's must facilitate this need with quick connect dies to increase setup speed.

79 D All of these are correct results

The Just-in-time operation greatly simplifies paperwork, transaction processing, and tracking of operations. When material flow is reliable and fast, WIP tracking is not needed. VMI can handle purchasing by paying for parts as they are consumed so invoices and purchase orders are no longer necessary. QC will also experience increased simplicity because multiple inspections, and the corresponding paperwork, are no longer necessary.

80 D All of the choices are included

The Just-in-time process includes all of the answers above. The philosophy of JIT is simple – inventory is waste and by eliminating waste you expose the hidden costs of carrying inventory.