TRUE/FALSE

1. Collins Industries and its subsidiary Wheeled Coach obtain competitive advantage through MRP in part because of their excellent record integrity and insistence on record accuracy.
2. MRP is generally practiced on items with dependent demand.
3. Reduced inventory levels and faster response to market changes are both benefits of MRP.
4. A dependent demand item is so called because its demand is dependent on customer preferences.
5. The quantity required of a dependent demand item is computed from the demand for the final products in which the item is used.
6. Since MRP is quite detailed in nature, it has no influence on the longer-range, less detailed aggregate planning.
7. The master production schedule is a forecast of demand for families of products.
8. Lead times, inventory availability, and purchase orders outstanding are among the five things operations managers must know for effective use of MRP.
9. A bill of materials lists all components, ingredients, and materials needed to produce one unit of an end item.
10. "Phantom bills" are bills of materials for subassemblies that do not exist in reality.
11. Planning bills of material are bills of material for "kits" of inexpensive items such as washers, nuts, and bolts.
12. The Aggregate Plan, derived from the Master Production Schedule, specifies in more detail how much of which products is to be made at what times.
13. The time phased product structure, unlike the bill of materials, adds the concept of lead times.
14. If X consists of one A and one B, and each A consists of one F and two Gs, then A is the "parent" component of G.
15. If 100 units of Q are needed and 10 are already in stock, then the gross requirement is 100 and the net requirement is 90.
16. Gross material requirements do not take into account the amount of inventory on hand.
17. In MRP, a "bucket" refers to a fixed order quantity, such as an EOQ.
18. Time fences divide that segment of the MPS that can be revised from that section that is "frozen."
19. MRP is an excellent tool for scheduling products with variable lead times.
20. Finite capacity scheduling, unlike MRP, recognizes the capacity limitations of departments and machines when building schedules.
21. If parts and subassemblies common to a variety of products are managed through the supermarket concept, formal order releases for such parts are not necessary.
22. The lot-for-lot lot-sizing technique is particularly appropriate when demand is not very smooth and set up cost is small compared to holding cost.
23. In general, the lot-for-lot approach should be used whenever economical.
24. The economic part period is a fraction of a time bucket.
25. The Wagner-Whitin algorithm is the most widely used MRP lot-sizing technique.
26. MRP can be effective only if very accurate lot sizes are calculated in advance.
27. Smoothing a resource requirements profile to stay within capacity limits may increase setup costs.
28. Closed-loop MRP systems allow production planners to move work between time periods to smooth the load or to at least bring it within capacity.
29. Operations splitting sends pieces to the next operation before the entire lot is completed on the previous operation.
30. Material requirements planning II allows MRP to be used in services.

31. In extending MRP to restaurant services, the bill of material is similar to an ingredients list, while the product structure tree is similar to a recipe.

32. DRP is a time-phased stock-replenishment plan for all levels of a distribution network.

33. While ERP may provide a strategic advantage over competitors, it is so complex that many companies cannot adjust to it.

34. Firms may discover that, rather than adapting ERP to the way they do business, they have to adapt the way they do business to accommodate the ERP software.

35. The supply chain systems that result from using ERP in the grocery industry are called efficient consumer response (ECR) systems.

MULTIPLE CHOICE

36. Which of the following statements regarding Collins Industries is false?
   a. Collins has found competitive advantage through MRP.
   b. Collins' subsidiary Wheeled Coach builds ambulances in a repetitive process.
   c. Collins' MRP system allowed the company to meet tight schedules, but caused inventory to rise.
   d. Collins' MRP system maintains excellent record integrity.
   e. Low inventory and high quality are two positive outcomes of Collins' use of MRP.

37. Demand for a given item is said to be dependent if
   a. it originates from the external customer
   b. there is a deep bill of materials
   c. the finished products are mostly services (rather than goods)
   d. there is a clearly identifiable parent
   e. the item has several children

38. The phrase "demand related to the demand for other products" describes
   a. a dependent variable
   b. dependent demand
   c. recursive demand
   d. regression analysis
   e. independent demand

39. Dependent demand and independent demand items differ in that
   a. for any product, all components are dependent-demand items
   b. the need for independent-demand items is forecast
   c. the need for dependent-demand items is calculated
   d. All of the above are true.
   e. None of the above is true.

40. A master production schedule specifies
   a. the raw materials required to complete the product
   b. what component is to be made, and when
   c. what product is to be made, and when
   d. the labor hours required for production
   e. the financial resources required for production
41. The ______ is (are) the MRP input detailing which end items are to be produced, when they are needed, and in what quantities.
   a. master production schedule
   b. gross requirements
   c. inventory records
   d. assembly time chart
   e. bill of materials

42. A master production schedule contains information about
   a. quantities and required delivery dates of all subassemblies
   b. quantities and required delivery dates of final products
   c. inventory on hand for each subassembly
   d. inventory on hand for each final product
   e. scheduled receipts for each final product

43. The aggregate plan gets input or feedback from which of the following areas?
   a. engineering
   b. finance, marketing, and human resources
   c. the master production schedule
   d. procurement, production, and general management
   e. all of the above

44. In continuous (make-to-stock) operations, the master production schedule is usually expressed in terms of
   a. end items
   b. modules
   c. kits
   d. customer orders
   e. warehouse orders

45. In job shop (make-to-order) operations, the master production schedule is usually expressed in
   a. end items
   b. modules
   c. kits
   d. customer orders
   e. warehouse orders
46. The following table is an example of a(n)

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothes Washer</td>
<td>200</td>
<td></td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothes Dryer</td>
<td>300</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Upright Freezer</td>
<td></td>
<td>200</td>
<td></td>
<td>500</td>
<td></td>
</tr>
</tbody>
</table>

a. aggregate plan
b. load report
c. master production schedule
d. capacity plan
e. inventory record

47. A document calls for the production of 50 small garden tractors in week 1; 50 small garden tractors and 100 riding mowers in week 2; 100 riding mowers and 200 garden utility carts in week 3; and 100 riding mowers in week 4. This document is most likely a(n)

a. net requirements document
b. resource requirements profile
c. aggregate plan
d. master production schedule
e. Wagner-Whitin finite capacity document

48. The ______ is the input to materials requirements planning which lists the assemblies, subassemblies, parts, and raw materials needed to produce one unit of finished product.

a. bill of materials
b. master production schedule
c. inventory records
d. assembly time chart
e. net requirements chart

49. A bill of materials lists the

a. times needed to perform all phases of production
b. production schedules for all products
c. components, ingredients, and materials required to produce an item
d. operations required to produce an item
e. components, ingredients, materials, and assembly operations required to produce an item

50. Firms making many different final products use _________ to facilitate production scheduling.

a. planning bills
b. modular bills
c. phantom bills
d. overdue bills
e. none of the above
51. A bill of material must be updated with the corrected dimensions of a part. The document that details this change is a(n)
   a. modular bill
   b. engineering change notice
   c. resource requirements profile
   d. lead time-offset product structure document
   e. planning bill

52. The bill of materials contains information necessary to
   a. place an order to replenish the item
   b. calculate quantities on hand and on order
   c. convert net requirements into higher level gross requirements
   d. convert gross requirements into net requirements
   e. convert (explode) net requirements at one level into gross requirements at the next level

53. Which of the following statements best compares modular bills and phantom bills?
   a. Both pertain to assemblies that are not inventoried.
   b. There is no difference between the two.
   c. Both pertain to assemblies that are inventoried.
   d. Modular bills are used for assemblies that are not inventoried, unlike phantom bills.
   e. Modular bills represent subassemblies that actually exist and are inventoried, while phantom bills represent subassemblies that exist only temporarily and are not inventoried.

54. The minimum record accuracy required for successful MRP is approximately
   a. lower than 90%
   b. 90%
   c. 95%
   d. 97%
   e. 99%
55. Given the following bill of materials

\[ \text{A} \]

\[ \text{B(2)} \quad \text{C (3)} \quad \text{D (1)} \]

\[ \text{C (1)} \quad \text{D (1)} \quad \text{D (1)} \quad \text{E (2)} \quad \text{F (1)} \quad \text{G (2)} \]

If the demand for product A is 50 units, what will be the gross requirement for component E?

a. 4
b. 100
c. 200
d. 250
e. 300

56. Given the following bill of materials

\[ \text{A} \]

\[ \text{B(1)} \quad \text{C (1)} \]

\[ \text{D (2)} \quad \text{E (1)} \quad \text{F (2)} \quad \text{D (1)} \quad \text{F (1)} \]

If the demand for product A is 50 units, what will be the gross requirement for component E?

a. 50
b. 100
c. 150
d. 200
e. 300

57. "Exploding" the bill of materials means

a. identifying the various components, ingredients, and materials that make a product
b. identifying the lead time of all the components
c. determining the various components' quantities that are already on hand
d. determining the net requirements for all the components
e. converting the bill of materials into components and raw material requirements
58. Given the following bill of materials

If the demand for product A is 30 units, and there are 10 units of B on hand and none of C, how many units of part D will be needed?

a. 3  
b. 40  
c. 70  
d. 90  
e. 110

59. Low level coding means that

a. a final item has only a few levels in the BOM structure  
b. it is the code for the lowest level in the BOM structure  
c. a component item is coded at the lowest level at which it appears in the BOM structure  
d. the top level of the BOM is below level zero and that BOMs are not organized around the finished product  
e. none of the above

60. Each X requires 2 of component Y; each Y requires 4 of part Z. The lead time for assembly of X is 1 week. The lead time for the manufacture of Y is 1 week. The lead time for the procurement of Z is 6 weeks. The cumulative lead time for X is _____ weeks.

a. 6  
 b. 7  
c. 8  
d. 10  
e. cannot be determined

61. A material requirements plan contains information with regard to all of the following except

a. quantities and required delivery dates of all subassemblies  
b. quantities and required delivery dates of final products  
c. the capacity needed to provide the projected output rate  
d. inventory on hand for each final product  
e. inventory on hand for each subassembly
62. Each R requires 2 of component S and 1 of part T. The lead time for assembly of R is 3 days. The lead time for the manufacture of S is 5 days. The lead time for the manufacture of T is 10 days. The cumulative lead time for R is _____ days.
   a. 6
   b. 9
   c. 13
   d. 17
   e. cannot be determined

63. Each R requires 4 of component S; each S requires 3 of part T. The lead time for assembly of R is 1 week. The lead time for the manufacture of S is 2 weeks. The lead time for the procurement of T is 6 weeks. The cumulative lead time for R is ______ weeks.
   a. 6
   b. 9
   c. 12
   d. 18
   e. 28

64. Which of the following best describes a gross material requirements plan?
   a. a schedule that shows total demand for an item, and when it must be ordered from a supplier or when production must be started
   b. an intermediate range plan for the scheduling of families of products
   c. a chart illustrating whether capacity has been exceeded
   d. a table that corrects scheduled quantities for inventory on hand
   e. a schedule showing which products are to be manufactured and in what quantities

65. Which of the following statements regarding the gross material requirements plan is true?
   a. It shows total demand for an item.
   b. It shows when an item must be ordered from a supplier or when production must be started.
   c. It combines a master production schedule with the time-phased schedule.
   d. It requires several inputs, including an accurate bill of material.
   e. All of the above are true.

66. The MPS calls for 110 units of Product M. There are currently 30 of Product M on hand. Each M requires 4 of Component N. There are 20 units of N on hand. The net requirements for N are
   a. 150
   b. 170
   c. 300
   d. 320
   e. 440
67. The MPS calls for 50 units of Product A and 60 of B. There are currently 25 of Product B on hand. Each A requires 2 of Part C; each B requires 5 of C. There are 160 units of C available. The net requirements for C are
   a. 115
   b. 175
   c. 240
   d. 690
   e. 700

68. The MPS calls for 110 units of Product A. There are currently 60 of Product A on hand. Each A requires 4 of Part B. There are 20 units of B available. The net requirements for B are
   a. 20
   b. 120
   c. 180
   d. 240
   e. 440

69. In MRP record calculations, the appearance of a negative value for the gross requirements of an end item in a specific time bucket
   a. signals the need to purchase that end item in that period
   b. implies that value was scheduled by the MPS
   c. signals the need for a negative planned order receipt in that period
   d. is impossible
   e. All of the above are true.

70. The number of units projected to be available at the end of each time period refers to
   a. net requirements
   b. scheduled receipts
   c. the projected usage of the item
   d. the amount projected to be on hand
   e. the amount necessary to cover a shortage

71. Linking a part requirement with the parent component that caused the requirement is referred to as
   a. net requirements planning
   b. a time fence
   c. pegging
   d. kanban
   e. leveling

72. In MRP, system nervousness is caused by
   a. management's attempt to continually respond to minor changes in production requirements
   b. the use of the lot-for-lot approach
   c. management's marking part of the master production schedule as "not to be rescheduled"
   d. the use of phantom bills of materials
   e. management's attempt to evaluate alternative plans before making a decision
73. One of the tools that is particularly useful in reducing the system nervousness in the MRP system is (are)
   a. modular bills
   b. time phasing
   c. time fences
   d. lot sizing
   e. closed loop system

74. A major strength of MRP is its capability
   a. to minimize labor hours used in production
   b. for timely and accurate replanning
   c. to reduce lead times
   d. to maximize production throughput
   e. to minimize scrap

75. Material requirements plans specify
   a. the quantities of the product families that need to be produced
   b. the quantity and timing of planned order releases
   c. the capacity needed to provide the projected output rate
   d. the costs associated with alternative plans
   e. whether one should use phantom bills of materials or not

76. Which of the following best differentiates material requirements planning (MRP) from finite capacity scheduling (FCS)?
   a. FCS recognizes the finite nature of capacity while MRP does not.
   b. FCS works in services while MRP does not.
   c. MRP requires time buckets while FCS does not.
   d. FCS is an input into traditional MRP systems.
   e. FCS uses the Wagner-Whitin algorithm while MRP uses lot-for-lot and EOQ.

77. Which of the following lot-sizing techniques results in the lowest holding costs?
   a. lot-for-lot
   b. EOQ
   c. part-period balancing
   d. Wagner-Whitin algorithm
   e. the quantity discount model

78. Which of the following statements is true about the MRP plan when using lot-for-lot ordering?
   a. The quantity of gross requirements for a child item is always equal to the quantity of planned order releases for its parent.
   b. The quantity of gross requirements for a child item is equal to the quantity of planned order release(s) multiplied by the number of child items used in the parent assembly.
   c. The quantity of gross requirements for a child item is always equal to the quantity of gross requirements for its parent.
   d. The quantity and gross requirements for a child item is always equal to the quantity of net requirements for its parent.
   e. All of the above are true.
79. What lot-sizing technique is generally preferred when inventory holding costs are extremely high?
   a. lot-for-lot
   b. EOQ
   c. part-period balancing
   d. the Wagner-Whitin algorithm
   e. All of the above are appropriate for the situation.

80. For the lot-sizing technique known as lot-for-lot to be appropriate
   a. future demand should be known for several weeks
   b. setup cost should be relatively small
   c. annual volume should be rather low
   d. item unit cost should be relatively small
   e. the independent demand rate should be very stable

81. An item's holding cost is 60 cents per week. Each setup costs $120. Lead time is 2 weeks. EPP is
   a. .005
   b. 60
   c. 72
   d. 100
   e. 200

82. Which of the following statements regarding lot-sizing is true?
   a. EOQ principles should be followed whenever economical.
   b. Too much concern with lot-sizing results in false accuracy.
   c. Lot-for-lot cannot be modified for scrap allowance or process constraints.
   d. The Wagner-Whitin algorithm simplifies lot size calculations.
   e. All of the above are true.

83. A firm makes numerous models of mowers, garden tractors, and gasoline powered utility vehicles. Some assemblies and parts are common to many end items. To relieve the MPS of performing order releases on these common parts, the firm might choose to use the __________ technique.
   a. Wagner-Whitin
   b. economic part period
   c. supermarket
   d. gross material requirements
   e. resource requirements profile

84. Capacity planning in closed-loop MRP
   a. utilizes feedback about workload from each work center
   b. may make use of resource requirements profiles (load reports)
   c. may smooth work center loads with such tactics as overlapping and lot splitting
   d. does not add capacity, but rather seeks effective use of existing capacity
   e. All of the above are true.
85. If a load report (resource requirements profile) shows a work center scheduled beyond capacity
a. the company must add capacity by enlarging the facility
b. the company must add capacity by such tactics as overtime and subcontracting
c. the work center's load may be smoothed by such tactics as operations splitting or lot splitting
d. the aggregate plan must be revised
e. the Wagner-Whitin algorithm should be used to rebalance the load

86. MRP II is accurately described as
a. MRP software designed for services
b. MRP with a new set of computer programs that execute on microcomputers
c. MRP augmented by other resource variables
d. an enhancement of MRP that plans for all levels of the supply chain
e. a new generation of MRP software that extends MRP to planning and scheduling functions

87. The extension of MRP which extends to resources such as labor hours and machine hours, as well as to order entry, purchasing, and direct interface with customers and suppliers is
a. MRP II
b. enterprise resource planning
c. the master production schedule
d. closed-loop MRP
e. not yet technically possible

88. Which of the following statements regarding MRP in services is true?
   a. MRP is for manufacturing only, and is not applicable to services.
   b. MRP can be used in services, but only those that offer very limited customization.
   c. MRP does not work in services because there is no dependent demand.
   d. Services such as restaurant meals illustrate dependent demand, and require product structure trees, bills-of-material, and scheduling.
   e. None of the above is true.

89. Distribution resource planning (DRP) is
   a. a transportation plan to ship materials to warehouses
   b. a time-phased stock replenishment plan for all levels of a distribution network
   c. a shipping plan from a central warehouse to retail warehouses
   d. material requirements planning with feedback loop from distribution centers
   e. a material requirements planning package used exclusively by warehouses

90. In what way are distribution resource planning (DRP) and material requirements planning (MRP) similar?
   a. Both employ similar logic and procedures.
   b. Both are employed in a manufacturing organization.
   c. Both work most efficiently with largest lot sizes.
   d. Both are employed by retail organizations.
   e. Both work best with lumpy demand.
91. Enterprise resource planning (ERP)
   a. has existed for over a decade
   b. does not integrate well with functional areas other than operations
   c. is inexpensive to implement
   d. automates and integrates the majority of business processes
   e. all of the above

92. Enterprise resource planning (ERP)
   a. has been made possible because of advances in hardware and software
   b. uses client/server networks
   c. creates commonality of databases
   d. uses business application-programming interfaces (BAPI) to access their database
   e. All of the above are true of ERP.

93. Which of the following is false concerning enterprise resource planning (ERP)?
   a. It attempts to automate and integrate the majority of business processes.
   b. It shares common data and practices across the enterprise.
   c. It is inexpensive to implement.
   d. It provides and accesses information in a real-time environment.
   e. All of the above are true.

94. Which of the following regarding enterprise resource planning (ERP) is true?
   a. It involves an ongoing process for implementation.
   b. It can incorporate improved, reengineered "best processes."
   c. It has a software database that is off-the-shelf coding.
   d. ERP systems usually include MRP, financial and human resource information.
   e. All of the above are true.

95. All of the following are advantages of enterprise resource planning (ERP) except it
   a. creates commonality of databases
   b. increases communications and collaboration worldwide
   c. helps integrate multiple sites and business units
   d. requires major changes in the company and its processes to implement
   e. can provide a strategic advantage over competitors