Chapter 6

Student: _____

1. Information to develop a project network is collected from the

    A. Organization breakdown structure.
    B. Work breakdown structure.
    C. Budget.
    D. Project proposal.
    E. Responsibility matrix.

2. Which of the following represents an activity on an activity-on-node (AON) project network?

    A. An arrow
    B. A line
    C. A node
    D. Both an arrow and a line
    E. An arrow, a line and a node all represent activities

3. Arrows on an activity-on-node (AON) project network represent

    A. An activity.
    B. Project flow.
    C. Dependency.
    D. Project flow and dependency.
    E. An activity and dependency.

4. When translated into a project network, a work package will become

    A. A single activity.
    B. One or more activities.
    C. A milestone.
    D. A critical path.
    E. An arrow.

5. Which of the following is provided by both the project network and the work breakdown structure?

   A. Dependencies
   B. Sequencing
   C. Interrelationships
   D. Activity duration
   E. Timing

6. On a project network, the activity times are derived from the

   A. Organization breakdown structure.
   B. Work packages.
   C. Budget.
   D. Project proposal.
   E. Responsibility matrix.

7. Which of the following does NOT help describe a project network?

   A. A graphic display of the flow and sequence of work through the project
   B. Provides the basis for scheduling labor and equipment
   C. Gives the times when activities can start and finish and when they can be delayed
   D. Highlights major deliverables and identifies their completion dates
   E. Identifies critical activities

8. An activity that has more than one dependency arrow flowing into it is termed a(n)

   A. Parallel activity.
   B. Critical path.
   C. Burst activity.
   D. Merge activity.
   E. Independent activity.

9. The critical path in a project network is the

   A. Shortest path through the network.
   B. Longest path through the network.
   C. Network path with the most difficult activities.
   D. Network path using the most resources.
   E. Network path with the most merge activities.

10. A(n) _____ activity has more than one dependency arrow flowing from it.

    A. Parallel
    B. Critical path
    C. Burst
    D. Merge
    E. Independent

11. Which of the following can be used without coordinating with managers of succeeding activities?

    A. Total slack
    B. Free slack
    C. Critical float
    D. Float pad
    E. Slip pad

12. Activities which can take place at the same time are termed

    A. Parallel activity.
    B. Critical path.
    C. Burst activity.
    D. Merge activity.
    E. Independent activity.

13. A sequence of connected, dependent activities is termed a(n)

    A. Path of events.
    B. Parallel path.
    C. Activity chain.
    D. Path.
    E. Dependent chain.

14. Bill is building a project network that involves testing a prototype. He must design the prototype (activity 1), build the prototype (activity 2), and test the prototype (activity 3). Activity 1 is the predecessor for activity 2 and activity 2 is the predecessor for activity 3. If the prototype fails testing, Bill must redesign the prototype; therefore, activity 3 is a predecessor for activity 1. This is an example of

    A. Conditional statements.
    B. Looping.
    C. Having more than one start node.
    D. Good network development.
    E. Natural network flow.

15. Which of the following is <u>NOT</u> one of the basic rules to follow when developing project networks?

    A. An activity cannot begin until all preceding activities have been completed
    B. Each activity must have a unique identification number
    C. Conditional statements are allowed but looping statements are not allowed
    D. An activity identification number must be larger than that of any preceding activities
    E. Networks flow from left to right

16. _____ activities must be completed immediately before a particular activity.

    A. Merge
    B. Burst
    C. Predecessor
    D. Successor
    E. Parallel

17. _____ activities are to be completed immediately following a particular activity.

    A. Merge
    B. Burst
    C. Predecessor
    D. Successor
    E. Parallel

18. The forward pass in project network calculations determines all of the following EXCEPT

    A. Earliest time an activity can begin.
    B. Earliest time an activity can finish.
    C. Duration of the project.
    D. The critical path.
    E. How soon the project can finish.

19. The backward pass in project network calculations determines all of the following EXCEPT

    A. Latest time an activity can begin.
    B. Earliest time an activity can finish.
    C. The critical path.
    D. How long an activity can be delayed.
    E. Latest time an activity can finish.

20. Which of the following correctly calculates the early finish for an activity?

A. LS + DUR
B. ES + DUR
C. LF + DUR
D. ES + SL
E. LF + SL

21. Which of the following correctly calculates the late start for an activity?

A. EF - DUR
B. ES - DUR
C. LF - DUR
D. ES - SL
E. LF - SL

22. The amount of time an activity can be delayed and yet not delay the project is termed

A. Total slack.
B. Free slack.
C. Critical float.
D. Float pad.
E. Slip pad.

23. Which of the following will correctly calculate the total slack in an activity?

A. LS - ES
B. LF - EF
C. LS - LF
D. LF - ES
E. Either LS - ES or LF - EF

24. The likelihood the original critical path(s) will change once the project is initiated is referred to as

A. Flexibility.
B. Resilience.
C. Sensitivity.
D. Concurrent engineering.
E. Rigidity.

25. Which of the following is true about hammock activities?

    A. They are used to identify the use of fixed resources or costs over a segment of a project
    B. They are a combination of Start to Start and Start to Finish lags
    C. They are activities in which the costs are not subject to change
    D. They are an alternative description for the critical path
    E. They are highly sensitive

26. If, for some reason, the project must be expedited to meet an earlier date, which of the following actions would the project manager take first?

    A. Check to see which activities cost the least
    B. Check to see which activities have the longest duration
    C. Check to see which activities are on the critical path
    D. Check to see which activities have the most slack
    E. Check to see which activities have the highest risk

27. The assumption that all immediate preceding activities must be 100% complete is too restrictive in some situations. When an activity is broken down into smaller segments in order to start the succeeding activity sooner, this is called

    A. Hammock activities.
    B. Concurrent engineering.
    C. A forward pass.
    D. Dissecting.
    E. Laddering.

28. If a project has more than one activity that can begin when the project is to start, a common start node should be used to indicate a clear project beginning on the network. Without a common start node, each path is a

    A. Critical path.
    B. Parallel path.
    C. Dangler path.
    D. Multiple start path.
    E. Confused path.

29. Tom is responsible for ordering hardware for a custom home his company is building. The contractor installing the hardware is scheduled to start in 5 working days, but the hardware is on backorder and will not arrive for another 9 working days. Fortunately, Tom has 10 days of slack; however, he shares this slack with the hardware installer. He will have to let the contactor know that the hardware will be ready 4 days later than expected and that the slack for the installer has been reduced by 4 days. Tom and the installer share 10 days of

A. Free Slack.
B. Shared Slack.
C. Total Slack.
D. Critical Slack.
E. Functional Slack.

30. The minimum amount of time a dependent activity must be delayed to begin or end is referred to as

A. Hammock.
B. Laddering.
C. Lag.
D. Cushion.
E. Buffer.

31. The requirement for a freshly poured foundation to cure before beginning construction is an example of which of the following type of lag?

A. Start to Start
B. Start to Finish
C. Finish to Finish
D. Finish to Start
E. Any of these could be correct

32. Concurrent engineering, which has dramatically reduced the development time for new products, relies on what kind of lag?

A. Start to Start lags
B. Start to Finish lags
C. Finish to Finish lags
D. Finish to Start lags
E. Any of these could be correct

33. If testing cannot be completed any earlier than four days after the prototype has been built, what type of lag exists?

    A. Start to Start
    B. Start to Finish
    C. Finish to Finish
    D. Finish to Start
    E. Any of these could be correct

34. When completing a backward pass, you carry the LS to the next preceding activity to establish the LF, unless the next preceding activity is a burst activity, in which case you select

    A. The smallest LS of all its immediate successor activities to establish the LF.
    B. The largest ES of all its immediate successor activities to establish the LF.
    C. The average LS of all its immediate successor activities to establish the LF.
    D. The smallest ES of all its immediate successor activities to establish the LF.
    E. The largest LS of all its immediate successor activities to establish the LF.

35. System documentation cannot end until three days after testing has started. This is an example of which kind of lag?

    A. Start to Start
    B. Start to Finish
    C. Finish to Finish
    D. Finish to Start
    E. Any of these could be correct

36. An element in the project that consumes time is a(n) _____.

    _____

37. The activity time estimates used to build a project network are derived from _____.

    _____

38. An activity that has more than one predecessor is a _____ activity.

    _____

39. The delaying of any activity on the _____ will delay the completion of the project by the same amount.

    _____

40. Activities that can take place at the same time if the manager wishes them to are called _____ activities.

    _____

41. A(n) _____ calculates project duration.

_____

42. A(n) _____ activity has more than one successor activity.

_____

43. A(n) _____ calculates how late an activity can start and finish.

_____

44. In a project network, recycling through a set of activities or _____ is not permitted.

_____

45. In a project network, _____ indicate activity dependency and project flow.

_____

46. _____ slack must be coordinated with all participants in the activities that follow in the chain.

_____

47. Activities that must occur immediately before a given activity are called _____ activities.

_____

48. Activities that must immediately follow a given activity are called _____ activities.

_____

49. Activities that can occur while an activity is taking place are called _____ activities.

_____

50. The _____ calculates the earliest times that activities can start or finish.

_____

51. The _____ calculates the critical path and determines how long an activity can be delayed without delaying the project.

_____

52. An activity has a duration of 10 days. Its early start is 4 and its late start is 6. This activity has _____ days of total slack.

_____

53. _____ can never be negative and applies only to the last activity in a single chain of activities.

_____

54. A(n) _____ is the minimum amount of time a dependent activity must be delayed to begin or end.

_____

55. When an activity with a long duration is broken into smaller segments so that the following activities can begin sooner it is called _____.

_____

56. The longest path through a project network is called the _____.

_____

57. _____ reflects the likelihood the original critical path(s) will change once the project is initiated.

_____

58. A network has only one critical path and the slack for noncritical activities is high. This network would appear to have a _____ level of sensitivity

_____

59. The _____ lag is the most typical type of lag that is encountered in developing networks.

_____

60. A(n) _____ activity is frequently used to identify the use of fixed resources or costs over a segment of the project.

_____

61. An activity can include only one work package.

True   False

62. A merge activity is one that merges with other activities into a succeeding activity.

True   False

63. The WBS identifies dependencies, the sequencing of activities, and the timing of activities.

True   False

64. The critical path is the shortest path through a network and indicates activities that cannot be delayed without delaying the project.

True   False

65. An activity is an element of the project that always requires time.

True   False

66. If a network has more than one critical path but noncritical activities have very little slack, the network is considered to have a high level of sensitivity.

    True   False

67. The backward pass determines project duration.

    True   False

68. An activity cannot begin until ALL preceding connected activities have been completed.

    True   False

69. In developing a project network, neither looping nor conditional statements are permitted.

    True   False

70. Experience suggests that when there are multiple starts, a common start node should be used to indicate a clear project beginning on the network. Similarly, a single project end node can be used to indicate a clear ending.

    True   False

71. Burst activities have more than one activity immediately following them (more than one dependency arrow flowing from them).

    True   False

72. It is acceptable for arrows to cross one another in a network diagram.

    True   False

73. The forward pass through a project network determines the critical path.

    True   False

74. The backward pass through a project network determines slack or how long an activity can be delayed without impacting the completion date of the project.

    True   False

75. Different activities along the same path can have different total slack.

    True   False

76. If the project has a duration of 13 days, the project should be completed 13 days from the day it starts.

    True   False

77. It is possible for a project network to have more than one critical path.

    True   False

78. Using free slack does not delay any following activities and requires no coordination with managers of other activities.

    True   False

79. Gantt charts are popular because they represent an easy-to-understand, clear picture on a time-scaled horizon.

    True   False

80. When completing a forward pass, you carry the early finish to the next activity where it becomes its early start unless the next succeeding activity is a merge activity. In this case you select the smallest early finish number of all its immediate predecessor activities.

    True   False

81. Only activities that occur at the end of a chain of activities can have free slack.

    True   False

82. Lags can be used to constrain the start and finish of an activity.

    True   False

83. How does the WBS differ from the project network? How are WBS and project networks linked?

84. Briefly describe looping and conditional statements and explain why they are not allowed when developing project networks.

85. When completing the forward pass, the project duration is determined. A project duration of 90 days doesn't mean that if the project were to start today it would be complete in 90 days. Explain.

86. In the network computation process what is a *forward pass* and what three things does it determine?

87. In the network computation process what is a *backward pass* and what four things does it determine?

88. What is the difference between free slack and total slack?

89. What is a Gantt chart and what advantages does it have over project networks?

90. When completing a forward pass you carry the early finish to the next activity where it becomes its early start, unless the next succeeding activity is a merge activity. In this case you select the largest early finish number of all its immediate predecessor activities. Why do you select the largest early finish number?

91. What is a lag and give an example of when you would need to use one?

92. What is a hammock activity and give an example?

93. What is the Concurrent Engineering Approach and why should project managers be aware of it?

94. Identify and briefly describe the four types of lags giving an example for each type.

Chapter 6 Key

1.   Information to develop a project network is collected from the

     A. Organization breakdown structure.
     B. Work breakdown structure.
     C. Budget.
     D. Project proposal.
     E. Responsibility matrix.

The project network is developed from the information collected for the work breakdown structure (WBS) and is a graphic flow chart of the project job plan.

2.   Which of the following represents an activity on an activity-on-node (AON) project network?

     A. An arrow
     B. A line
     C. A node
     D. Both an arrow and a line
     E. An arrow, a line and a node all represent activities

The two approaches used to develop project networks are known as activity-on-node (AON) and activity-on-arrow (AOA). Both methods use two building blocks—the arrow and the node. Their names derive from the fact that the former uses a node to depict an activity.

3.   Arrows on an activity-on-node (AON) project network represent

       A. An activity.
       B. Project flow.
       C. Dependency.
       D. Project flow and dependency.
       E. An activity and dependency.

       The node depicts an activity, and the arrow shows dependency and project flow.

4.   When translated into a project network, a work package will become

       A. A single activity.
       B. One or more activities.
       C. A milestone.
       D. A critical path.
       E. An arrow.

       Work packages from the work breakdown structure (WBS) are used to build the activities
       found in the project network. An activity can include one or more work packages. The activities
       are placed in a sequence that provides for orderly completion of the project.

5.   Which of the following is provided by both the project network and the work breakdown structure?

   A. Dependencies
   B. Sequencing
   C. Interrelationships
   D. Activity duration
   E. Timing

   Project networks are developed from the work breakdown structure (WBS). The project network is a visual flow diagram of the sequence, interrelationships, dependencies and timing of all the activities that must be accomplished to complete the project. Both the WBS and the work packages will include the duration of the activity.

6.   On a project network, the activity times are derived from the

   A. Organization breakdown structure.
   B. Work packages.
   C. Budget.
   D. Project proposal.
   E. Responsibility matrix.

   Work packages from the work breakdown structure (WBS) are used to build the activities found in the project network. An activity is an element in the project that consumes time—for example, work or waiting.

7.   Which of the following does <u>NOT</u> help describe a project network?

   A. A graphic display of the flow and sequence of work through the project
   B. Provides the basis for scheduling labor and equipment
   C. Gives the times when activities can start and finish and when they can be delayed
   D. Highlights major deliverables and identifies their completion dates
   E. Identifies critical activities

   The work breakdown structure (WBS) will highlight major deliverables. Since major deliverables are a summary of the tasks below them, they do not directly consume time or resources; therefore, they are not included in the network.

8.   An activity that has more than one dependency arrow flowing into it is termed a(n)

   A. Parallel activity.
   B. Critical path.
   C. Burst activity.
   D. Merge activity.
   E. Independent activity.

   Merge activity is an activity that has more than one activity immediately preceding it (more than one dependency arrow flowing to it).

9.   The critical path in a project network is the

A. Shortest path through the network.
B. Longest path through the network.
C. Network path with the most difficult activities.
D. Network path using the most resources.
E. Network path with the most merge activities.

When the critical path term is used, it means the path(s) with the longest duration through the network. If an activity on the critical path is delayed, the project is delayed the same amount of time.

10.   A(n) _____ activity has more than one dependency arrow flowing from it.

A. Parallel
B. Critical path
C. Burst
D. Merge
E. Independent

Burst activity is an activity that has more than one activity immediately following it (more than one dependency arrow flowing from it).

11. Which of the following can be used without coordinating with managers of succeeding activities?

    A. Total slack
    B. Free slack
    C. Critical float
    D. Float pad
    E. Slip pad

Free slack is the amount of time an activity can be delayed without delaying any succeeding activity. It only occurs at the end of a chain of activities where you have a merge activity and requires no coordination with managers of succeeding activities unless all the available free slack is used.

12. Activities which can take place at the same time are termed

    A. Parallel activity.
    B. Critical path.
    C. Burst activity.
    D. Merge activity.
    E. Independent activity.

Parallel activities are activities that can take place at the same time, if the manager wishes. However, the manager may choose to have parallel activities not occur simultaneously.

13. A sequence of connected, dependent activities is termed a(n)

    A. Path of events.
    B. Parallel path.
    C. Activity chain.
    D. Path.
    E. Dependent chain.

A path is a sequence of connected, dependent activities.

14. Bill is building a project network that involves testing a prototype. He must design the prototype (activity 1), build the prototype (activity 2), and test the prototype (activity 3). Activity 1 is the predecessor for activity 2 and activity 2 is the predecessor for activity 3. If the prototype fails testing, Bill must redesign the prototype; therefore, activity 3 is a predecessor for activity 1. This is an example of

    A. Conditional statements.
    B. Looping.
    C. Having more than one start node.
    D. Good network development.
    E. Natural network flow.

This is an example of looping or recycling through a set of activities and cannot take place within a well-structured project network. One important reason is that it inhibits its ability to establish a completion date.

15. Which of the following is <u>NOT</u> one of the basic rules to follow when developing project networks?

    A. An activity cannot begin until all preceding activities have been completed
    B. Each activity must have a unique identification number
    C. Conditional statements are allowed but looping statements are not allowed
    D. An activity identification number must be larger than that of any preceding activities
    E. Networks flow from left to right

Conditional statements are not allowed (that is, this type of statement should not appear: If successful, do something; if not, do nothing).

16. _____ activities must be completed immediately before a particular activity.

    A. Merge
    B. Burst
    C. Predecessor
    D. Successor
    E. Parallel

Which activities must be completed immediately before this activity? These activities are called predecessor activities.

17. _____ activities are to be completed immediately following a particular activity.

    A. Merge
    B. Burst
    C. Predecessor
    D. Successor
    E. Parallel

Which activities must immediately follow this activity? These activities are called successor activities.

18.   The forward pass in project network calculations determines all of the following EXCEPT

    A. Earliest time an activity can begin.
    B. Earliest time an activity can finish.
    C. Duration of the project.
    D. The critical path.
    E. How soon the project can finish.

The forward pass starts with the first project activity(ies) and traces each path (chain of sequential activities) through the network to the last project activity(ies). It calculates how soon an activity can start, how soon it can finish and the project duration or how soon the project will be finished.

19.   The backward pass in project network calculations determines all of the following EXCEPT

    A. Latest time an activity can begin.
    B. Earliest time an activity can finish.
    C. The critical path.
    D. How long an activity can be delayed.
    E. Latest time an activity can finish.

The backward pass calculates how late an activity can start, how late it can finish, the critical path or longest path through the network and how long an activity can be delayed without delaying the project.

20. Which of the following correctly calculates the early finish for an activity?

A. LS + DUR
B. ES + DUR
C. LF + DUR
D. ES + SL
E. LF + SL

The early finish for activity = ES + DUR.

21. Which of the following correctly calculates the late start for an activity?

A. EF - DUR
B. ES - DUR
C. LF - DUR
D. ES - SL
E. LF - SL

You subtract activity times along each path starting with the project end activity (LF - DUR = LS).

22. The amount of time an activity can be delayed and yet not delay the project is termed

A. Total slack.
B. Free slack.
C. Critical float.
D. Float pad.
E. Slip pad.

Total slack tells us the amount of time an activity can be delayed and yet not delay the project. Stated differently, total slack is the amount of time an activity can exceed its early finish date without affecting the project end date or an imposed completion date.

23.   Which of the following will correctly calculate the total slack in an activity?

A. LS - ES
B. LF - EF
C. LS - LF
D. LF - ES
E. Either LS - ES or LF - EF

Total slack or float for an activity is simply the difference between the LS and ES (LS - ES = SL) or between LF and EF (LF - EF = SL).

24.   The likelihood the original critical path(s) will change once the project is initiated is referred to as

A. Flexibility.
B. Resilience.
C. Sensitivity.
D. Concurrent engineering.
E. Rigidity.

We use the term sensitivity to reflect the likelihood the original critical path(s) will change once the project is initiated. Sensitivity is the function of the number of critical paths and the level of slack for noncritical activities.

25. Which of the following is true about hammock activities?

A. They are used to identify the use of fixed resources or costs over a segment of a project
B. They are a combination of Start to Start and Start to Finish lags
C. They are activities in which the costs are not subject to change
D. They are an alternative description for the critical path
E. They are highly sensitive

Hammock activities are frequently used to identify the use of fixed resources or costs over a segment of the project. Typical examples of hammock activities are inspection services, consultants, or construction management services. A hammock activity derives its duration from the time span between other activities. For example, a special color copy machine is needed for a segment of a tradeshow publication project. A hammock activity can be used to indicate the need for this resource and to apply costs over this segment of the project.

26. If, for some reason, the project must be expedited to meet an earlier date, which of the following actions would the project manager take first?

A. Check to see which activities cost the least
B. Check to see which activities have the longest duration
C. Check to see which activities are on the critical path
D. Check to see which activities have the most slack
E. Check to see which activities have the highest risk

If for some reason the project must be expedited to meet an earlier date, it is possible to select those activities, or combination of activities, that will cost the least to shorten the project. Similarly, if the critical path is delayed and the time must be made up by shortening some activity or activities on the critical path to make up any negative slack, it is possible to identify the activities on the critical path that cost the least to shorten. If there are other paths with very little slack, it may be necessary to shorten activities on those paths also.

27. The assumption that all immediate preceding activities must be 100% complete is too restrictive in some situations. When an activity is broken down into smaller segments in order to start the succeeding activity sooner, this is called

   A. Hammock activities.
   B. Concurrent engineering.
   C. A forward pass.
   D. Dissecting.
   E. Laddering.

Under the finish-to-start relationship, when an activity has a long duration and will delay the start of an activity immediately following it, the activity can be broken into segments and the network drawn as a laddering approach so the following activity can begin sooner and not delay the work.

28. If a project has more than one activity that can begin when the project is to start, a common start node should be used to indicate a clear project beginning on the network. Without a common start node, each path is a

   A. Critical path.
   B. Parallel path.
   C. Dangler path.
   D. Multiple start path.
   E. Confused path.

If a project has more than one activity that can begin when the project is to start, each path is a dangler path. The same is true if a project network ends with more than one activity. Dangler paths give the impression that that project doesn't have a clear beginning or ending. Using a common start or end node helps to identify the total planning period for all projects.

29. Tom is responsible for ordering hardware for a custom home his company is building. The contractor installing the hardware is scheduled to start in 5 working days, but the hardware is on backorder and will not arrive for another 9 working days. Fortunately, Tom has 10 days of slack; however, he shares this slack with the hardware installer. He will have to let the contactor know that the hardware will be ready 4 days later than expected and that the slack for the installer has been reduced by 4 days. Tom and the installer share 10 days of

A. Free Slack.
B. Shared Slack.
C. Total Slack.
D. Critical Slack.
E. Functional Slack.

Total slack tells us the amount of time an activity can be delayed and not delay the project. The use of total slack must be coordinated with all participants in the activities that follow in the chain.

30. The minimum amount of time a dependent activity must be delayed to begin or end is referred to as

A. Hammock.
B. Laddering.
C. Lag.
D. Cushion.
E. Buffer.

A lag is the minimum amount of time a dependent activity must be delayed to begin or end.

31. The requirement for a freshly poured foundation to cure before beginning construction is an example of which of the following type of lag?

    A. Start to Start
    B. Start to Finish
    C. Finish to Finish
    D. Finish to Start
    E. Any of these could be correct

There are situations in which the next activity in a sequence must be delayed even when the preceding activity is complete. For example, removing concrete forms cannot begin until the poured cement has cured for two time units.

32. Concurrent engineering, which has dramatically reduced the development time for new products, relies on what kind of lag?

    A. Start to Start lags
    B. Start to Finish lags
    C. Finish to Finish lags
    D. Finish to Start lags
    E. Any of these could be correct

Concurrent engineering basically breaks activities into smaller segments so that work can be done in parallel and the project expedited. Start-to-start relationships can depict the concurrent engineering conditions and reduce network detail.

33. If testing cannot be completed any earlier than four days after the prototype has been built, what type of lag exists?

A. Start to Start
B. Start to Finish
C. Finish to Finish
D. Finish to Start
E. Any of these could be correct

When the finish of one activity depends on the finish of another activity, a finish to finish lag exists. For example, testing cannot be completed any earlier than four days after the prototype is complete.

34. When completing a backward pass, you carry the LS to the next preceding activity to establish the LF, unless the next preceding activity is a burst activity, in which case you select

A. The smallest LS of all its immediate successor activities to establish the LF.
B. The largest ES of all its immediate successor activities to establish the LF.
C. The average LS of all its immediate successor activities to establish the LF.
D. The smallest ES of all its immediate successor activities to establish the LF.
E. The largest LS of all its immediate successor activities to establish the LF.

When completing a backward pass, you carry the LS to the next preceding activity to establish the LF, unless the next preceding activity is a burst activity, in which case you select the smallest LS of all its immediate successor activities to establish the LF.

35. System documentation cannot end until three days after testing has started. This is an example of which kind of lag?

    A. Start to Start
    B. Start to Finish
    C. Finish to Finish
    D. Finish to Start
    E. Any of these could be correct

The relationship represents a situation in which the finish of an activity depends on the start of another activity. Here all the relevant information to complete the system documentation is produced after the first three days of testing, which is an example of a start to finish lag.

36. An element in the project that consumes time is a(n) _____.

activity

An activity is an element of the project that requires time. It may or may not require resources.

37. The activity time estimates used to build a project network are derived from _____.

work packages

A work package is defined independently of other work packages, has definite start and finish points, requires specific resources, includes technical specifications, and has cost estimates for the package.

38. An activity that has more than one predecessor is a _____ activity.

merge

A merge activity is an activity that has more than one activity immediately preceding it (more than one dependency arrow flowing to it).

39. The delaying of any activity on the _____ will delay the completion of the project by the same amount.

critical path

Critical path means the path(s) with the longest duration through the network. If an activity on the critical path is delayed, the project is delayed the same amount of time.

40. Activities that can take place at the same time if the manager wishes them to are called _____ activities.

parallel

Parallel activities are activities that can take place at the same time, if the manager wishes. However, the manager may choose to have parallel activities not occur simultaneously.

41. A(n) _____ calculates project duration.

forward pass

The forward pass calculates how soon an activity can start and finish. It also calculates how soon the project will be finished.

42. A(n) _____ activity has more than one successor activity.

burst

Burst activity has more than one activity immediately following it (more than one dependency arrow flowing from it).

43. A(n) _____ calculates how late an activity can start and finish.

backward pass

The backward pass calculates how late an activity can start and finish. It also determines the critical path and how long activities can be delayed without delaying the project.

44. In a project network, recycling through a set of activities or _____ is not permitted.

looping

Looping is not allowed (in other words, recycling through a set of activities cannot take place).

45. In a project network, _____ indicate activity dependency and project flow.

arrows

The wide availability of personal computers and graphics programs has served as an impetus for use of the activity-on-node (AON) method (sometimes called the precedence diagram method). The dependencies among activities are depicted by arrows between the rectangles (boxes) on the AON network. The arrows indicate how the activities are related and the sequence in which things must be accomplished.

46. _____ slack must be coordinated with all participants in the activities that follow in the chain.

Total

Total slack tells us the amount of time an activity can exceed its early finish date without affecting the project end date or an imposed completion date. Total slack also must be coordinated with all participants in the activities that follow in the chain.

47. Activities that must occur immediately before a given activity are called _____ activities.

predecessor

Activities that must be completed immediately before an activity are called predecessor activities.

48. Activities that must immediately follow a given activity are called _____ activities.

successor

Activities that must immediately follow an activity are called successor activities.

49. Activities that can occur while an activity is taking place are called _____ activities.

parallel or concurrent

Activities that can occur while an activity is taking place are known as concurrent or parallel activities.

50. The _____ calculates the earliest times that activities can start or finish.

forward pass

The forward pass describes how soon the activity can start (early start—ES) and how soon the activity can finish (early finish—EF).

51. The _____ calculates the critical path and determines how long an activity can be delayed without delaying the project.

backward pass

The backward pass determines which activities represent the critical path. The critical path is the longest path in the network which, when delayed, will delay the project and determines how long the activity can be delayed without delaying the project.

52. An activity has a duration of 10 days. Its early start is 4 and its late start is 6. This activity has _____ days of total slack.

2

Total slack tells us the amount of time an activity can be delayed and yet not delay the project. Stated differently, total slack is the amount of time an activity can exceed its early finish date without affecting the project end date or an imposed completion date. It is calculated by subtracting the late start from the early start. In this case, this activity has 2 days of slack.

53.   _____ can never be negative and applies only to the last activity in a single chain of activities.

Free slack

Free slack is the amount of time an activity can be delayed without delaying any immediately following (successor) activity. Or, free slack is the amount of time an activity can exceed its early finish date without affecting the early start date of any successor(s). Free slack can never be negative.

54.   A(n) _____ is the minimum amount of time a dependent activity must be delayed to begin or end.

lag

A lag is the minimum amount of time a dependent activity must be delayed to begin or end.

55.   When an activity with a long duration is broken into smaller segments so that the following activities can begin sooner it is called _____.

laddering

The assumption that all immediate preceding activities must be 100 percent complete is too restrictive for some situations found in practice. This restriction occurs most frequently when one activity overlaps the start of another and has a long duration. Under the standard finish-to-start relationship, when an activity has a long duration and will delay the start of an activity immediately following it, the activity can be broken into segments and the network drawn using a laddering approach so the following activity can begin sooner and not delay the work.

56. The longest path through a project network is called the _____.

critical path

The critical path is the network path that has the least slack in common. It is the longest path through the network and its duration determines the duration of the project.

57. _____ reflects the likelihood the original critical path(s) will change once the project is initiated.

Sensitivity

Sensitivity reflects the likelihood the original critical path(s) will change once the project is initiated. Sensitivity is a function of the number of critical or near-critical paths.

58. A network has only one critical path and the slack for noncritical activities is high. This network would appear to have a _____ level of sensitivity

low

Network sensitivity is a function of the number of critical paths and the level of slack for noncritical activities. Since this project has only one critical path and the level of slack for noncritical activities is high, it would appear to have a low level of sensitivity.

59. The _____ lag is the most typical type of lag that is encountered in developing networks.

finish to start

The finish-to-start relationship represents the typical, generic network; however, there are situations in which the next activity in a sequence must be delayed even when the preceding activity is complete.

60.   A(n) _____ activity is frequently used to identify the use of fixed resources or costs over a segment of the project.

hammock

Hammock activities are frequently used to identify the use of fixed resources or costs over a segment of the project. Typical examples of hammock activities are inspection services, consultants, or construction management services. A hammock activity derives its duration from the time span between other activities. For example, a special color copy machine is needed for a segment of a tradeshow publication project. A hammock activity can be used to indicate the need for this resource and to apply costs over this segment of the project.

61.   An activity can include only one work package.

FALSE

Activities usually represent one or more tasks from a work package.

62.   A merge activity is one that merges with other activities into a succeeding activity.

FALSE

A merge activity is an activity that has more than one activity immediately preceding it (more than one dependency arrow flowing into it).

63.   The WBS identifies dependencies, the sequencing of activities, and the timing of activities.

FALSE

Networks provide the project schedule by identifying dependencies, sequencing, and timing of activities, which the WBS is not designed to do.

64. The critical path is the shortest path through a network and indicates activities that cannot be delayed without delaying the project.

   FALSE

   Critical path means the path(s) with the longest duration through the network. If an activity on the critical path is delayed, the project is delayed the same amount of time.

65. An activity is an element of the project that always requires time.

   TRUE

   An activity is an element of the project that requires time. It may or may not require resources.

66. If a network has more than one critical path but noncritical activities have very little slack, the network is considered to have a high level of sensitivity.

   TRUE

   Network sensitivity is a function of the number of critical paths and the level of slack for noncritical activities. Since this network has more than one critical path and the level of slack for noncritical activities is low, it would appear to have a high level of sensitivity.

67.   The backward pass determines project duration.

   FALSE

   The forward pass determines the early start and finish for activities. It also determines the early finish of the project.

68.   An activity cannot begin until ALL preceding connected activities have been completed.

   TRUE

   All preceding activities must be completed before an activity can begin.

69.   In developing a project network, neither looping nor conditional statements are permitted.

   TRUE

   Looping is not allowed (in other words, recycling through a set of activities cannot take place). Also conditional statements are not allowed (that is, this type of statement should not appear: If successful, do something; if not, do nothing).

70.   Experience suggests that when there are multiple starts, a common start node should be used to indicate a clear project beginning on the network. Similarly, a single project end node can be used to indicate a clear ending.

   TRUE

   Experience suggests that when there are multiple starts, a common start node can be used to indicate a clear project beginning on the network. Similarly, a single project end node can be used to indicate a clear ending. This helps to identify the total planning period of the project.

71. Burst activities have more than one activity immediately following them (more than one dependency arrow flowing from them).

    <u>TRUE</u>

    Burst activities have more than one activity immediately following them (more than one dependency arrow flowing from them).

72. It is acceptable for arrows to cross one another in a network diagram.

    <u>TRUE</u>

    Arrows on networks indicate precedence and flow. Arrows can cross over each other.

73. The forward pass through a project network determines the critical path.

    <u>FALSE</u>

    The forward pass starts with the first project activity(ies) and traces each path (chain of sequential activities) through the network to the last project activity(ies). The forward pass assumes every activity will start the instant in time when the last of its predecessors is finished. It determines the early start and early finish for activities and the project duration. The backward pass determines the critical path.

74. The backward pass through a project network determines slack or how long an activity can be delayed without impacting the completion date of the project.

TRUE

The backward pass represents the critical path. The critical path is the longest path in the network, which, when delayed, will delay the project and determines how long the activity can be delayed without delaying the project.

75. Different activities along the same path can have different total slack.

TRUE

If slack of one activity in a path is used, the ES for all activities that follow in the chain will be delayed and their slack reduced. Use of total slack must be coordinated with all participants in the activities that follow in the chain.

76. If the project has a duration of 13 days, the project should be completed 13 days from the day it starts.

FALSE

After determining a project's duration, you will need to assign calendar dates to your project. You will need to consider weekends and holidays when determining the completion date.

77. It is possible for a project network to have more than one critical path.

<u>TRUE</u>

Critical path means the path(s) with the longest duration through the network. If an activity on the critical path is delayed, the project is delayed the same amount of time. A network may have multiple critical activities resulting in multiple critical paths.

78. Using free slack does not delay any following activities and requires no coordination with managers of other activities.

<u>TRUE</u>

Free slack is the amount of time an activity can be delayed without delaying any immediately following (successor) activity. Or, free slack is the amount of time an activity can exceed its early finish date without affecting the early start date of any successor(s).

79. Gantt charts are popular because they represent an easy-to-understand, clear picture on a time-scaled horizon.

<u>TRUE</u>

Gantt charts are used for planning, resource scheduling and status reporting. The format is a two-dimensional representation of the project schedule, with activities down the rows and time across the horizontal axis.

80. When completing a forward pass, you carry the early finish to the next activity where it becomes its early start unless the next succeeding activity is a merge activity. In this case you select the smallest early finish number of all its immediate predecessor activities.

   FALSE

   When completing a forward pass, you carry the early finish to the next activity where it becomes its early start unless the next succeeding activity is a merge activity. In this case you select the largest early finish number of all its immediate predecessor activities. This makes sense because all preceding activities must be complete before an activity can start.

81. Only activities that occur at the end of a chain of activities can have free slack.

   TRUE

   Free slack occurs at the last activity in a chain of activities. Using this slack does not have to be coordinated with managers of succeeding activities.

82. Lags can be used to constrain the start and finish of an activity.

   TRUE

   Lags are used when activities of long duration delay the start or finish of successor activities. The network designer normally breaks the activity into smaller activities to avoid the long delay of the successor activity. Using lags can avoid such delays and reduce network detail. Lags can also be used to constrain the start and finish of an activity.

83. How does the WBS differ from the project network? How are WBS and project networks linked?

Answer will vary

Feedback: The network is developed from the information collected from the WBS and is a graphic flow chart of the project job plan. Networks provide the project schedule by identifying dependencies, sequencing, and timing of activities the WBS is not designed to do.

84. Briefly describe looping and conditional statements and explain why they are not allowed when developing project networks.

Answer will vary

Feedback: Looping is the attempt by the network designer to return to an earlier activity. If looping were allowed paths would continuously repeat themselves. Conditional statements are "if/then" statements. If conditional statements were allowed, the network would make little sense and would not be able to accomplish many of its objectives.

85. When completing the forward pass, the project duration is determined. A project duration of 90 days doesn't mean that if the project were to start today it would be complete in 90 days. Explain.

Answer will vary

Feedback: The project duration gives you an estimated number of working days necessary to complete the project. It doesn't consider weekends, holidays, overtime, etc.

86.   In the network computation process what is a *forward pass* and what three things does it determine?

Answer will vary

Feedback: Starting with the first activity, each path is traced forward through the network, adding times until the end of the project. This determines (1) how soon each activity can start, (2) how soon each activity can finish, and (3) how soon the entire project can be completed.

87.   In the network computation process what is a *backward pass* and what four things does it determine?

Answer will vary

Feedback: Starting with the last activity, each path is traced backward through the network, subtracting times until the beginning of the project. This determines (1) how late each activity can start, (2) how late each activity can finish, (3) the critical path, and (4) how long each activity can be delayed without changing the completion date.

88.   What is the difference between free slack and total slack?

Answer will vary

Feedback: Total slack tells us the amount of time an activity can be delayed and not delay the project. Use of total slack must be coordinated with all participants in the activities that follow in the chain. Free slack is the amount of time an activity can be delayed without delaying any immediately following activity. It requires no coordination with other managers.

89. What is a Gantt chart and what advantages does it have over project networks?

Answer will vary

Feedback: Gantt charts are bar charts where activities are displayed as bars on a horizontal time-scale. They are easy-to-read and provide a clear overview of the project schedule and progress against that schedule.

90. When completing a forward pass you carry the early finish to the next activity where it becomes its early start, unless the next succeeding activity is a merge activity. In this case you select the largest early finish number of all its immediate predecessor activities. Why do you select the largest early finish number?

Answer will vary

Feedback: Acknowledging that the finish number represents the activities' early finish, the largest early finish number is selected because all preceding activities must be completed before an activity can begin. If anything less than the largest number is chosen, there will not be enough time for all preceding activities to finish.

91. What is a lag and give an example of when you would need to use one?

Answer will vary

Feedback: A lag is the minimum amount of time a dependent activity must be delayed to begin or end. Lags occur during laddering and avoid delays and they are also used to constraint the start and finish of an activity.

92.   What is a hammock activity and give an example?

Answer will vary

Feedback: A hammock activity identifies the use of a resource over a segment of the project. Thus its duration is determined by the duration of other activities. The example used in the text was for a color copier during specific phases of a project.

93.   What is the Concurrent Engineering Approach and why should project managers be aware of it?

Answer will vary

Feedback: The chainlike sequence of finish-to-start relationships is replaced by a series of start-to-start lag relationships as soon as meaningful work can be initiated for the next phase. The resulting overlap of tasks slightly increases risk but results in a much shorter schedule.

94.   Identify and briefly describe the four types of lags giving an example for each type.

Answer will vary

Feedback: (1) Finish-to-Start; (2) Start-to-Start; (3) Finish-to-Finish; (4) Start-to-Finish.

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