Chapter 8

Student: _____

1. Resources are adequate, but demand varies widely over the life of the project. Delaying noncritical activities to lower peak demand on resources is known as resource

   A. Shifting.
   B. Effectiveness.
   C. Manipulating.
   D. Smoothing.
   E. Allocation.

2. If resources are not adequate to meet peak demands, the resulting reschedule is termed

   A. Resource-constrained scheduling.
   B. Time-constrained scheduling.
   C. Mandatory leveling.
   D. Project resource adjustment.
   E. Allocation.

3. Which of the following is <u>NOT</u> a potential consequence of failing to identify limited resources before project implementation?

   A. Activity delays
   B. Project delays
   C. Difficulty in taking quick corrective action
   D. Increase costs
   E. Scope creep

4. When developing a new software package, logically, the software must be designed before the code is written, and the code must be written before it is tested. These activities are dependent on each other by _____ constraints.

   A. Physical
   B. Technical
   C. Resource
   D. Schedule
   E. Time

5. When considering the sequence and timing of activities, which of the following is <u>NOT</u> one of the types of project network constraints?

   A. Physical
   B. Technical
   C. Resource
   D. Time
   E. All of these are types of constraints that could impact structure of the project network

6. Sam, the project engineer, has been scheduled to run the product system test at the same time he is to build a marketing prototype. This is an example of what type of resource constraint?

   A. Physical
   B. Technical
   C. People
   D. Equipment
   E. Time

7. Susan is to conduct environmental testing but the chamber cannot hold all the equipment that she wants to test. This is an example of a constraint that could impact the sequence and timing of activities in a project network. What type of constraint is it?

   A. Physical
   B. Technical
   C. Resource
   D. Scheduling
   E. Time

8. All of the following are types of resource constraints EXCEPT

   A. Materials.
   B. People.
   C. Equipment.
   D. Information.
   E. Human.

9. Gene is trying to order the concrete needed to continue his project. However, the supplier will not be able to deliver it until next week. This is an example of what kind of resource constraint?

   A. Working capital
   B. People
   C. Equipment
   D. Information
   E. Materials

10. A special truck that George needs on his project has been scheduled on another project. This is an example of what type of resource constraint?

   A. Working capital
   B. People
   C. Equipment
   D. Information
   E. Materials

11. Most of the scheduling methods available today require the project manager to classify the project as either _____ constrained or _____ constrained.

   A. Time, quality
   B. Quality, resource
   C. Cost, time
   D. Quality, cost
   E. Time, resource

12. Regina's boss has told her that her project is very important. If the critical path is delayed, she will be given whatever she needs to get it back on schedule. Her project is classified as _____ constrained.

   A. Time
   B. Quality
   C. Cost
   D. Performance
   E. Resource

13. In reviewing the status of her project with top management, Shirley was told that there are only two programmers that she can use for her project. Her project is classified as _____ constrained.

   A. Time
   B. Quality
   C. Cost
   D. Performance
   E. Resource

14. All resource leveling techniques involve

   A. Delaying noncritical activities.
   B. Delaying critical activities.
   C. Using negative slack.
   D. Delaying the project.
   E. Adding resources.

15. Technical constraints have been carefully considered when developing a project network. Which of the following is true at this point?

    A. Resources have been assigned to each activity so they are adequate to complete the project on time
    B. Technical dependencies between activities are known
    C. The project completion date can be established
    D. The project is ready to be implemented
    E. All of these are true statements once technical constraints have been established

16. Rachel is working on a project that technically allows three activities to be done at the same time. If they were to be implemented at the same time, she would need 5 contractors in order for the activities to be completed on time. There are only 3 available for her to use. This is an example of what type of constraint?

    A. Technical
    B. People
    C. Equipment
    D. Physical
    E. Materials

17. Resource leveling or smoothing can have all the following results on a project EXCEPT

    A. Lower peak resource demand.
    B. Reduced resource need over the life of the project.
    C. Reduced fluctuations in resource demand.
    D. A longer project duration.
    E. A more sensitive network.

18. Jan is trying to reallocate resources in a time-constrained project to create smoother resource utilization. She should first identify activities with the

    A. Smallest duration.
    B. Least slack.
    C. Most slack.
    D. Lowest identification number.
    E. Highest cost.

19. In a resource-constrained project, which of the following is most likely to be changed?

    A. The completion date
    B. The budget
    C. Project quality
    D. Resource levels
    E. Scope creep

20. In a resource-constrained project, the first priority in assigning resources is usually given to activities with the

   A. Smallest duration.
   B. Least slack.
   C. Most slack.
   D. Lowest identification number.
   E. Highest cost.

21. In a resource-constrained project the second priority in assigning resources is usually given to activities with the

   A. Smallest duration.
   B. Least slack.
   C. Most slack.
   D. Lowest identification number.
   E. Highest cost.

22. Tony has realized that two activities in his project cannot be done at the same time because not enough resources are available. Activity 3 is critical and has a duration of 5 days. Activity 4 has 2 days of slack and a duration of 2 days. How will he decide which activity should be scheduled first?

   A. The activity with the smallest duration
   B. The activity with the least slack
   C. The activity with the most slack
   D. The activity with the lowest identification number
   E. The activity with the highest cost

23. Splitting an activity can result in all of the following EXCEPT

   A. More people working on the same activity.
   B. Possible startup and shutdown costs.
   C. A resource being moved from one activity to another and then back.
   D. Activity work being placed on hold for a period until more resources are available.
   E. A better project schedule.

24. All of the following are benefits of scheduling resources before project implementation EXCEPT

   A. It allows time for considering reasonable options if resource constraints do exist.
   B. The project completion date can be established.
   C. Work packages can be time-phased.
   D. It allows managers to share resources with other project managers if it is requested without negatively impacting their project.
   E. It ensures low network sensitivity.

25. These are all guidelines a project manager should consider when assigning project work EXCEPT

   A. Select people with compatible work habits and personalities.
   B. Always assign the best people to the most difficult tasks.
   C. When possible, team veterans up with new hires.
   D. Select individuals with skillsets that complement each other.
   E. Have people work together early so that they can become familiar with each other.

26. When a company will reduce the number of projects they have to manage internally to only core projects and send noncritical projects to contractors and consulting firms this is called

   A. Outsourcing.
   B. Redistribution of projects.
   C. Project allocation.
   D. Task sharing.
   E. Referring.

27. Which of the following is <u>NOT</u> one of the more common problems associated with scheduling multiproject resources?

   A. Overall schedule slippage
   B. Inefficient resource utilization
   C. Decline in project quality
   D. Resource bottlenecks
   E. Delays in one project causing delays in other projects

28. In a resource-constrained project the third priority in assigning resources is usually given to activities with the

   A. Smallest duration.
   B. Least slack.
   C. Most slack.
   D. Lowest identification number.
   E. Highest cost.

29. Why is it necessary to have a time-phased budget baseline?

   A. It allows proper resource allocation
   B. It shows how much work was accomplished for the money spent
   C. It reduces schedule slippage when scheduling multiproject resources
   D. It is not necessary to have a time-phased budget baseline
   E. It reduces fluctuations in cash flow during the project

30. Project budgets are developed by time-phasing which of the following?

   A. Resource schedules
   B. Work packages
   C. The network diagram
   D. Critical activities
   E. None of these are time-phased to develop a project budget

31. A project budget report is showing our project as spending $35,000 against a budgeted amount of $40,000. Which of the following is true?

   A. We are spending less than we should for the project
   B. We are doing a good job managing the project
   C. We should check to see if all the bills have been paid
   D. We have more money to put into budget reserves
   E. We can't be sure how the project is going

32. Delaying noncritical activities to lower peak demand and, thus, increase resource utilization is called resource _____.

   _____

33. A(n) _____ constraint addresses the sequence in which project activities must occur even after considering resource constraints.

   _____

34. Having one person responsible for performing several activities, all due at the same time, is an example of a(n) _____ constraint.

   _____

35. Trying to renovate a ship compartment that is too small for more than one person is an example of a(n) _____ resource constraint.

   _____

36. A shortage of programmers to write software is an example of a(n) _____ type of resource constraint.

   _____

37. The shortage of computer chips to produce a circuit board is an example of a(n) _____ type of resource constraint.

   _____

38. If three copiers are needed to produce a final report on time and only two are available, the project is facing a(n) _____ type of resource constraint.

_____

39. Resource dependency takes priority over the technological dependency but does not violate _____ dependencies.

_____

40. In order that the new product is on the shelf for the Christmas buying season, the development of the new product would be classified as a(n) _____ -constrained project.

_____

41. Beth has two engineers assigned to her project and does not have access to more even if the result means extending the completion date on her project. She is managing a(n) _____ -constrained project.

_____

42. All leveling techniques delay noncritical activities by using _____ to reduce peak demand.

_____

43. When scheduling activities in a resource-constrained project, typically the activity scheduled first has the _____ amount of slack.

_____

44. Since resource leveling or smoothing delays noncritical activities, a common result is an increase in network _____.

_____

45. When the work in an activity is interrupted to work on another activity and is then resumed at a later point in time, it is called _____.

_____

46. In scheduling resource-constrained projects, _____ are typically used rather than optimum mathematical solutions.

_____

47. When classifying projects, _____ constrained means that project duration is fixed and resources are flexible.

_____

48. When classifying projects, _____ constrained means that a specific resource is fixed and the duration of the project is flexible.

_____

49. Startup and shutdown costs are major considerations when using the _____ scheduling technique.

_____

50. After resource leveling or smoothing one goal is that the amount of resources needed over the life of the project will be _____.

_____

51. Many companies are _____ project work to contractors and consultants as a means of dealing with the peaks and valleys of resource allocation among projects.

_____

52. When a project is classified as resource-constrained and a resource constraint exists, the project duration is typically _____.

_____

53. In reality resource allocation generally occurs in a(n) _____ environment where the demands of one project have to be reconciled with the needs of other projects.

_____

54. Without a _____ budget a good project schedule and cost control are impossible.

_____

55. A project cost baseline is also called _____.

_____

56. The fact that you must pour foundation before you frame the house and that you have to frame the house before you can put on the roof demonstrates scheduling constraints.

    True   False

57. Too many parallel activities for one individual is an example of a resource constraint.

    True   False

58. The level of resources each activity will need to be completed in the given amount of time has been estimated; therefore, there are no resource constraints.

    True   False

59. Resource leveling or smoothing is only used on projects which are resource constrained.

True   False

60. Resource bottlenecks are one of the three more common problems encountered in managing multiproject resource schedules.

True   False

61. The inability to fit more than two earth movers on a construction site at the same time when more are needed to complete the activity on time is an example of a physical constraint.

True   False

62. In a resource-constrained project, the completion date is most likely to change.

True   False

63. Having too few programmers and too many engineers is an example of a people resource constraint.

True   False

64. If a project needs one earth mover six months from now in order to complete one activity, and the organization has four such machines, there is no equipment resource constraint.

True   False

65. A lack of readily available engineers is a technical constraint.

True   False

66. Resource dependency takes priority over technological dependency but it does not violate it.

True   False

67. To determine if a project is time-constrained or resource-constrained you would consult the project priority matrix.

True   False

68. Sequential activities hold just as much potential for resource conflicts as parallel activities.

True   False

69. All leveling techniques delay noncritical activities by using positive slack to smooth out the resource requirements.

True   False

70. Since resource leveling or smoothing delays noncritical activities, a common result is a decrease in network sensitivity.

True   False

71. Scheduling projects classified as resource-constrained focuses on completing the project as soon as possible under the given resource constraints.

    True   False

72. When resource constraints are added to technical constraints the original project network may change as well as the completion date.

    True   False

73. When scheduling activities in a resource-constrained project typically the activity scheduled first has the most amount of slack.

    True   False

74. A project budget report is showing our project as spending $35,000 against a budgeted amount of $40,000. We can assume that everything is going as planned and that we are under budget.

    True   False

75. Splitting is a scheduling technique used to get a better schedule or better resource utilization and should be used without hesitation.

    True   False

76. Without a time-phased budget a good project schedule and cost control are impossible.

    True   False

77. If resources are truly limited and activity time estimates are accurate, the resource-constrained schedule will materialize as the project is implemented, not the time-constrained schedule.

    True   False

78. Project managers should always assign the best people to the most difficult tasks.

    True   False

79. Identify and briefly describe the three types of project constraints that could impact or change the structure of project network.

80. What is the difference in project goals when using resource leveling on time-constrained projects and using it on resource-constrained projects?

81. Why is a schedule not a schedule until resources have been assigned? Provide a real life example that illustrates your explanation.

82. Identify and give an example of the three types of resource constraints.

83. Identify and briefly describe two ways to classify projects with scheduling problems.

84. List and briefly describe the disadvantages of resource leveling or smoothing.

85. What are the impacts of resource-constrained scheduling?

86. After constructing a project network based on technical constraints and reviewing resource requirements throughout the project, Anne realizes many peaks and valleys in regard to resource usage. At one point Anne needs 6 developers, but top management has made it very clear that she will not have access to more than 4. Classify Anne's project in terms of her scheduling problem. What are her options at this point?

87. When using resource-constrained scheduling, activities that were once scheduled to be completed at the same time now may have to be scheduled in sequence. What are the "rules of thumb" or heuristics that need to be followed to determine which activity is scheduled first?

88. Why should project managers be cautious about using the splitting scheduling technique?

89. Why is it important to make efforts to identify resource scheduling problems before the project is implemented?

90. Why is it critical to form a time-phased budget?

91. If your project has spent $50,000 versus a budget of $45,000 and it is a week ahead of schedule, is it a certainty that your project is doing well? Explain why or why not.

Chapter 8 Key

1.   Resources are adequate, but demand varies widely over the life of the project. Delaying noncritical activities to lower peak demand on resources is known as resource

   A. Shifting.
   B. Effectiveness.
   C. Manipulating.
   D. Smoothing.
   E. Allocation.

   If resources are adequate but the demand varies widely over the life of the project, it may be desirable to even out resource demand by delaying noncritical activities (using slack) to lower peak demand and, thus, increase resource utilization. This process is called resource smoothing.

2.   If resources are not adequate to meet peak demands, the resulting reschedule is termed

   A. Resource-constrained scheduling.
   B. Time-constrained scheduling.
   C. Mandatory leveling.
   D. Project resource adjustment.
   E. Allocation.

   If resources are not adequate to meet peak demands, the late start of some activities must be delayed, and the duration of the project may be increased. This process is called resource-constrained scheduling.

3.   Which of the following is <u>NOT</u> a potential consequence of failing to identify limited resources before project implementation?

        A. Activity delays
        B. Project delays
        C. Difficulty in taking quick corrective action
        D. Increase costs
        E. Scope creep

        The consequences of failing to schedule limited resources are costly activity and project delays that usually manifest themselves midway in the project when quick corrective action is difficult.

4.   When developing a new software package, logically, the software must be designed before the code is written, and the code must be written before it is tested. These activities are dependent on each other by _____ constraints.

        A. Physical
        B. Technical
        C. Resource
        D. Schedule
        E. Time

        A network for a new software project could place the activities in the network, as a sequence of (1) design, (2) code, and (3) test. In other words, you cannot logically perform activity 2 until activity 1 is completed, and so on. The project network depicts technical constraints.

5. When considering the sequence and timing of activities, which of the following is <u>NOT</u> one of the types of project network constraints?

    A. Physical
    B. Technical
    C. Resource
    D. Time
    E. All of these are types of constraints that could impact structure of the project network

If resources are not adequate to meet peak demands, the late start of some activities must be delayed, and the duration of the project may be increased. The absence or shortage of resources can drastically alter technical constraints. In rare situations, physical factors cause activities that would normally occur in parallel to be constrained by contractual or environmental conditions.

6. Sam, the project engineer, has been scheduled to run the product system test at the same time he is to build a marketing prototype. This is an example of what type of resource constraint?

    A. Physical
    B. Technical
    C. People
    D. Equipment
    E. Time

If one person must perform all activities, the resource constraint requires the activities be performed in sequence or series. Since Sam's skillset is required for both activities at the same time, this is an example of human or people resource constraint.

7.	Susan is to conduct environmental testing but the chamber cannot hold all the equipment that she wants to test. This is an example of a constraint that could impact the sequence and timing of activities in a project network. What type of constraint is it?

A. Physical
B. Technical
C. Resource
D. Scheduling
E. Time

Since physical space allows limited testing at once, it may take longer for testing to be completed. This is a physical constraint.

8.	All of the following are types of resource constraints EXCEPT

A. Materials.
B. People.
C. Equipment.
D. Information.
E. Human.

People, materials and equipment are all considered resource constraints. If any of these are limited in that there are not enough to complete the activities they are scheduled for in the amount of time given, the timing and sequence of activities in the project network may be impacted.

9. Gene is trying to order the concrete needed to continue his project. However, the supplier will not be able to deliver it until next week. This is an example of what kind of resource constraint?

A. Working capital
B. People
C. Equipment
D. Information
E. Materials

Material availability and shortages have been blamed for the delay of many projects. When it is known that a lack of availability of materials is important and probable, materials should be included in the project network plan and schedule.

10. A special truck that George needs on his project has been scheduled on another project. This is an example of what type of resource constraint?

A. Working capital
B. People
C. Equipment
D. Information
E. Materials

Equipment is usually presented by type, size, and quantity. In some cases equipment can be interchanged to improve schedules, but this is not typical. Equipment is often overlooked as a constraint. The most common oversight is to assume the resource pool is more than adequate for the project.

11. Most of the scheduling methods available today require the project manager to classify the project as either _____ constrained or _____ constrained.

   A. Time, quality
   B. Quality, resource
   C. Cost, time
   D. Quality, cost
   E. Time, resource

   Most of the scheduling methods available today require the project manager to classify the project as either time constrained or resource constrained.

12. Regina's boss has told her that her project is very important. If the critical path is delayed, she will be given whatever she needs to get it back on schedule. Her project is classified as _____ constrained.

   A. Time
   B. Quality
   C. Cost
   D. Performance
   E. Resource

   A time-constrained project is one that must be completed by an imposed date. If required, resources can be added to ensure the project is completed by a specific date. Although time is the critical factor, resource usage should be no more than is necessary and sufficient.

13. In reviewing the status of her project with top management, Shirley was told that there are only two programmers that she can use for her project. Her project is classified as _____ constrained.

    A. Time
    B. Quality
    C. Cost
    D. Performance
    E. Resource

A resource-constrained project is one that assumes the level of resources available cannot be exceeded. If the resources are inadequate, it will be acceptable to delay the project, but as little as possible.

14. All resource leveling techniques involve

    A. Delaying noncritical activities.
    B. Delaying critical activities.
    C. Using negative slack.
    D. Delaying the project.
    E. Adding resources.

All leveling techniques delay noncritical activities by using positive slack to reduce peak demand and fill in the valleys for the resources.

15. Technical constraints have been carefully considered when developing a project network. Which of the following is true at this point?

   A. Resources have been assigned to each activity so they are adequate to complete the project on time
   B. Technical dependencies between activities are known
   C. The project completion date can be established
   D. The project is ready to be implemented
   E. All of these are true statements once technical constraints have been established

   After considering technical constraints, all you know at this point is the sequence of activities based on logical considerations. You must consider both resource constraints and physical constraints in addition to technical constraints before your schedule is an actual schedule. These constraints can change the timing and/or sequencing of activities.

16. Rachel is working on a project that technically allows three activities to be done at the same time. If they were to be implemented at the same time, she would need 5 contractors in order for the activities to be completed on time. There are only 3 available for her to use. This is an example of what type of constraint?

   A. Technical
   B. People
   C. Equipment
   D. Physical
   E. Materials

   The fact that Rachel doesn't have enough contractors to complete the project as specified in the network is a people or human resource constraint. These three activities may have to be done one at a time, extending the duration of the project, if Rachel has no access to additional resources.

17.   Resource leveling or smoothing can have all the following results on a project EXCEPT

      A. Lower peak resource demand.
      B. Reduced resource need over the life of the project.
      C. Reduced fluctuations in resource demand.
      D. A longer project duration.
      E. A more sensitive network.

Practitioners have attacked the utilization problem using resource leveling or smoothing techniques that balance or smooth demand for a resource. Basically, all leveling techniques delay noncritical activities by using positive slack to reduce peak demand and fill in the valleys for the resources. A consequence of resource smoothing is a more sensitive network resulting in the reduction of slack.

18.   Jan is trying to reallocate resources in a time-constrained project to create smoother resource utilization. She should first identify activities with the

      A. Smallest duration.
      B. Least slack.
      C. Most slack.
      D. Lowest identification number.
      E. Highest cost.

Activities with the most slack may be delayed to reduce the level of resources needed at a particular time.

19. In a resource-constrained project, which of the following is most likely to be changed?

   A. The completion date
   B. The budget
   C. Project quality
   D. Resource levels
   E. Scope creep

   If resources are not adequate to meet peak demands and there is no access to further resources, activities might take longer than initially planned. Furthermore, activities that technically could be done at the same time will have to be done one after the other if the same resources are required for each. This will delay the completion date.

20. In a resource-constrained project, the first priority in assigning resources is usually given to activities with the

   A. Smallest duration.
   B. Least slack.
   C. Most slack.
   D. Lowest identification number.
   E. Highest cost.

   The first activity placed in the schedule would be the activity with the least slack (rule 1).

21. In a resource-constrained project the second priority in assigning resources is usually given to activities with the

   A. Smallest duration.
   B. Least slack.
   C. Most slack.
   D. Lowest identification number.
   E. Highest cost.

   If all activities have the same slack, the next rule would be invoked (rule 2), and the activity with the smallest duration would be placed in the schedule first.

22. Tony has realized that two activities in his project cannot be done at the same time because not enough resources are available. Activity 3 is critical and has a duration of 5 days. Activity 4 has 2 days of slack and a duration of 2 days. How will he decide which activity should be scheduled first?

   A. The activity with the smallest duration
   B. The activity with the least slack
   C. The activity with the most slack
   D. The activity with the lowest identification number
   E. The activity with the highest cost

   The first activity placed in the schedule would be the activity with the least slack (rule 1).

23. Splitting an activity can result in all of the following EXCEPT

   A. More people working on the same activity.
   B. Possible startup and shutdown costs.
   C. A resource being moved from one activity to another and then back.
   D. Activity work being placed on hold for a period until more resources are available.
   E. A better project schedule.

   A planner splits the continuous work included in an activity by interrupting the work and sending the resource to another activity for a period of time and then having the resource resume work on the original activity. Splitting can be a useful tool if the work involved does not include large startup or shut down costs—for example, moving equipment from one activity location to another. The most common error is to interrupt "people work," where there are high conceptual startup and shutdown costs.

24. All of the following are benefits of scheduling resources before project implementation EXCEPT

   A. It allows time for considering reasonable options if resource constraints do exist.
   B. The project completion date can be established.
   C. Work packages can be time-phased.
   D. It allows managers to share resources with other project managers if it is requested without negatively impacting their project.
   E. It ensures low network sensitivity.

   Often after scheduling resources, if resource constraints exist, network sensitivity will increase. All resource leveling techniques delay noncritical activities which decrease slack levels within the project. This increases the number of critical and/or near critical activities.

25. These are all guidelines a project manager should consider when assigning project work EXCEPT

A. Select people with compatible work habits and personalities.
B. Always assign the best people to the most difficult tasks.
C. When possible, team veterans up with new hires.
D. Select individuals with skillsets that complement each other.
E. Have people work together early so that they can become familiar with each other.

There is a natural tendency to assign the best people the most difficult tasks. Project managers need to be careful not to overdo this. Over time these people may grow to resent the fact that they are always given the toughest assignments. At the same time, less experienced participants may resent the fact that they are never given the opportunity to expand their skill/knowledge base.

26. When a company will reduce the number of projects they have to manage internally to only core projects and send noncritical projects to contractors and consulting firms this is called

A. Outsourcing.
B. Redistribution of projects.
C. Project allocation.
D. Task sharing.
E. Referring.

Many companies are using outsourcing as a means for dealing with their resource allocation problems. In some cases, a company will reduce the number of projects they have to manage internally to only core projects and outsource noncritical projects to contractors and consulting firms. In other cases, specific segments of projects are outsourced to overcome resource deficiencies and scheduling problems.

27. Which of the following is <u>NOT</u> one of the more common problems associated with scheduling multiproject resources?

    A. Overall schedule slippage
    B. Inefficient resource utilization
    C. Decline in project quality
    D. Resource bottlenecks
    E. Delays in one project causing delays in other projects

Overall schedule slippage or delays in one project causing delays in other projects, inefficient resource utilization, and resource bottlenecks are all common problems associated with scheduling multiproject resources.

28. In a resource-constrained project the third priority in assigning resources is usually given to activities with the

    A. Smallest duration.
    B. Least slack.
    C. Most slack.
    D. Lowest identification number.
    E. Highest cost.

In very rare cases, when all eligible activities have the same slack and the same duration, the tie is broken by the lowest activity identification number (rule 3), since each activity has a unique ID number.

29. Why is it necessary to have a time-phased budget baseline?

    A. It allows proper resource allocation
    B. It shows how much work was accomplished for the money spent
    C. It reduces schedule slippage when scheduling multiproject resources
    D. It is not necessary to have a time-phased budget baseline
    E. It reduces fluctuations in cash flow during the project

It is necessary to have a time-phased budget baseline so you know how much work has been accomplished for the money spent. Without time-phasing cost to match your project schedule, it is impossible to have reliable information for control purposes.

30. Project budgets are developed by time-phasing which of the following?

    A. Resource schedules
    B. Work packages
    C. The network diagram
    D. Critical activities
    E. None of these are time-phased to develop a project budget

Using your project schedule, you can time-phase work packages and assign them to their respective scheduled activities to develop a budget schedule over the life of your project.

31. A project budget report is showing our project as spending $35,000 against a budgeted amount of $40,000. Which of the following is true?

    A. We are spending less than we should for the project
    B. We are doing a good job managing the project
    C. We should check to see if all the bills have been paid
    D. We have more money to put into budget reserves
    E. We can't be sure how the project is going

There is no way to be certain how much of the physical work has been accomplished.

32. Delaying noncritical activities to lower peak demand and, thus, increase resource utilization is called resource _____.

leveling or smoothing

Practitioners have attacked the utilization problem using resource leveling techniques that balance or smooth demand for a resource. Basically, all leveling techniques delay noncritical activities by using positive slack to reduce peak demand and fill in the valleys for the resources.

33. A(n) _____ constraint addresses the sequence in which project activities must occur even after considering resource constraints.

technical or logic

The start and sequence of activities have been based solely on technical or logical considerations. For example, a project network for framing a house might show three activities in a sequence: (1) pour foundation, (2) build frame, and (3) cover roof. Resource constraints do not violate technical constraints.

34. Having one person responsible for performing several activities, all due at the same time, is an example of a(n) _____ constraint.

resource

If one person must perform all activities, the resource constraint requires the activities be performed in sequence or series.

35. Trying to renovate a ship compartment that is too small for more than one person is an example of a(n) _____ resource constraint.

<u>physical</u>

In rare situations, physical factors cause activities that would normally occur in parallel to be constrained by contractual or environmental conditions. For example, in theory the renovation of a sailboat compartment might involve four to five tasks that can be done independently. However, since space allows only one person to work at one time, all tasks have to be performed sequentially.

36. A shortage of programmers to write software is an example of a(n) _____ type of resource constraint.

<u>people</u>

This is the most obvious and important project resource. Human resources are usually classified by the skills they bring to the project—for example, programmer, mechanical engineer, welder, inspector, marketing director, or supervisor. In rare cases some skills are interchangeable, but usually with a loss of productivity. The many differing skills of human resources add to the complexity of scheduling projects.

37. The shortage of computer chips to produce a circuit board is an example of a(n) _____ type of resource constraint.

<u>materials</u>

Material availability and shortages have been blamed for the delay of many projects. When it is known that a lack of availability of materials is important and probable, materials should be included in the project network plan and schedule.

38. If three copiers are needed to produce a final report on time and only two are available, the project is facing a(n) _____ type of resource constraint.

equipment

The most common oversight is to assume the resource pool is more than adequate for the project. Equipment is often overlooked as a constraint.

39. Resource dependency takes priority over the technological dependency but does not violate _____ dependencies.

technical

Resource dependency takes priority over the technological dependency but does not violate technical dependencies; that is, hiring a band, decorating the hall, and purchasing refreshments may have to be done in sequence rather than at the same time, but they all must be complete before the reception.

40. In order that the new product is on the shelf for the Christmas buying season, the development of the new product would be classified as a(n) _____ -constrained project.

time

A time-constrained project is one that must be completed by an imposed date. If required, resources can be added to ensure the project is completed by a specific date. Although time is the critical factor, resource usage should be no more than is necessary and sufficient.

41. Beth has two engineers assigned to her project and does not have access to more even if the result means extending the completion date on her project. She is managing a(n) _____ - constrained project.

resource

A resource-constrained project is one that assumes the level of resources available cannot be exceeded. If the resources are inadequate, it will be acceptable to delay the project, but as little as possible.

42. All leveling techniques delay noncritical activities by using _____ to reduce peak demand.

positive slack

All leveling techniques delay noncritical activities by using positive slack to reduce peak demand and fill in the valleys for the resources.

43. When scheduling activities in a resource-constrained project, typically the activity scheduled first has the _____ amount of slack.

least

In resource-constrained scheduling activities that were once scheduled to be completed at the same time now may have to be scheduled in sequence. The activity with the least amount of slack will be scheduled first. If the activities have the same amount of slack the activity with the shortest duration will be scheduled first. If the activities have the same duration the activity with the lowest activity identification number will be scheduled first.

44. Since resource leveling or smoothing delays noncritical activities, a common result is an increase in network _____.

sensitivity

As noncritical activities are delayed, slack levels are reduced which increases the number of critical and noncritical activities. This results in an increase in network sensitivity.

45. When the work in an activity is interrupted to work on another activity and is then resumed at a later point in time, it is called _____.

splitting or multitasking

A planner splits the continuous work included in an activity by interrupting the work and sending the resource to another activity for a period of time and then having the resource resume work on the original activity.

46. In scheduling resource-constrained projects, _____ are typically used rather than optimum mathematical solutions.

heuristics or rules of thumb

A few researchers have demonstrated optimum mathematical solutions to the resource allocation problem but only for small networks and very few resource types. The massive data requirements for larger problems make pure mathematical solutions (e.g., linear programming) impractical. An alternative approach to the problem has been the use of heuristics (rules of thumb) to solve large combinatorial problems.

47. When classifying projects, _____ constrained means that project duration is fixed and resources are flexible.

time

In scheduling terms, time constrained means time (project duration) is fixed and resources are flexible.

48. When classifying projects, _____ constrained means that a specific resource is fixed and the duration of the project is flexible.

resource

In scheduling terms, resource constrained means resources are fixed and time is flexible.

49. Startup and shutdown costs are major considerations when using the _____ scheduling technique.

splitting or multitasking

The most common error is to interrupt "people work," where there are high conceptual startup and shutdown costs.

50. After resource leveling or smoothing one goal is that the amount of resources needed over the life of the project will be _____.

reduced

The three goals of smoothing are to reduce the peak demand for resources, to reduce the resources needed over the life of the project and to reduce the fluctuations in resource demand.

51. Many companies are _____ project work to contractors and consultants as a means of dealing with the peaks and valleys of resource allocation among projects.

outsourcing

Many companies are using outsourcing as a means for dealing with their resource allocation problems. In some cases, a company will reduce the number of projects they have to manage internally to only core projects and outsource noncritical projects to contractors and consulting firms. In other cases, specific segments of projects are outsourced to overcome resource deficiencies and scheduling problems.

52. When a project is classified as resource-constrained and a resource constraint exists, the project duration is typically _____.

extended

If resources are not adequate to meet peak demands and there is no access to further resources, activities might take longer than initially planned. Furthermore, activities that technically could be done at the same time will have to be done one after the other if the same resources are required for each. This will delay the completion date.

53. In reality resource allocation generally occurs in a(n) _____ environment where the demands of one project have to be reconciled with the needs of other projects.

multiproject

In reality resource allocation generally occurs in a multiproject environment where the demands of one project have to be reconciled with the needs of other projects. Organizations must develop and manage systems for efficiently allocating and scheduling resources across several projects with different priorities, resource requirements, sets of activities, and risks.

54. Without a _____ budget a good project schedule and cost control are impossible.

time-phased

A budget alone does not measure how much work was accomplished for the money spent. Hence, without time-phasing cost to match your project schedule, it is impossible to have reliable information for control purposes.

55. A project cost baseline is also called _____.

planned value (PV)

The outcome of these budget allocations is the project cost baseline (also called planned value—PV), which is used to determine cost and schedule variances as the project is implemented.

56. The fact that you must pour foundation before you frame the house and that you have to frame the house before you can put on the roof demonstrates scheduling constraints.

FALSE

The start and sequence of activities have been based solely on technical or logical considerations. For example, a project network for framing a house might show three activities in a sequence: (1) pour foundation, (2) build frame, and (3) cover roof.

57. Too many parallel activities for one individual is an example of a resource constraint.

TRUE

If one person must perform all activities, the resource constraint requires the activities be performed in sequence or series.

58.   The level of resources each activity will need to be completed in the given amount of time has been estimated; therefore, there are no resource constraints.

<u>FALSE</u>

The time estimates for the work packages and network times were made independently with the implicit assumption that resources would be available. This may or may not be the case.

59.   Resource leveling or smoothing is only used on projects which are resource constrained.

<u>FALSE</u>

Practitioners have attacked the utilization problem using resource leveling techniques that balance or smooth demand for a resource. Basically, all leveling techniques delay noncritical activities by using positive slack to reduce peak demand and fill in the valleys for the resources. Resource leveling or smoothing can be used for both resource-constrained and time-constrained projects.

60.   Resource bottlenecks are one of the three more common problems encountered in managing multiproject resource schedules.

<u>TRUE</u>

Overall schedule slippage (delays in one project causing delays in other projects), inefficient resource utilization, and resource bottlenecks are all common problems associated with scheduling multiproject resources.

61. The inability to fit more than two earth movers on a construction site at the same time when more are needed to complete the activity on time is an example of a physical constraint.

<u>TRUE</u>

In rare situations, physical factors cause activities that would normally occur in parallel to be constrained by contractual or environmental conditions.

62. In a resource-constrained project, the completion date is most likely to change.

<u>TRUE</u>

If resources are not adequate to meet peak demands and there is no access to further resources, activities might take longer than initially planned. Furthermore, activities that technically could be done at the same time will have to be done one after the other if the same resources are required for each. This will delay the completion date.

63. Having too few programmers and too many engineers is an example of a people resource constraint.

<u>TRUE</u>

Finding people with certain differing skills adds to the complexity of scheduling projects. Human or people resource constraints are the most common resource constraint.

64. If a project needs one earth mover six months from now in order to complete one activity, and the organization has four such machines, there is no equipment resource constraint.

FALSE

The most common oversight is to assume the resource pool is more than adequate for the project. For example, if a project needs one earth-moving tractor six months from now and the organization owns four, it is common to assume the resource will not delay the pending project. However, when the earth-moving tractor is due on-site in six months, all four machines in the pool might be occupied on other projects.

65. A lack of readily available engineers is a technical constraint.

FALSE

When the number of people and/or equipment is not adequate to meet peak demand requirements and it is impossible to obtain more, the project manager faces a resource-constrained problem.

66. Resource dependency takes priority over technological dependency but it does not violate it.

TRUE

Resource dependency takes priority over the technological dependency but does not violate a technical dependency; that is, hiring a band, decorating the hall, and purchasing refreshments may have to be done in sequence rather than at the same time, but they all must be complete before the reception.

67. To determine if a project is time-constrained or resource-constrained you would consult the project priority matrix.

TRUE

Project managers need to consult their priority matrix to determine which case fits their project.

68. Sequential activities hold just as much potential for resource conflicts as parallel activities.

FALSE

A network planner may assume adequate resources and show activities occurring in parallel. However, parallel activities hold more potential for resource conflicts than sequential activities.

69. All leveling techniques delay noncritical activities by using positive slack to smooth out the resource requirements.

TRUE

All leveling techniques delay noncritical activities by using positive slack to reduce peak demand and fill in the valleys for the resources.

70. Since resource leveling or smoothing delays noncritical activities, a common result is a decrease in network sensitivity.

FALSE

As noncritical activities are delayed, slack levels are reduced which increases the number of critical and noncritical activities. This results in an increase in network sensitivity.

71. Scheduling projects classified as resource-constrained focuses on completing the project as soon as possible under the given resource constraints.

    <u>TRUE</u>

    When the number of people and/or equipment is not adequate to meet peak demand requirements and it is impossible to obtain more, the project manager faces a resource-constrained problem. Something has to give. The trick is to prioritize and allocate resources to minimize project delay without exceeding the resource limit or altering the technical network relationships.

    AACSB: Reflective Thinking
    Accessibility: Keyboard Navigation
    Blooms: Understand
    Larson - Chapter 08 #71
    Learning Objective: Resource Allocation Methods
    Level of Difficulty: 3 Hard

72. When resource constraints are added to technical constraints the original project network may change as well as the completion date.

    <u>TRUE</u>

    When resource constraints are added to technical constraints the original project network may change as well as the completion date. The traditional critical path concept of sequential activities from the start to end of the project is no longer meaningful.

    AACSB: Reflective Thinking
    Accessibility: Keyboard Navigation
    Blooms: Understand
    Larson - Chapter 08 #72
    Learning Objective: Resource Allocation Methods
    Level of Difficulty: 2 Medium

73. When scheduling activities in a resource-constrained project typically the activity scheduled first has the most amount of slack.

    <u>FALSE</u>

    In resource-constrained scheduling, activities that were once scheduled to be completed at the same time now may have to be scheduled in sequence. The activity with the least amount of slack will be scheduled first. If the activities have the same amount of slack the activity with the shortest duration will be scheduled first. If the activities have the same duration the activity with the lowest activity identification number will be scheduled first.

    AACSB: Reflective Thinking
    Accessibility: Keyboard Navigation
    Blooms: Understand
    Larson - Chapter 08 #73
    Learning Objective: Resource Allocation Methods
    Level of Difficulty: 2 Medium

74. A project budget report is showing our project as spending $35,000 against a budgeted amount of $40,000. We can assume that everything is going as planned and that we are under budget.

FALSE

There is no way to be certain how much of the physical work has been accomplished for the money we have spent.

75. Splitting is a scheduling technique used to get a better schedule or better resource utilization and should be used without hesitation.

FALSE

Splitting tasks is a scheduling technique used to get a better project schedule and/or to increase resource utilization. However, planners should avoid the use of splitting as much as possible, except in situations where splitting costs are known to be small or when there is no alternative for resolving the resource problem.

76. Without a time-phased budget a good project schedule and cost control are impossible.

TRUE

Without a time-phased budget a good project schedule and cost control are impossible and we are not able to measure how much work was accomplished for the money spent.

77. If resources are truly limited and activity time estimates are accurate, the resource-constrained schedule will materialize as the project is implemented, not the time-constrained schedule.

TRUE

If resources are truly limited and activity time estimates are accurate, the resource-constrained schedule will materialize as the project is implemented, not the time-constrained schedule. In other words if there are not enough resources to complete an activity, you should know now because the problem will not solve itself. Failure to schedule limited resources can lead to serious problems for the project managers.

78. Project managers should always assign the best people to the most difficult tasks.

FALSE

There is a natural tendency to assign the best people the most difficult tasks. Project managers need to be careful not to overdo this. Over time these people may grow to resent the fact that they are always given the toughest assignments. At the same time, less experienced participants may resent the fact that they are never given the opportunity to expand their skill/knowledge base.

79. Identify and briefly describe the three types of project constraints that could impact or change the structure of project network.

Answer will vary

Feedback: (1) Technical (logic)-the sequence that activities must be performed; (2) Resource-the absence of required people, materials, equipment, or working capital; (3) Physical-limitations based on space or environmental limits.

80.   What is the difference in project goals when using resource leveling on time-constrained projects and using it on resource-constrained projects?

Answer will vary

Feedback: In time-constrained projects the goal is to smooth out the peaks and valleys and thus improve the utilization. In resource-constrained projects the goal is to achieve the shortest project duration given a limited supply of resources.

81.   Why is a schedule not a schedule until resources have been assigned? Provide a real life example that illustrates your explanation.

Answer will vary

Feedback: Before resources are assigned it is assumed that there will be adequate resources available once the project is implemented. Without assigning resources before implementation, resource constraints will be recognized during implementation and could have negative impacts on the project's deadline.

82.   Identify and give an example of the three types of resource constraints.

Answer will vary

Feedback: (1) People-by skill classification (engineer, programmer, salesperson); (2) Materials-paint, data, parts, etc.; (3) Equipment-computers, earth movers, office space.

83.   Identify and briefly describe two ways to classify projects with scheduling problems.

Answer will vary

Feedback: (1) Time-constrained-the end date is fixed and needed resources are available; (2) Resource-constrained-the resources are fixed and the end date is flexible.

84.   List and briefly describe the disadvantages of resource leveling or smoothing.

Answer will vary

Feedback: (1) Loss of flexibility; (2) Increased risk of project delay; (3) More critical or near critical activities.

85.   What are the impacts of resource-constrained scheduling?

Answer will vary

Feedback: Like leveling schedules, the limited resource schedule usually reduces slack, reduces flexibility by using slack to ensure delay is minimized, and increases the number of critical and near-critical activities. Since resources are not enough to accommodate the initial schedule, project duration is extended.

86. After constructing a project network based on technical constraints and reviewing resource requirements throughout the project, Anne realizes many peaks and valleys in regard to resource usage. At one point Anne needs 6 developers, but top management has made it very clear that she will not have access to more than 4. Classify Anne's project in terms of her scheduling problem. What are her options at this point?

Answer will vary

Feedback: Anne's project is classified as a resource-constrained project. Anne can attempt the resource leveling or smoothing method. This may reduce the peak demand for resources, the fluctuations in resource demand, and it may even reduce the resources needed over the life of the project; however, if there is not enough slack to absorb the resource demand, Anne will have to use resource-constrained scheduling. With this method, the length of her project may be extended.

87. When using resource-constrained scheduling, activities that were once scheduled to be completed at the same time now may have to be scheduled in sequence. What are the "rules of thumb" or heuristics that need to be followed to determine which activity is scheduled first?

Answer will vary

Feedback: The first priority is to allocate resources to the activity with the least amount of slack, usually an activity on the critical path. If more than one activity has the same amount of slack, then select the activity with the smallest duration. If more than one activity has the same slack and the same duration, then select the activity that has the lowest identification number.

88.   Why should project managers be cautious about using the splitting scheduling technique?

        Answer will vary

        Feedback: The splitting technique is where an activity is interrupted and the resources are applied to another activity. The potential problems are in the additional shutdown and startup costs which are added as one moves from activity to activity prior to completing the original activity.

89.   Why is it important to make efforts to identify resource scheduling problems before the project is implemented?

        Answer will vary

        Feedback: Failing to schedule limited resources can be costly and project delays will manifest themselves midway through the project when quick corrective action is difficult. Responding to scheduling issues early allows the project manager to establish a completion date and to prepare time-phased work package budgets.

90.   Why is it critical to form a time-phased budget?

        Answer will vary

        Feedback: Without a time-phased budget it is difficult to measure how much work has been done with the money spent. Without time phasing cost to match your project schedule, it is impossible to have reliable information for control purposes.

91. If your project has spent $50,000 versus a budget of $45,000 and it is a week ahead of schedule, is it a certainty that your project is doing well? Explain why or why not.

Answer will vary

Feedback: Not necessarily. You need more information to draw that conclusion. You do not know what work has been accomplished for the money spent.

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