Chapter Questions

Question 1

- Give at least 10 examples of resources.

- General categories of resources include: people, equipment, machines, tools, facilities and space.

- Example for construction project: builder, inspector, bank personnel, building materials, landscaper, architect, blue print, permits, sub-contractors (concrete, electricity, dry wall, painting, flooring, plumbing, cabinet and shelf installation)

Question 2

- Think about a project that you are currently working on or have worked on. List all of the resources used in this project.

- Responses should include more specific descriptions than people, machines, equipment, tools, facilities, and space.

Question 3

- Discuss why resources need to be considered when developing a schedule.

- Resources need to be considered when developing a schedule because, if sufficient resources are not available, some activities may have to be rescheduled for a later time when resources are available.

- This can push back the project completion time.

Question 4

- Describe how resources can be considered when creating a network diagram.

- If three resources are needed for three activities and available simultaneously, the three activities can be performed simultaneously.
- However, if three resources are needed but only available sequentially, the three activities must be done sequentially.
- The diagram should be drawn to reflect these relationships.

Question 5

- What are technical constraints? Give some examples.

- Technical constraints are activities that must be performed in a certain order to meet the project objective.
- For example, three house-building activities—build foundation, build frame, and put on roof—must be performed in that sequence

Question 6

- What are resource constraints? Give some examples.

- Resource constraints are resources that are limited and available in a particular timeframe.
- For example, if three rooms of a house need to be painted, but only one painter is available, the project is constrained by the "personnel" resource.

Question 7

- Describe what is meant by resource leveling or smoothing.
- Why is it used?
- When is it used?

- Resource leveling, or smoothing, is a method for developing a schedule that attempts to minimize the fluctuations in requirements for resources.
- This method levels the resources so that they are applied as uniformly as possible without extending the project schedule beyond the required completion time.
- It is used when variation in resource requirements exists between different activities.

Question 8

- Does resource leveling keep a project on schedule? If so, how?

- Resource leveling keeps the project on schedule because activities are delayed only to the point where all their positive slack is used up.

- Any further delays would cause the project to extend beyond the project due date.

Question 9

- Describe what is meant by resource-limited scheduling.
- Why is it used?
- When is it used?

- Resource-limited scheduling is a method for developing the shortest schedule when the quantity of available resources is fixed and cannot be exceeded.

- This method will extend the project completion time if necessary in order to keep within the resource limits.
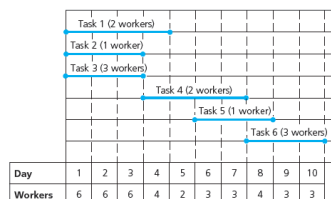
Question 10

- Does resource-limited scheduling keep a project on schedule? If so, how?

- Resource-limited scheduling does not necessarily keep a project on schedule.
- It may extend the schedule in order to keep within the resource limits.

Question 11

- Using the following figure, perform resource leveling. Assume that each task can be performed independently of the other tasks.

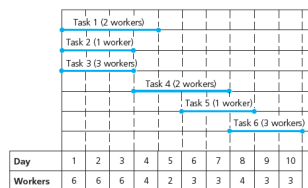| Task	1	2	3	4	5	6	7	8	9	10
Task 1 (2 workers)										
Task 2 (1 worker)										
Task 3 (3 workers)										
Task 4 (2 workers)										
Task 5 (1 worker)										
Task 6 (3 workers)										
Day	1	2	3	4	5	6	7	8	9	10
Workers	6	6	6	4	2	3	3	4	3	3

- One possible solution would be:
    - Step 1 – Delay Task 1 to start after Task 2 is complete.
    - Step 2 – Delay Task 5 to start after Task 4 is complete.
- The new dates would be:
    - Task 2: Days 1 – 3 (1 worker)
    - Task 3: Days 1 – 3 (3 workers)
    - Task 1: Days 4 – 7 (2 workers)
    - Task 4: Days 4 – 7 (2 workers)
    - Task 5: Days 8 – 10 (1 worker)
    - Task 6: Days 8 – 10 (3 workers)
- This would allow 4 workers to be busy at all times and would not extend the completion time of the project.

Question 12

- Using the figure in question 11, perform resource-limited scheduling. Assume that you have only three workers available at any given time. What is the new completion date for the project?

Task 1 (2 workers)										
Task 2 (1 worker)										
Task 3 (3 workers)										
			Task 4 (2 workers)							
					Task 5 (1 worker)					
						Task 6 (3 workers)				
Day	1	2	3	4	5	6	7	8	9	10
Workers	6	6	6	4	2	3	3	4	3	3

- One possible solution would be:
  - Step 1 – Delay Task 1 to start after Task 3 is complete; delay Task 2 to start after Task 3 is complete.
  - Step 2 – Delay Task 1 to start after Task 2 is complete.
  - Step 3 – Delay Task 5 to start after Task 2 is complete.
  - Step 4 – Delay Task 1 to start after Task 4 is complete.
  - Step 5 – Delay Task 6 to start after Task 1 is complete.
- The new dates would be:
  - Task 3: Days 1 – 3 (3 workers)
  - Task 2: Days 4 – 6 (1 worker)
  - Task 4: Days 4 – 7 (2 workers)
  - Task 5: Days 7 – 9 (1 worker)
  - Task 1: Days 8 – 11 (2 workers)
  - Task 6: Days 12 – 14 (3 workers)
- The project completion date goes from day 10 to day 14.