

Name: _____

ID: _____

AEC 258 Spring 2019

Assignment 2 (50 points)

Due date: 3/3/2019

1. What is the primary concern of contractors when contract provisions address the issue of the ownership of float? (2.5 points)

The primary concern of contractors is that they will want to know if the float is owned by the contractor or by the owner. Contractors have their freedom of managing the project greatly diminished if the owner owns any of the float. When the ownership of float rests with the owner, owner delays and owner changes often do not include compensation in the form of time extensions when only noncritical activities are impacted. The consequences of such provisions can therefore be quite severe.

2. What defines the start date and what defines the finish date of a contract, with the bracketed time being the project duration? (2.5 points)

The start date is generally specifically noted in the Notice to Proceed. The start date may be specifically given or it may be stated in terms of the date of the Notice to Proceed, e. g., ten days from the date of receipt of the notice to proceed. In some contracts, the start date is the day the notice to proceed is received by the contractor.

The finish date of a contract (defining when no liquidated damages will be assessed against the contractor) generally occurs at the point of substantial completion. Substantial completion is the point in a project at which the owner is able to occupy the facility being constructed and use it for its intended purpose. Only minor items of work may remain at the time of substantial completion. These deficiencies are commonly itemized in the punch list.

3. What types of projects tend to be scheduled in terms of working days? Why? (2.5 points)

Projects that are most susceptible to the elements (namely the weather) tend to be scheduled in terms of working days. Public projects tend to use working days.

Examples would generally include the construction of engineering projects (those specifically including the services of an engineer but not an architect) such as highways, bridges, dams, airport runways, canals, and utility installations. The specific durations of projects conducted in the elements are difficult to quantify in calendar days. Rainfall at the very beginning of a project can stall the entire work effort. In fact, large amounts of rainfall at any time during the construction of engineering projects will generally have a significant impact on the construction effort. This problem can be best addressed by defining construction duration in terms of working days. This is regarded as the most equitable way to define duration when weather can hamper progress. The use of working days permits the duration to be defined in terms that are fair to the contractor. If calendar days were used to define duration on such projects, the owner would be faced with numerous requests for time extensions. Requesting time extensions can be adversarial and this would occur far too often on engineering projects defined in calendar days.

On the other hand, building projects are generally only severely impacted by adverse weather in the early stages of construction. In some regions of the country, building projects are begun in the spring months when weather conditions are most conducive to construction work. Once a building is "dried in", the elements can still compromise the work effort, but progress can generally still be made.

4. What are liquidated damages? (2.5 points)

Liquidated damages provision in the contract is an agreement about the cost to the contractor for each day that the project extends beyond the contract time. If the contract time is stated as being 180 days, the contract may state that the contractor must pay \$1,000 per day for each day the project delivery extends beyond 180 days. This amount is called liquidated damages. Liquidated damages provide compensation to the owner for financial and other losses resulting from delayed completion.

5. What distinguishes the last periodic payment from the final payment made to the contractor on most construction projects? (2.5 points)

The last periodic payment is made after a project has reached substantial completion. After the last periodic payment is made, the owner still will be withholding the retainage. The retainage, often as much as 10% of the contract amount, is released at the point of final completion in the form of the final payment. The punch list typically separates the last periodic payment and the final payment.

6. What are the primary grounds on which the contractor can typically terminate the contract? (2.5 points)

The contractor can terminate a contract when the owner fails to make payments to the contractor that have been earned and are due. This is the only universal reason for which the contractor can terminate the contract. Another reason for termination by the contractor would include a condition whereby the construction effort is stopped for a stipulated period of time by a court or other public authority.

7. Tiles (12" * 12") can be installed at a rate of 35 per worker hour. A floor area of 30' * 50' is to be covered with these tiles. If two workers are assigned to this task, what duration should be assigned to this activity? (5 points)

Number of tiles per square foot = $1 \text{ sf} / (12'' * 12'') = 1 \text{ tile per sf}$

Total number of tiles = $30' * 50' * 1 \text{ tile per sf} = 1,500 \text{ tiles}$

Worker hours to install the tiles = $1,500 \text{ tiles} / 35 \text{ tiles per worker hour} = 42.86 \text{ hours for one worker}$

Time to install tiles for 2 workers = $42.86 / 2 = 21.43 \text{ hours per crew}$

Assuming 8-hour work days are used,

Time in days = $21.43 \text{ hours} / 8 = 2.67 \text{ days}$, round up to 3 days.

8. What is resource allocation? Why do we need to do resource allocation? How to do resource allocation? (5 points)

What: Resource allocation is the allocation of resources that are limited.

Why: Limited resources impact project schedule. We need to consider the limitations imposed by resources when we make project schedule.

How: Resource allocation uses the precedence diagram as the basis for the solution. After completing the network calculation, resources for each activity on each day are listed. Compare the sum of resources for each day with the daily limits for resources, and adjust the schedule if necessary.

9. What is resource leveling? Why do we need to do resource leveling? How to do resource leveling? (5 points)

What: Resource leveling is the efficient use of resources when project duration cannot be altered.

Why: Resource leveling can help to reduce the maximum demands for a given resource on any given day and it helps avoid or minimize the need for hiring short-term workers.

How: After completing the network calculation, activities are put into a bar chart by their early start dates. Critical path activities are fixed in the bar chart. Identify most unlevel days and adjust activities within the range to reduce the resources needed for the peak days.

10. What are the differences between series method and parallel method in resource allocation?

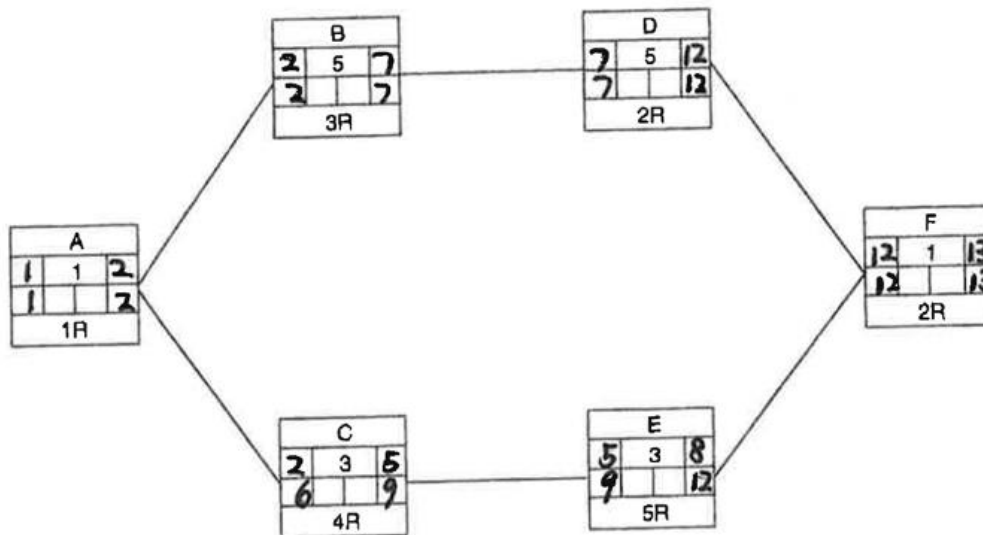
What is the order of priorities in series method? (5 points)

Differences: The series method assumes that once an activity has been started, it cannot be interrupted; the parallel method permits activities to be interrupted.

The order of priorities in the series method is:

1. activity in progress
2. earliest late start
3. least total float
4. largest number of resources

11. Solve the following resource leveling problem. Determine the maximum resources needed for any given day after resource leveling. (5 points)



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A/1	B/3	B/3	B/3	B/3	B/3	D/2	D/2	D/2	D/2	D/2	F/2					
	C/4	C/4	C/4	E/5	E/5	E/5										
1	7	7	7	8	8	7	2	2	2	2	2					
					4/4	4/4	4/4	E/5	E/5	E/5						
	1	3	3	3	3	7	6	6	7	7	2					

The maximum resources needed for any given day after leveling are 7 resources.

Activity

ES	dur	EF
2	1	3
2	1	3
resource		

Activity A

1	1	2
1	0	2

Activity B

2	2	4
2	0	4
3C, 2L		

Activity C

4	4	8
4	0	8
1C, 3L		

Activity D

2	3	5
1	1	7

Activity E

2	2	4
1	1	4
2C		

Activity F

8	3	11
8	0	11
2L		

Activity G

11	2	13
11	0	13
2C, 3L		

Activity H

4	3	7
1	1	7
1C, 1L		

Activity I

2	6	8
1	1	9
1L		

Activity J

5	2	7
1	1	9

Activity K

13	6	19
13	0	19
1C, 2L		

Activity L

7	2	9
1	1	9
2C, 1L		

Activity M

1	1	20
1	0	20
1C		

[illegible]