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EXAM PREP

A Basic Guide to Activity-On-Node and Critical Path Method

- Concepts and Definitions explained with examples
- Detailed step-by-step solved examples
- Practice exercises with detailed solutions

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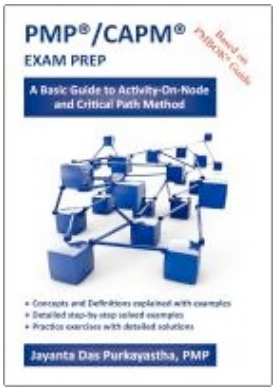

A thorough and in-depth preparation guide for PMP® and CAPM® exams covering Precedence Diagramming Method/Activity-On-Node concepts and their analysis using Critical Path Method. This guide explains the concepts with illustrated examples with emphasis on special situations. Explanation of concepts through stepwise solved examples will provide readers hands-on ability for their application. This guide will serve as a launch pad for advanced study in this area beyond the requirements of the two exams.

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"I am not sure about project scope but we have microscopes and telescopes."

Understanding AONs and how CPM can be used to analyze them, covers an important aspect of time management for projects. While there exists software that can be used to create AONs and perform CPM, as a project management professional it is important to know the basic concepts, techniques and how they are applied in order to comprehend and interpret results. Such understanding becomes even more critical when one seeks to create and analyze what-if scenarios. Determining the appropriate and efficient organization of activities including minimizing critical activities and ensuring no-occurrence of negative float or negative total float is an important part of schedule management.

It must also be understood that network diagrams are never static. They can change as project conditions, constraints and other factors change. Project network diagrams can evolve in cases where Rolling Wave Planning is used especially when all project requirements or details are available during the planning phase. Below are benefits that AON and CPM provide for project managers in order to actively, effectively and efficiently manage project schedules.

Knowledge and understanding of the advantages that Activity-On-Node network diagrams bring, along with the use of critical path analysis, is significant in ensuring that they are actually used in management of projects.

Benefits of Using AON and CPM

1. AON provides graphical representation of activity sequence and dependency making it convenient to plan and manage schedule activities. Visual representation makes it easier to communicate the project's activities, their sequence and time attributes.
2. The minimum amount of time required to complete the project can be easily and objectively determined from the network diagram given that the duration of each activity is provided or estimated.
3. Critical Path analysis of a network diagram allows for the identification of critical, near-critical and non-critical activities in the project. Especially for critical activities, it will be easier to determine if there is (are) any threat(s) to the project's completion date.
4. Impact assessments on project schedule can be made for different what-if scenarios. For example, different scenarios can be evaluated to see if

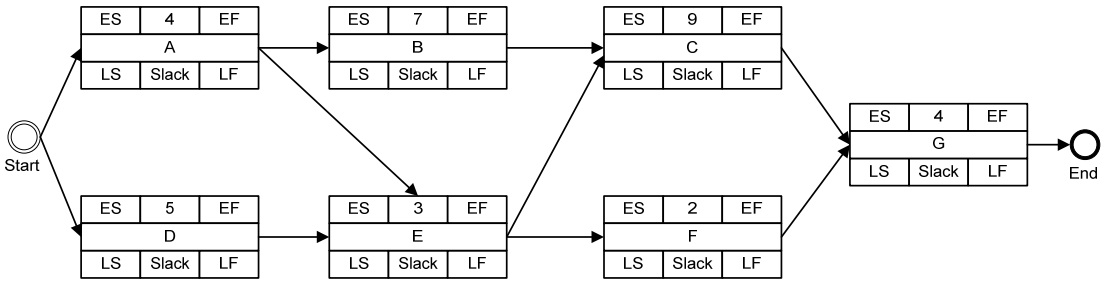
a planned project schedule can be compressed to meet a customer imposed completion date which is earlier than the planned completion date.

5. AONs can be very helpful in tracking project performance with regards to schedule. For instance, delay to an identified critical activity can be immediately identified, and steps can be taken to reduce any threat to the project's completion date.
6. For each activity, the early (start or finish) and late (start or finish) dates can be determined allowing for better schedule management at individual activity level.
7. AONs accommodate all types of logical relationships between activities—FS, FF, SS, SF—including Lags and Leads unlike AOAs which can only use FS (Taylor, 2007).

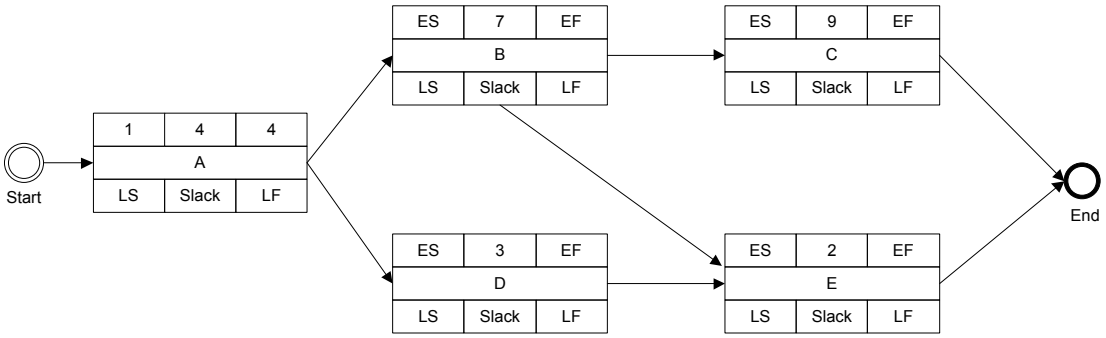
It is not surprising that no tools and techniques are without disadvantage(s) and limitation(s). One of the frequently cited disadvantages of AONs is the sheer difficulty of constructing it for large complex projects with very large number of activities and dependencies. Hard copy representation of such large network diagrams can be very unwieldy. In addition, use of critical path method on large network diagrams can be cumbersome. Use of software programs that handle creation of network diagrams and critical path analysis can greatly assist in mitigating this disadvantage. The limitation of CPM, which one must have noticed already, is that it relies on the duration of each activity in the network diagram. So, it assumes that the duration of each activity can be relied upon. Therefore, the efficacy of CPM depends heavily on this assumption.

Practice Exercises

1. For the network diagram below, determine the following:
   (a) Critical Path
   (b) ES, EF, LS, LF and Float for each activity



2. For the network diagram below, determine the following:
   (a) Critical Path
   (b) ES, EF, LS, LF and Float for each activity



3.

Activity	***Predecessor(s)***	***Duration (days)***
A	Start	4
B	A, C, F	7
C	Start	3
D	Start	4
E	B, F	2
F	C	4
G	D, F	9
H	F, G	7
End	E, H	0

Based on the activity details given above, do the following:

(a) Construct the AON.
(b) Determine Critical Path
(c) Determine ES, EF, LS, LF and Float for each activity

4. An activity in a network diagram has an Early Start (ES) of 3 days, Duration of 6 days and Late Finish (LF) of 12 days. What is activity's float?

(a) 2 days
(b) 4 days
(c) 3 days
(d) 5 days

5. An activity in a network diagram has Duration of 5 days and Early Finish (EF) of 11 days. What is activity's Early Start (ES)?

(a) 7 days
(b) 4 days
(c) 8 days
(d) 3 days

6. An activity in a network diagram has Duration of 5 days and Late Finish (LF) of 11 days. What is activity's Late Start (LS)?

(a) 7 days
(b) 4 days
(c) 8 days
(d) 3 days

7. An activity in a network diagram has Duration of 5 days and Late Start (LS) of 3 days. What is activity's Late Finish (LF)?

(a) 7 days
(b) 4 days
(c) 8 days
(d) 3 days

8. A landscaper must complete preparing the flower bed before the flower plants can be planted. The relationship between "prepare flower bed" activity and "plant flower plants" can be best described as:

(a) Start-Finish (SF)
(b) Finish-Start (FS)
(c) Finish-Finish (FF)
(d) Start-Start (SS)

9. A homeowner plans to sealcoat the driveway of his house. He has already purchased the required quantity of driveway seal coater and the weather would be right to do it. The seal coating material dries quickly and therefore, must be spread without delay. He has already washed and cleaned his driveway, and is prepared to start sealcoating the driveway. Next day, he knows he has to primarily perform two activities—pour the seal coater, and spread the sealcoater. The relationship between the predecessor activity to pour the sealcoater and the successor activity to spread the seal coater can be best described as:
    (a) Start-Finish (SF)
    (b) Finish-Start (FS)
    (c) Finish-Finish (FF)
    (d) Start-Start (SS)

10. At a trade show, two teams were employed to set up electric connection and lighting for each booth. One team laid out the electric cables and connection while the other team set up the lighting and made sure it was set up as per specifications. Both teams must ensure that they have fully completed before the scheduled start date. The relationship between the two teams activities can be best described as:
    (a) Start-Finish (SF)
    (b) Finish-Start (FS)
    (c) Finish-Finish (FF)
    (d) Start-Start (SS)

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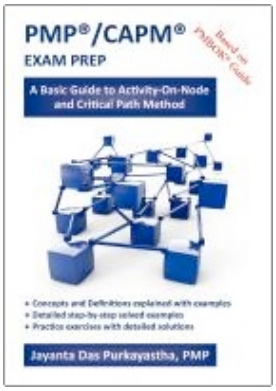

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