Pert Cpm Example Problems With Solution

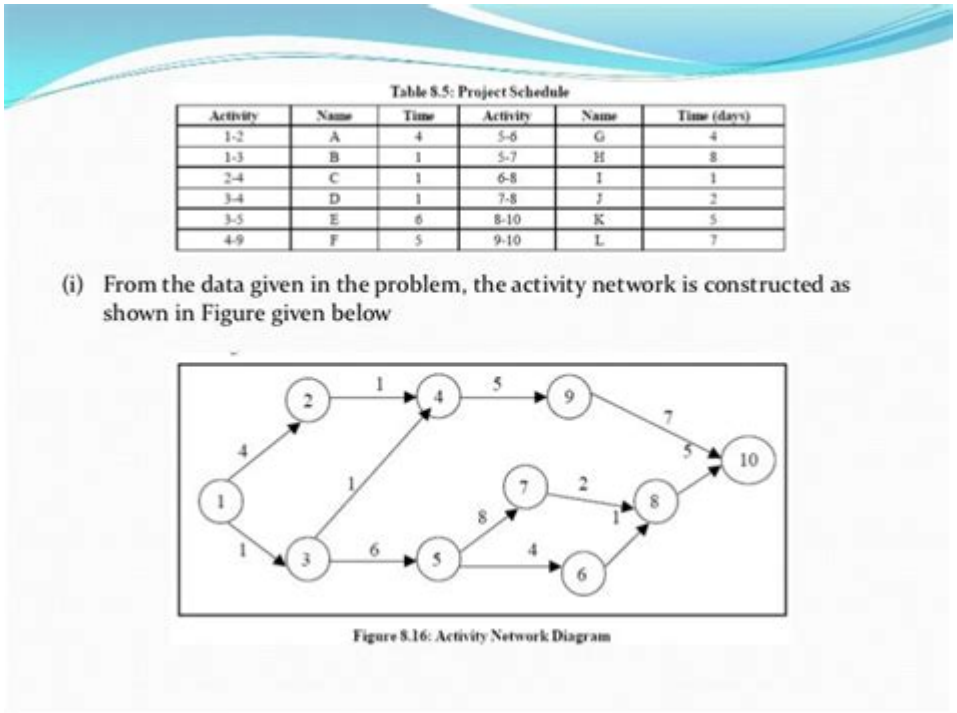

Table 8.5: Project Schedule

Activity	Name	Time	Activity	Name	Time (days)
1-2	A	4	5-6	G	4
1-3	B	1	5-7	H	8
2-4	C	1	6-8	I	1
3-4	D	1	7-8	J	2
3-5	E	6	8-10	K	5
4-9	F	5	9-10	L	7

(i) From the data given in the problem, the activity network is constructed as shown in Figure given below

Figure 8.16: Activity Network Diagram

PERT CPM Example Problems with Solution are critical for project managers and teams looking to optimize their project planning and scheduling. Program Evaluation Review Technique (PERT) and Critical Path Method (CPM) are two essential project management tools used to analyze and represent the tasks involved in a project. While PERT is primarily used for projects where time estimates are uncertain, CPM is more appropriate for projects where tasks and durations are fixed. In this article, we will explore several example problems that illustrate the application of PERT and CPM, along with their solutions to help you better understand these techniques.

Understanding PERT and CPM

What is PERT?

PERT stands for Program Evaluation Review Technique. It is a statistical tool used in project management that helps to analyze and represent the tasks involved in completing a project. PERT is particularly useful for projects where the time required to complete different tasks is uncertain. The main components of PERT are:

- Events: Milestones or points in time during the project.
- Activities: Tasks that need to be completed to move from one event to another.
- Time Estimates: The time required to complete each activity, typically represented as:
- Optimistic time (O): The minimum possible time required to complete an activity.
- Pessimistic time (P): The maximum possible time required to complete an activity.
- Most likely time (M): The best estimate of the time required to complete an activity.

Using these estimates, the expected time for each activity can be calculated using the formula:

$$
TE = \frac{O + 4M + P}{6}
$$

where TE is the expected time.

What is CPM?

The Critical Path Method (CPM) is a project management technique used to determine the longest stretch of dependent activities and measure the time required to complete them from start to finish. CPM is beneficial for identifying critical tasks that cannot be delayed without affecting the overall project timeline. The main components of CPM include:

- Activities: Tasks that need to be completed.
- Dependencies: Relationships between tasks, indicating which tasks must be completed before others can begin.
- Duration: The time required to complete each activity.

The critical path is the sequence of activities that represents the longest duration through a project, which determines the shortest possible project duration.

Example Problem 1: PERT Analysis

Problem Statement

A project consists of three activities: A, B, and C, with the following time estimates:

- Activity A: O = 2 days, M = 4 days, P = 6 days
- Activity B: O = 1 day, M = 2 days, P = 3 days
- Activity C: O = 3 days, M = 5 days, P = 7 days

Determine the expected time for each activity and the overall project duration if activities A, B, and C are independent.

Solution Steps

1. Calculate Expected Time for Each Activity:
- For Activity A:

$$
TE_A = \frac{2 + 4 \times 4 + 6}{6} = \frac{2 + 16 + 6}{6} = \frac{24}{6} = 4 \text{ days}
$$

- For Activity B:
$$
TE_B = \frac{1 + 4 \times 2 + 3}{6} = \frac{1 + 8 + 3}{6} = \frac{12}{6} = 2 \text{ days}
$$

- For Activity C:
$$
TE_C = \frac{3 + 4 \times 5 + 7}{6} = \frac{3 + 20 + 7}{6} = \frac{30}{6} = 5 \text{ days}
$$

2. Determine the Overall Project Duration:
Since activities A, B, and C are independent, the overall project duration is the longest expected time:
- Project Duration = max(TE_A, TE_B, TE_C) = max(4, 2, 5) = 5 days.

Example Problem 2: CPM Analysis

Problem Statement

Consider a project with the following activities and their durations:

Activity	Duration (Days)	Predecessors
A	4	-
B	2	A
C	3	A
D	5	B, C
E	6	D

Determine the critical path and the total project duration.

Solution Steps

1. Draw the Network Diagram:
- Represent the activities and dependencies graphically.
- Activity A leads to B and C.
- Both B and C lead to D.
- D leads to E.

2. Calculate Early Start (ES) and Early Finish (EF):
- For Activity A:
- ES = 0, EF = 0 + 4 = 4
- For Activity B:
- ES = 4, EF = 4 + 2 = 6
- For Activity C:
- ES = 4, EF = 4 + 3 = 7

- For Activity D:
- ES = max(EF_B, EF_C) = max(6, 7) = 7, EF = 7 + 5 = 12
- For Activity E:
- ES = 12, EF = 12 + 6 = 18

3. Calculate Late Start (LS) and Late Finish (LF):
- Start from the end of the project, Activity E:
- LF = 18, LS = 18 - 6 = 12
- For Activity D:
- LF = 12, LS = 12 - 5 = 7
- For Activity B:
- LF = LS of D = 7, LS = 7 - 2 = 5
- For Activity C:
- LF = LS of D = 7, LS = 7 - 3 = 4
- For Activity A:
- LF = min(LS_B, LS_C) = min(5, 4) = 4, LS = 4 - 4 = 0

4. Identify Critical Path:
- The critical path consists of activities with zero slack (LS = ES).
- Critical Path: A → C → D → E
- Total Project Duration = 18 days.

Importance of PERT and CPM

Using PERT CPM example problems with solutions is essential for effective project management, as they allow project managers to:

- Visualize project timelines and dependencies.
- Identify critical tasks that must not be delayed.
- Allocate resources efficiently to ensure timely project completion.
- Reduce uncertainty in project scheduling by estimating time more accurately.

In conclusion, understanding and applying PERT and CPM techniques can significantly enhance your project management skills and help ensure successful project delivery. Through the example problems provided, you can see how these methods work in practice, allowing for better planning and execution in real-world scenarios.

Frequently Asked Questions

What is PERT and how does it differ from CPM?

PERT (Program Evaluation and Review Technique) focuses on the time required to complete tasks, considering uncertainties in activity durations, while CPM (Critical Path Method) emphasizes the sequential nature of project tasks and uses fixed durations.

Can you provide a simple example problem using PERT?

Sure! Consider a project with three activities: A, B, and C. Activity A takes 2 weeks, B takes 3 weeks, and C takes 4 weeks. If A must finish before B starts, and B must finish before C starts, the total project duration is the sum of all activities: 2 + 3 + 4 = 9 weeks.

How do you calculate expected time in PERT?

The expected time (TE) for an activity in PERT is calculated using the formula: TE = (Optimistic time + 4 Most likely time + Pessimistic time) / 6.

What is a critical path in PERT/CPM?

The critical path is the longest duration path through a project, determining the shortest time to complete the project. Any delay in critical path activities will directly affect the project completion time.

How can you identify the critical path in a given example?

To identify the critical path, list all paths through the project, calculate the total duration for each path, and the path with the longest duration is the critical path.

Can you solve a PERT problem with given optimistic, pessimistic, and most likely times?

Certainly! For an activity with an optimistic time of 2 weeks, a pessimistic time of 6 weeks, and a most likely time of 4 weeks, the expected time is TE = (2 + 44 + 6) / 6 = 4 weeks.

What are some common pitfalls when using PERT/CPM?

Common pitfalls include underestimating activity durations, neglecting resource constraints, and failing to update the project schedule as work progresses.

How do you create a PERT chart from an example problem?

To create a PERT chart, identify all activities, determine their dependencies, estimate time for each, and then use nodes to represent activities and arrows to represent dependencies to visualize the project flow.

What tools can be used to solve PERT/CPM problems?

Tools for solving PERT/CPM problems include project management software like Microsoft Project, online PERT calculators, and even spreadsheet software like Excel for custom calculations and charts.

Pert Cpm Example Problems With Solution

PERT/CPM - Difference Between PERT and CPM - Civil Engineers ...
Oct 30, 2015 · PERT vs CPM CPM and PERT (Program Evaluation and Review Technique) are most commonly used methods for project management. There are some similarities and ...

如何创建*PERT*图 - 百度经验
Dec 27, 2016 · PERT图是为了分析和记录完成一个给定工程所需要做的任务，PERT图经常被用于项目管理中。PERT图包含了一系列的任务盒子，之间连接的剪头显示依存关系。在任务盒子 ...

PERT地暖管安装流程 - 百度经验
Feb 18, 2017 · PERT地暖管安装流程。第一步：安装地暖管分集水器 地暖管分集水器可以根据房间的具体情况确定安装位置，平直，牢固紧贴墙壁即可；但是分集水器到地面这段距离，最好 ...

Visio如何绘制**“PERT”**图 **-** 百度经验
我们在使用Visio过程中，如何绘制“PERT”图呢？下面小编就和大家来分享一下：

Visio软件中如何创建**PERT**图 **-** 百度经验
May 21, 2020 · 在办公软件的教学中，孩子可以学习Visio软件来制作流程图。有时需要绘制PERT图。那么，Visio软件中如何绘制PERT图呢？小甜甜这里给大家分享一下Visio软件中绘 ...

PERT图怎么制作？ - 百度经验
Jan 11, 2020 · PERT计划评审图也是项目管理中常见的一种图表，主要是用来分析、记录一项工程从开始到结束，需要完成哪些事情。那么PERT图怎么制作呢？

*PERT*管热熔工艺 - 百度经验
Nov 21, 2017 · a、PERT管热熔承插焊接工艺，此工艺在热熔承插pert管时，应注意2个要点： 1.热熔机温度控制在250-260°C 2.PERT管材、管件承插时在模头里停留时间要短，速度要快管材 ...

PERT管施工_**PERT**管连接工艺 **-** 百度经验
Nov 18, 2017 · PERT管又称“耐热聚乙烯 (PE-RT)管”，PERT管是一种聚烯族塑性塑料，以优于传统PE管材的耐温性、加工灵活性，PERT管在工作温度为70摄氏度压力为0.4MPa条件下，可 ...

PERT管热熔连接安装及注意事项 **-** 百度经验
Nov 19, 2017 · PERT管件管材连接方法主要为热熔对接焊接工艺。热熔对接是采用热熔对接焊机，利用加热熔融后相互对接融合，经冷却固定而连接在一起的方法。

pert管连接方式 **-** 百度经验
Nov 20, 2017 · pert管常用的连接方式分为两种：热熔承插连接、热熔对接工艺。小口径 dn20-110 采用“热熔承插焊接”工艺，大口径dn125-500采用“热熔对接焊”工艺，不同工艺对焊接温度有严 ...

PERT/CPM - Difference Between PERT and CPM - Civil Engineers ...
Oct 30, 2015 · PERT vs CPM CPM and PERT (Program Evaluation and Review Technique) are most commonly used methods for project management. There are some similarities and ...

如何创建**PERT**图 **-** 百度经验
Dec 27, 2016 · PERT图是为了分析和记录完成一个给定工程所需要做的任务，PERT图经常被用于项目管理中。PERT图包含了一系列的任务盒子，之间连接的剪头显示依存关系。在任务盒子 ...

*PERT*地暖管安装流程 - 百度经验
Feb 18, 2017 · PERT地暖管安装流程。第一步：安装地暖管分集水器 地暖管分集水器可以根据房间的具体情况确定安装位置，平直，牢固紧贴墙壁即可；但是分集水器到地面

这段距离，最好 …

*Visio*如何绘制“*PERT*”图 - 百度经验
我们在使用Visio过程中，如何绘制“PERT”图呢？下面小编就和大家来分享一下：

Visio软件中如何创建**PERT**图 - 百度经验
May 21, 2020 · 在办公软件的教学中，孩子可以学习Visio软件来制作流程图。有时需要绘制PERT图。那么，Visio软件中如何绘制PERT图呢？小甜甜这里给大家分享一下Visio软件中绘 …

PERT图怎么制作？ - 百度经验
Jan 11, 2020 · PERT计划评审图也是项目管理中常见的一种图表，主要是用来分析、记录一项工程从开始到结束，需要完成哪些事情。那么PERT图怎么制作呢？

PERT管热熔工艺 - 百度经验
Nov 21, 2017 · a、PERT管热熔承插焊接工艺，此工艺在热熔承插pert管时，应注意2个要点： 1.热熔机温度控制在250-260°C 2.PERT管材、管件承插时在模头里停留时间要短，速度要快 …

PERT管施工_PERT管连接工艺 - 百度经验
Nov 18, 2017 · PERT管又称“耐热聚乙烯 (PE-RT)管”，PERT管是一种聚烯族塑性塑料，以优于传统PE管材的耐温性、加工灵活性，PERT管在工作温度为70摄氏度压力为0.4MPa条件下，可 …

PERT管热熔连接安装及注意事项 - 百度经验
Nov 19, 2017 · PERT管件管材连接方法主要为热熔对接焊接工艺。热熔对接是采用热熔对接焊机，利用加热熔融后相互对接融合，经冷却固定而连接在一起的方法。

pert管连接方式 - 百度经验
Nov 20, 2017 · pert管常用的连接方式分为两种：热熔承插连接、热熔对接工艺。小口径 dn20-110 采用“热熔承插焊接”工艺，大口径dn125-500采用“热熔对接焊”工艺，不同工艺对焊接温度有严 …

Explore practical PERT CPM example problems with solutions to enhance your project management skills. Learn more and master PERT CPM techniques today!

Back to Home