

Project Management Exam Solutions (Model 3)

Q: How can the total project duration be calculated using a network diagram? Explain the main steps.

Steps to Calculate Total Duration:

1. Draw the network diagram mapping all activity dependencies.

يُحسب وقت المشروع برسم الشبكة

2. Perform a **Forward Pass** to determine the Early Start (ES) and Early Finish (EF) for each activity. The highest EF at the end of the project is the total duration.

إجراء المسار الأمامي لحساب الأوقات المبكرة ES/EF.

3. Perform a **Backward Pass** to determine the Late Start (LS) and Late Finish (LF).

المسار الخلفي لحساب الأوقات المتأخرة (LS/LF)

4. Identify the **Critical Path**, which consists of activities with zero float (where $ES = LS$ and $EF = LF$). The length of this path equals the total project duration.

أخيراً تحديد المسار الحرج (الذي لا يمتلك وقتاً فائضاً) وهو الذي يمثل مدة المشروع الكلية.

1. What are Early Time and Late Time? Why are they important in project scheduling?

Early Time (ES & EF): The earliest possible time an activity can start and finish without violating precedent constraints.

Late Time (LS & LF): The latest possible time an activity can start and finish without delaying the overall project completion.

Importance: They are crucial for calculating "Float" (or Slack), which helps project managers identify critical activities that need strict monitoring and non-critical activities where resources can be flexibly shifted.

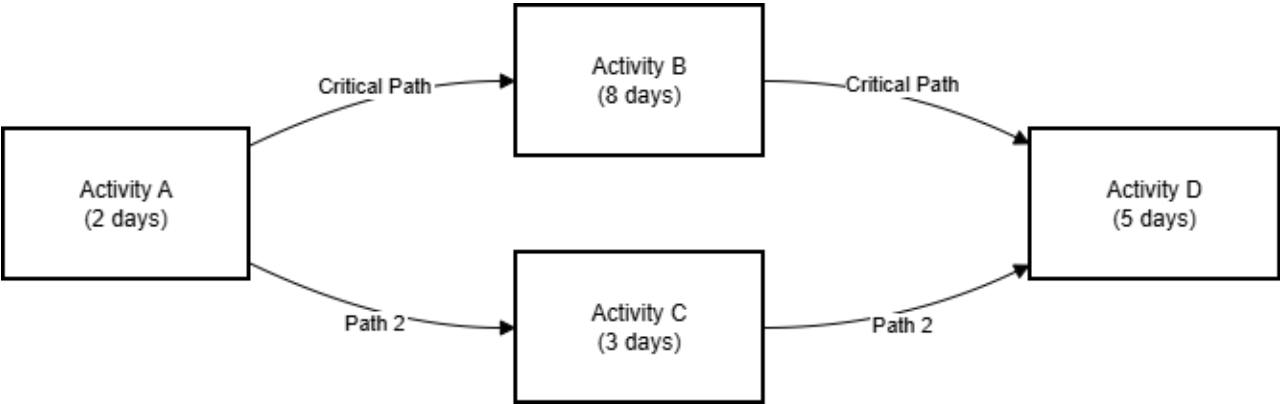
الأوقات المبكرة والمتأخرة: هي أبكر وأقصى وقت يمكن فيه تنفيذ النشاط دون تأخير المشروع. أهميتها تكمن في حساب "الوقت الفائض" لمعرفة الأنشطة الحرجة وتوزيع الموارد بمرونة.

Q_ Given the following project activities and their precedence relationships

Network Diagram Check (Precedence: A=2, B=8, C=3, D=5)

Path 1: A → B → D = 2 + 8 + 5 = **15 days (Critical Path)**

Path 2: A → C → D = 2 + 3 + 5 = 10 days



Q: - Using PERT, calculate the expected time for each activity

Activity	O	M	P	Formula: $T_e = \frac{(O + 4M + P)}{6}$	Expected Time
A	3	5	9	$\frac{(3 + 4(5) + 9)}{6} = \frac{32}{6}$	5.33
B	2	6	8	$\frac{(2 + 4(6) + 8)}{6} = \frac{34}{6}$	5.66
C	1	4	7	$\frac{(2 + 4(4) + 7)}{6} = \frac{24}{6}$	4

Q: - Can you explain your graduation project, including its main idea, objectives, methodology, implementation process, results, and possible future improvements? (10 marks)

Main Idea: Developing a "Flutter Medicine Tracker and Notification App" to act as a smart, personal medical schedule manager.

Objectives: To minimize medication non-adherence, reduce dosage errors, and provide a reliable digital health log.

Methodology & Implementation: Developed using the Dart programming language and the Flutter framework for cross-platform mobile compatibility. It utilizes a local database for secure offline data storage and background services for triggering alarms.

Results: A fully functional, user-friendly mobile application that accurately delivers timely medication reminders.

Future Improvements: Syncing the app with smartwatches for wrist notifications, and integrating AI-driven OCR (Optical Character Recognition) to automatically scan medical prescriptions.

تطبيق تتبع الأدوية باستخدام فلاتر (Flutter). يهدف لتقليل أخطاء الجرعات عبر إشعارات دقيقة. مستقبلاً يمكن ربطه بالساعات الذكية وإضافة الذكاء الاصطناعي لقراءة الروشتة.

Q: A project has the following data at the end of week 5:

$PV = \$150,000$

$EV = \$120,000$

$AC = \$140,000$

$BAC = \$350,000$

Required: 1. Calculate CV, SV, CPI, and SPI.

- CV (Cost Variance): $EV - AC = 120,000 - 140,000 = -\$20,000$
- SV (Schedule Variance): $EV - PV = 120,000 - 150,000 = -\$30,000$

Index	Formula & Calculation	Result
CPI (Cost Performance Index)	$\frac{EV}{AC} = \frac{120,000}{140,000}$	0.857
SPI (Schedule Performance Index)	$\frac{EV}{PV} = \frac{120,000}{150,000} =$	0.8

2. Interpret the project performance in terms of cost and schedule.

Cost: With a negative CV and $CPI < 1$ (0.857), the project is performing poorly and costing more than expected.

Schedule: With a negative SV and $SPI < 1$ (0.8), the project is progressing slower than originally planned.

النتائج سلبية: المشروع متأخر عن الجدول الزمني وتكلفته أعلى من المخطط لها.

3. Determine whether the project is over or under budget.

The project is **Over Budget** because the actual cost of the work performed (AC) is higher than the value of the work actually accomplished (EV).

المشروع يتجاوز الميزانية المحددة (Over Budget).