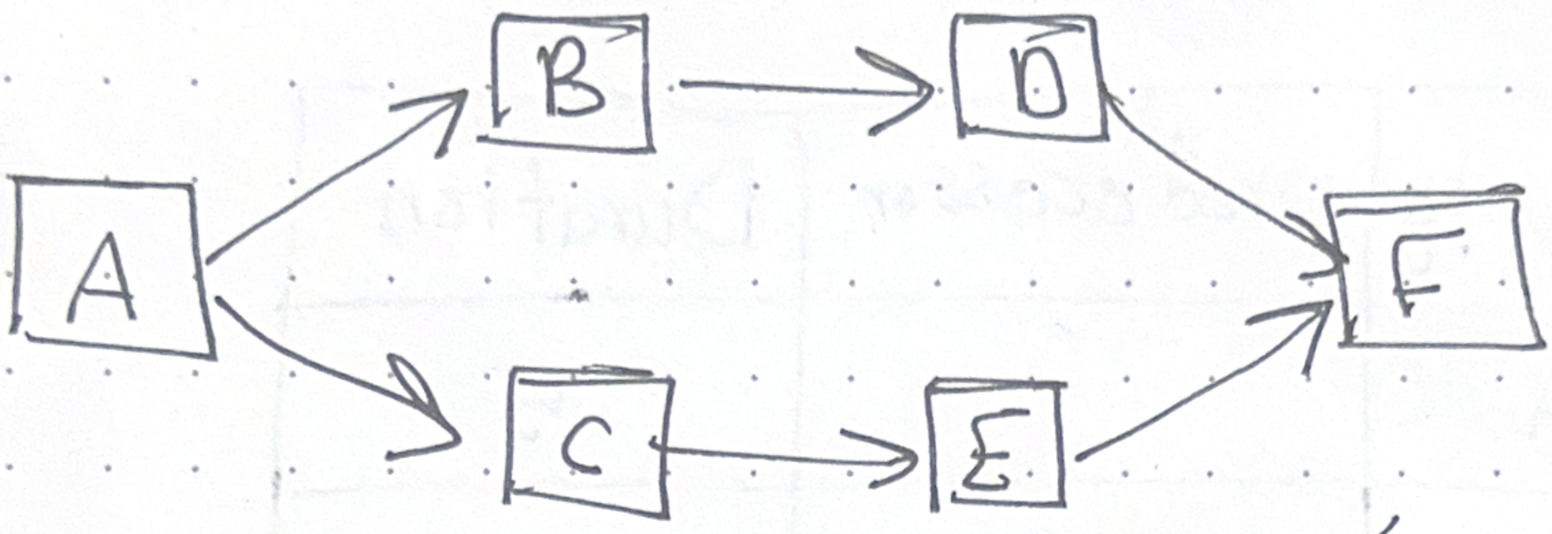
Day | Month | Year

| Activity | predecessor | Duration |
|---|---|---|
| A | - | 5 |
| B | A | 4 |
| C | A | 5 |
| D | B | 6 |
| E | C | 3 |
| F | D, E | 4 |

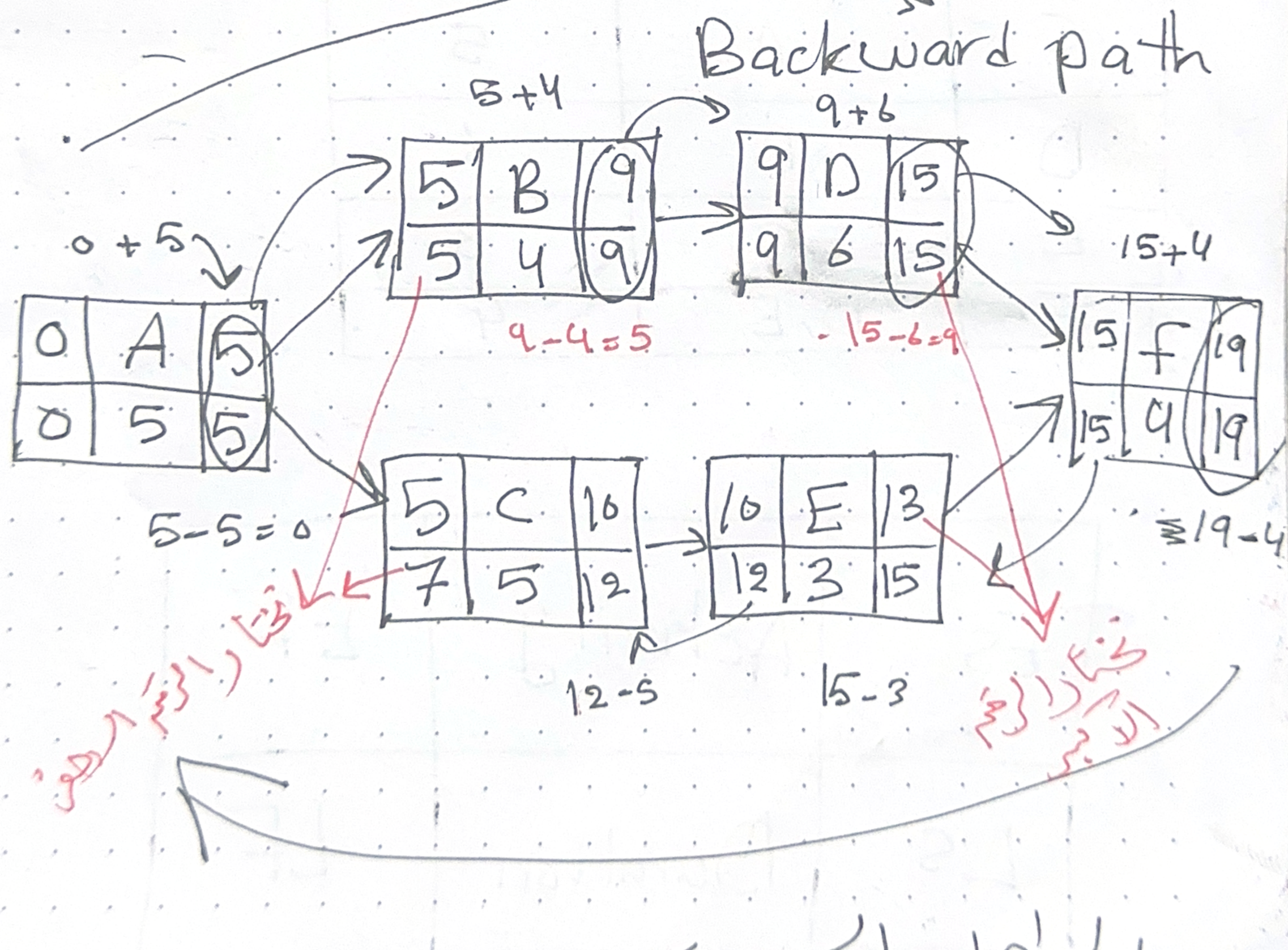
| ES | Activity | EF |
|---|---|---|
| LS | Duration | LF |

Day | Month | Year

Forward path




Backward path




المراحل الحرجة

A → B → D → F

# CPM

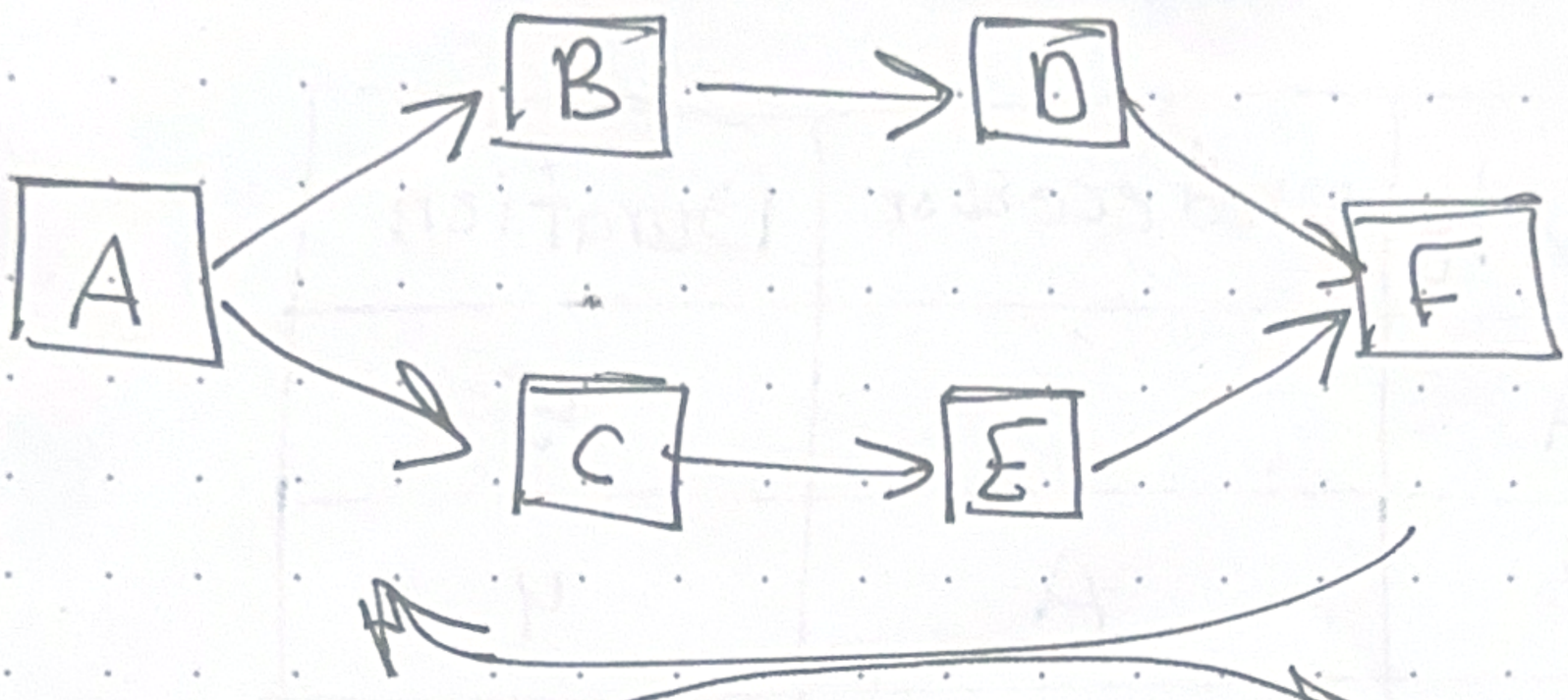
Day | Month | Year

| Activity | predecessor | Duration |
|---|---|---|
| A | - | 5 |
| B | A | 4 |
| C | A | 5 |
| D | B | 6 |
| E | C | 3 |
| F | D, E | 4 |

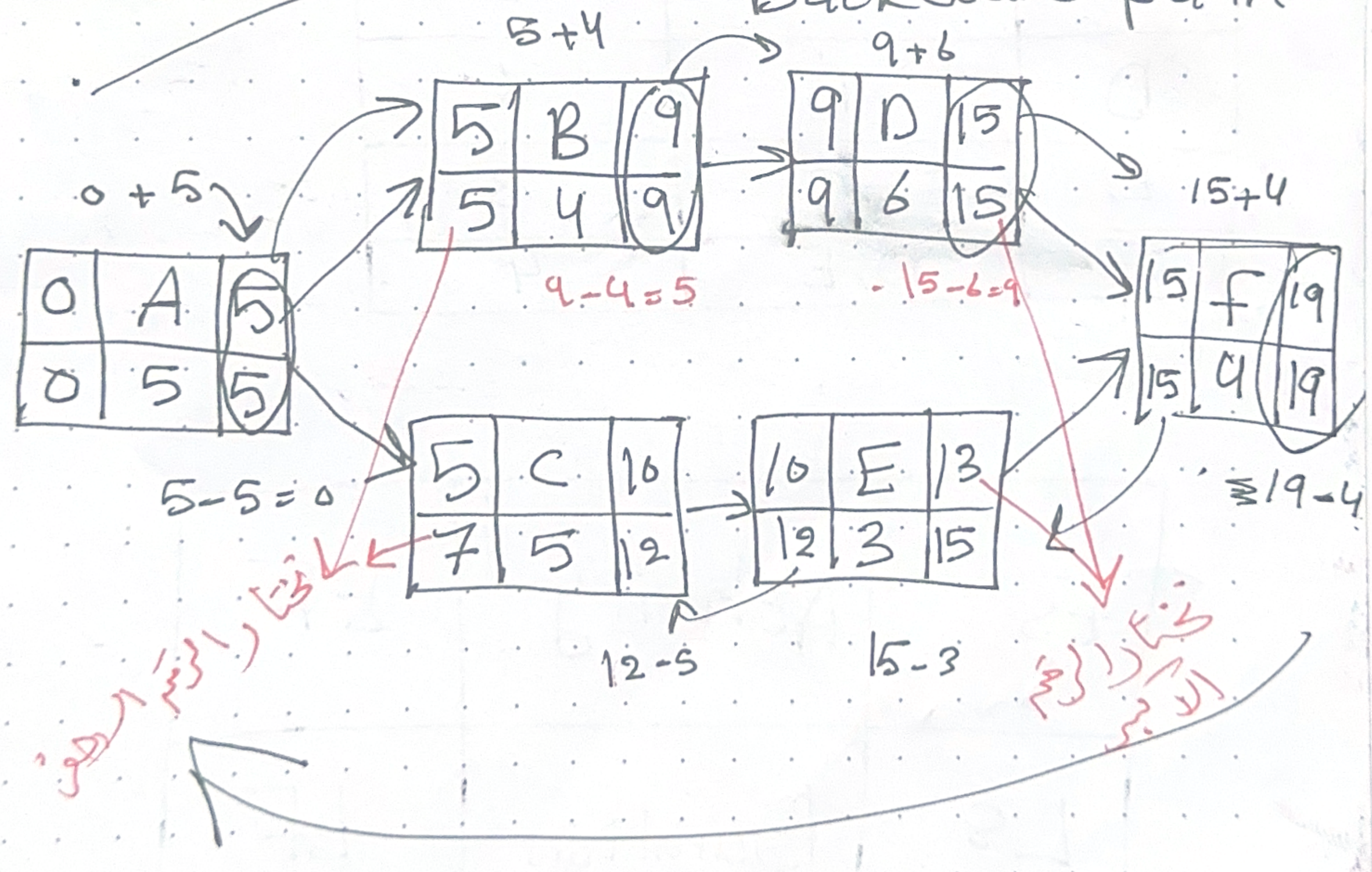
| ES | Activity | EF |
|---|---|---|
| LS | Duration | LF |

Day | Month | Year

Forward path




Backward path




المراحل الرجعية

$A \rightarrow B \rightarrow D \rightarrow F$

# Slack Time

PMP /

Day | Month | Year

| Activity | Duration | Es | EF | Ls | Lf | Slack (L-E) |
|---|---|---|---|---|---|---|
| A | 5 | 0 | 0 | 5 | 5 | 5-0=5 |
| B | 4 | 5 | 5 | 9 | 9 | 9-5=4 |
| C | 5 | | | | | |
| D | 6 | | | | | |
| E | 3 | | | | | |
| F | 4 | | | | | |

slack = LS - Es

iMMAP

pmp

Day | Month | Year

# Program Evaluation and Review Technique (PERT)

PERT هي مرحلة من مراحل جدولة المشروع بعد CPM تتاح لتطبيق تقنية PERT لتحسين جدولة المشروع والتأكيد على العبارات الحرجة التي تؤثر على المدة الإجمالية للمشروع وتقليل المخاطر المرتبطة بتقديرات الوقت.

## قوانين PERT

(1) حساب الزمن المتوقع لنشاط معين TE

Expected Time

Day | Month | Year

تتم حساب الزمن المتوقع لنشاط معين بالاعتماد على ثلاث تقديرات :-

(1) O (Optimistic time) $t_o$ :-

زمن التفائل ويمثل اقل مدة ممكنة لتنفيذ النشاط او Task

(2) M (Most likely time) $t_m$ :-

الزمن الاكثر احتمالاً (المدة التي يتوقع حدوثها غالباً)

(3) P (Pessimistic time) $t_p$

اطول ممكنة لانجاز المشروع او النشاط.

فانون حساب الزمن المتوقع لنشاط معين

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

Day | Month | Year

② حساب التباين لنشاط معين (V)

يعبر عن مدى التشتت في الزمن المتوقع لنشاط معين

$$V = \left(\frac{P-O}{6}\right)^2$$

③ حساب الانحراف المعياري لنشاط معين SD

$$SD = \frac{P-O}{6}$$

مقدار التغير في الزمن المتوقع في زمن النشاط مقارنة بالزمن المتوقع TE

④ حساب الانحراف المعياري للمسار الحرج

$$\sigma_{cp} = \sqrt{\sum V_{\text{critical path activities}}}$$

يتم حساب الانحراف المعياري للمسار الحرج بجمع التباينات لكل الأنشطة على المسار الحرج ثم أخذ الجذر التربيعي لها.

Day | Month | Year

(5) حساب احتمال انجاز المشروع في زمن معين
باستخدام التوزيع الطبيعي (Z)

$$Z = \frac{T - TE_{CP}}{\sigma_{CP}}$$

Z :- هو القيمة الاصطلاحية التي تستعمل لحساب الاحتمالات من جدول التوزيع الطبيعي

T :- هو الزمن المطلوب لانجاز المشروع

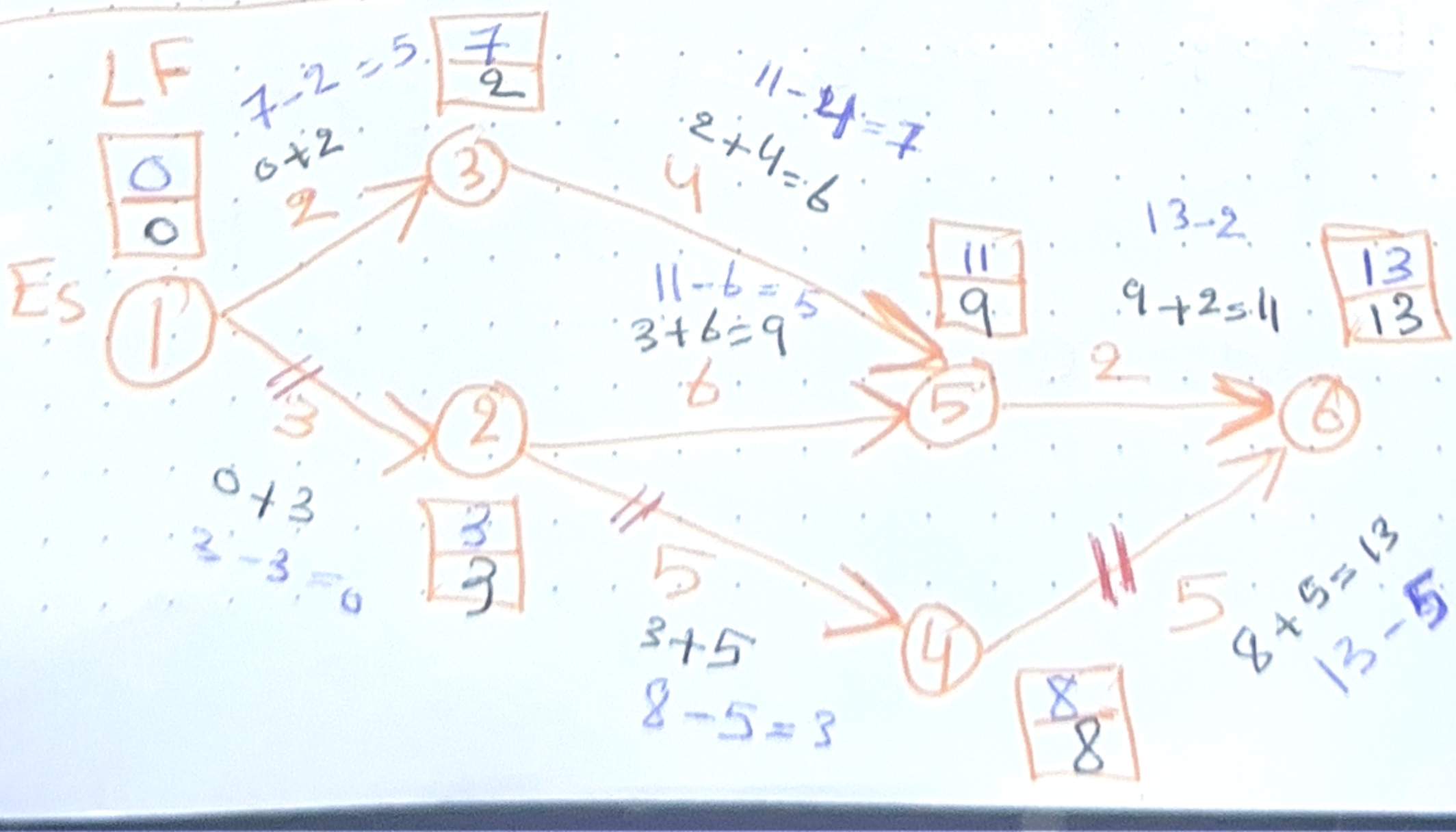
$TE_{CP}$ :- هو الوقت المتوقع لانجاز المشروع على المسار الحرج

$\sigma_{CP}$ :- هو الانحراف المعياري للمسار الحرج

Day | Month | Year

(EX) Find the probablity to finish the project with T = 17 days

| activity | to | tm | tp | (duration) $te = \frac{to+4tm+tp}{6}$ |
|---|---|---|---|---|
| 1-2 | 1 | 3 | 5 | 3 |
| 1-3 | 1 | 2 | 3 | 2 |
| 3-5 | 1 | 3 | 11 | 4 |
| 2-4 | 2 | 5 | 8 | 5 |
| 2-5 | 4 | 5 | 12 | 6 |
| 4-6 | 3 | 4 | 11 | 5 |
| 5-6 | 1 | 2 | 3 | 2 |



$T_e = T_c = 3+5+5$ ← لمسار الحرج فقط $t_e$

$= 13$

Day | Month | Year

| activity | $V = \left[\frac{t_p - t_o}{6}\right]^2$ |
|---|---|
| 1-2 | $\left[\frac{5-1}{6}\right]^2 \Rightarrow \left[\frac{4}{6}\right]^2 = \frac{16}{36}$ |
| 2-4 | $\frac{36}{36}$ |
| 4-6 | $\frac{64}{36}$ |

$\sigma_{cp} = \sqrt{\sum V_{cp}}$

$= \sqrt{\frac{16+36+64}{36}}$

$= \sqrt{\frac{116}{36}}$

$= \sqrt{3.2}$

iMMAP

Day | Month | Year

$$Z = \frac{T_s - T_e}{\sigma_{cp}}$$

$$= \frac{17 - 13}{\sqrt{3.2}}$$

$$Z = 2.35$$

من الجدول نقارن قيمة Z مع الاحتمالات الموجودة في الجدول

$$Z = 2.35 \rightarrow p = 0.988 * 100$$

$$= 98\%$$

نسبة انجاز المشروع في الوقت المحدد

1. Why is learning project management important?

   a) It helps in achieving goals efficiently
   b) It increases project costs
   c) It slows down project execution
   d) It reduces project complexity
   **Answer: a**

2. Which of the following is NOT a benefit of project management?

   a) Reducing waste of time and resources
   b) Improving quality of outcomes
   c) Increasing project uncertainty
   d) Avoiding chaos
   **Answer: c**

3. Project management involves directing which of the following resources?

   a) Time, money, people
   b) Only time
   c) Only money
   d) None of the above
   **Answer: a**

4. What is the first step in project management?

   a) Planning
   b) Directing
   c) Organizing
   d) Controlling
   **Answer: a**

5. Which phase of project management involves defining the project idea and objectives?

   a) Project Planning
   b) Project Scheduling
   c) Project Initiation

d) Project Control

**Answer: c**

6. In project management, what does organizing involve?

   a) Arranging resources and tasks
   b) Creating a budget
   c) Setting project goals
   d) Evaluating results

   **Answer: a**

7. What is an example of controlling in a project?

   a) Hiring staff
   b) Monitoring sales performance
   c) Selecting the project idea
   d) Conducting meetings

   **Answer: b**

8. Why is project management critical in modern industries?

   a) Due to increasing project complexity
   b) Because projects no longer need planning
   c) It allows unlimited use of resources
   d) It reduces the importance of leadership

   **Answer: a**

9. What is the primary objective of project planning?

   a) To execute the project immediately
   b) To outline what needs to be done, how, and when
   c) To close the project
   d) To ignore project risks

   **Answer: b**

10. What does staffing in project management refer to?

    a) Allocating labor to the project
    b) Setting a project budget
    c) Closing the project

d) Designing a blueprint

**Answer: a**

11. What is the role of leadership in project management?

a) Guiding and motivating the team
b) Ignoring team performance
c) Eliminating communication
d) Avoiding project deadlines

**Answer: a**

12. Which phase of project management involves evaluating the results?

a) Project Closure and Evaluation
b) Project Planning
c) Project Scheduling
d) Project Control

**Answer: a**

13. What does cost estimation in project management involve?

a) Calculating project expenses
b) Ignoring financial constraints
c) Reducing project efficiency
d) Increasing unnecessary expenditures

**Answer: a**

14. What is an example of project scheduling?

a) Setting deadlines for app testing
b) Closing the project
c) Ignoring resource allocation
d) Delaying the project indefinitely

**Answer: a**

15. Why is competition a reason for learning project management? a) Projects must be completed quickly and with high quality

b) Competition is irrelevant in project management
c) It increases project costs
d) It reduces the need for efficiency
**Answer: a**

16. What happens in the execution phase of a project?

a) The project plan is implemented
b) The project is closed
c) The project is ignored
d) The team stops working
**Answer: a**

17. What is an example of directing in project management?
a) Holding meetings to review progress
b) Ignoring team communication
c) Avoiding leadership
d) Increasing project risks
**Answer: a**

18. Why is monitoring important in project management?

a) To ensure adherence to the plan
b) To delay project completion
c) To avoid tracking progress
d) To ignore team performance
**Answer: a**

19. What does the term "resources" include in project management?

a) Time, money, people
b) Only people
c) Only money
d) None of the above
**Answer: a**

20. What happens in project closure and evaluation?

a) Reviewing project success and lessons learned
b) Ignoring project feedback
c) Restarting the project
d) Increasing project budget
**Answer: a**

21. What is the primary purpose of project planning?

a) To define goals and set strategies
b) To execute tasks randomly
c) To increase project costs
d) To avoid scheduling
**Answer: a**

22. Which of the following is NOT a benefit of project planning?

a) Better resource utilization
b) Increased project risks
c) Clarity of objectives
d) Improved communication
**Answer: b**

23. What is Microsoft Project primarily used for?

a) Playing games
b) Scheduling, resource management, and monitoring project progress
c) Video editing
d) Writing documents
**Answer: b**

24. Which of the following is an advantage of Microsoft Project?

a) High cost
b) Complexity for beginners

c) Collaboration support with Microsoft Teams
d) Limited resource management
**Answer: c**

25. What is a disadvantage of Microsoft Project? a) Familiar interface
b) High cost
c) Integrated resource management
d) Collaboration support
**Answer: b**

26. What type of projects can Microsoft Project be used for?
a) Mobile application development
b) Computer network deployment
c) Both a and b
d) None of the above
**Answer: c**

27. What is the primary purpose of MindMeister?

a) Creating mind maps and visualizing ideas
b) Managing finances
c) Writing project reports
d) Running simulations
**Answer: a**

28. Which of the following is NOT an advantage of MindMeister?

a) Real-time collaboration
b) Easy to use
c) Integration with Google Drive
d) Advanced project management functionalities
**Answer: d**

29. What is a practical example of using MindMeister?

a) Smart home system design
b) Mobile game development

c) Financial auditing
d) Writing an article
**Answer: a**

30. What is project scheduling?

a) Organizing tasks and milestones within a timeline
b) Ignoring deadlines
c) Randomly assigning tasks
d) Avoiding project planning
**Answer: a**

31. What does a Gantt Chart represent?

a) A visual timeline of project tasks
b) A financial statement
c) A coding platform
d) A communication log
**Answer: a**

32. Who invented the Gantt Chart?

a) Henry Gantt
b) Bill Gates
c) Steve Jobs
d) Mark Zuckerberg
**Answer: a**

33. What is a disadvantage of a Gantt Chart?

a) Difficult to modify in large projects
b) Provides a clear project timeline
c) Shows dependencies between tasks
d) Easy to update automatically
**Answer: a**

34. Which tool is best for tracking project issues and bugs?
a) JIRA

b) Microsoft Word
c) MindMeister
d) Google Sheets
**Answer: a**

35. What is one advantage of using JIRA?

a) Effective task and project management
b) High cost for large enterprises
c) Complexity for beginners
d) Lack of integration with development tools
**Answer: a**

36. What is a disadvantage of JIRA? a) Fast bug tracking
b) Complex for beginners
c) Integration with GitHub
d) Efficient task management
**Answer: b**

37. What type of project can JIRA be used for?

a) ERP system development
b) Video game development
c) Both a and b
d) None of the above
**Answer: c**

38. What is Power BI used for?

a) Data analytics and reporting
b) Writing code
c) Creating animations
d) Playing music
**Answer: a**

39. What is a benefit of Power BI?

a) Real-time data updates
b) High complexity

c) Limited data integration
d) High cost for all users
**Answer: a**

40. What is a disadvantage of Power BI? a) Complexity in creating advanced reports
b) Visual data analysis
c) Real-time updates
d) Integration with multiple data sources
**Answer: a**

41. What does project control primarily focus on?

a) Monitoring progress and making adjustments
b) Increasing project costs
c) Eliminating planning steps
d) Avoiding risk assessment
**Answer: a**

42. Which phase involves evaluating the project's success?
a) Project Closure
b) Project Initiation
c) Project Scheduling
d) Project Execution
**Answer: a**

43. What is the main goal of project scheduling?

a) Ensure tasks are completed on time
b) Ignore task dependencies
c) Increase project duration
d) Avoid planning
**Answer: a**

44. What is a key feature of project planning?

a) Defining tasks and allocating resources
b) Delaying decisions
c) Ignoring deadlines

d) Avoiding documentation

**Answer: a**

45. What is a practical example of project control?

a) Monitoring software bugs in JIRA
b) Using Power BI for performance tracking
c) Both a and b
d) None of the above

**Answer: c**

46. Why is learning project management important?

a) It helps in achieving goals efficiently
b) It increases project costs
c) It slows down project execution
d) It reduces project complexity

**Answer: a**

47. Which of the following is NOT a benefit of project management?
a) Reducing waste of time and resources
b) Improving quality of outcomes
c) Increasing project uncertainty
d) Avoiding chaos

**Answer: c**

48. Project management involves directing which of the following resources?

a) Time, money, people
b) Only time
c) Only money
d) None of the above

**Answer: a**

49. What is the first step in project management?

a) Planning
b) Directing
c) Organizing

d) Controlling
**Answer: a**

50. Which phase of project management involves defining the project idea and objectives?

a) Project Planning
b) Project Scheduling
c) Project Initiation
d) Project Control
**Answer: c**

51. In project management, what does organizing involve?

a) Arranging resources and tasks
b) Creating a budget
c) Setting project goals
d) Evaluating results
**Answer: a**

52. What is an example of controlling in a project?

a) Hiring staff
b) Monitoring sales performance
c) Selecting the project idea
d) Conducting meetings
**Answer: b**

53. Why is project management critical in modern industries?

a) Due to increasing project complexity
b) Because projects no longer need planning
c) It allows unlimited use of resources
d) It reduces the importance of leadership
**Answer: a**

54. What is the primary objective of project planning?

a) To execute the project immediately
b) To outline what needs to be done, how, and when

c) To close the project
d) To ignore project risks
**Answer: b**

55. What does staffing in project management refer to?

a) Allocating labor to the project
b) Setting a project budget
c) Closing the project
d) Designing a blueprint
**Answer: a**

**(MCQ)**

1. **What is the main objective of the Initiation Phase?**

   **Answer:** B) To define project goals, scope, and feasibility

2. **What document marks the start of the project in the Initiation Phase?**

**Answer:** B) Project Charter

3. **Which of the following is a key component of the Initiation Phase?**

**Answer:** C) Project Charter

4. **What does a Feasibility Study evaluate?**

**Answer:** A) Project's potential for success from technical, financial, and operational perspectives

5. **What is defined during the Initiation Phase to prevent scope creep?**

**Answer:** C) Project Scope

6. **Which feasibility type checks whether the team has the capacity to complete the project?**

**Answer:** A) Technical Feasibility

7. **What role is formed during the Initiation Phase to lead the project?**

**Answer:** A) Project Manager

8. **Which document helps in defining roles and responsibilities in the Initiation Phase?**

**Answer:** B) Project Charter

9. **What is clarified in the Initiation Phase to set the project's direction?**

**Answer:** C) The project's scope and objectives

10. **What is the primary purpose of verifying the project's feasibility in the Initiation Phase?**

**Answer:** B) To check if the project can be executed successfully

**11. What does the Planning Phase primarily focus on?**

**Answer:** B) Creating detailed plans for successful project execution

**12. What is one of the primary goals of the Planning Phase?**

**Answer:** B) Defining the project's scope, schedule, budget, and resources

**13. Which of the following is part of scope planning in the Planning Phase?**

**Answer:** B) Outlining what is included and excluded in the project

**14. What is the purpose of schedule planning in the Planning Phase?**

**Answer:** A) To break down work into tasks and estimate their duration

**15. What does budget planning involve in the Planning Phase?**

**Answer:** A) Estimating the costs of project activities

**16. What is a critical aspect of resource planning in the Planning Phase?**

**Answer:** A) Identifying available resources and allocating them

**17. What tool is used to manage project schedules in the Planning Phase?**

**Answer:** A) Gantt Chart

**18. What is SWOT analysis used for in the Planning Phase?**

**Answer:** C) To analyze the project's strengths, weaknesses, opportunities, and threats

**19. Which component of the Planning Phase focuses on ensuring the project meets its quality standards?**

**Answer:** B) Quality Planning

**20. What does Risk Management in the Planning Phase focus on?**

**Answer:** A) Identifying potential risks and creating mitigation strategies

**21. What is the primary focus during the Execution Phase?**

**Answer:** B) Managing team performance and executing tasks

22. **What key activity is central to the Execution Phase?**

**Answer:** A) Monitoring team performance

23. **Which of the following is essential for managing the project team during the Execution Phase?**

**Answer:** A) Assigning tasks according to the plan

24. **What is the role of resource management during the Execution Phase?**

**Answer:** A) Ensuring that resources are available as needed

25. **What does the Execution Phase involve in terms of quality control?**

**Answer:** A) Ensuring that all work meets the quality standards defined in the planning phase

26. **What tool is commonly used in the Execution Phase to track project progress?**

**Answer:** A) Key Performance Indicators (KPIs)

27. **What type of actions might be necessary during the Execution Phase if deviations from the plan are noticed?**

**Answer:** A) Corrective Actions

28. **What tool helps to evaluate the actual performance against the project plan in the Execution Phase?**

**Answer:** A) Earned Value Analysis

29. **During the Execution Phase, what is used to track task performance and resources?**

**Answer:** A) Project Management Systems (e.g., JIRA, Trello)

30. **What is the role of effective communication in the Execution Phase?**

**Answer:** A) To ensure all stakeholders are aware of progress and challenges

31. **What is the main objective of the Monitoring and Controlling Phase?**
    **Answer:** B) To track and monitor project performance to ensure alignment with plans
32. **Which tool is used to track project performance in the Monitoring and Controlling Phase?**
    **Answer:** A) Key Performance Indicators (KPIs)
33. **What action is taken if the project deviates from the plan during the Monitoring and Controlling Phase?**
    **Answer:** A) Corrective Actions
34. **What document is essential for reporting progress to stakeholders in the Monitoring and Controlling Phase?**
    **Answer:** A) Status Reports
35. **Which of the following is used to evaluate and monitor risks in the Monitoring and Controlling Phase?**
    **Answer:** A) Risk Matrix
36. **What type of analysis is commonly used in the Monitoring and Controlling Phase to track project performance against the schedule and budget?**
    **Answer:** A) Earned Value Analysis
37. **What should be done if changes are identified during the Monitoring and Controlling Phase?**
    **Answer:** A) Assess the impact and manage the changes
38. **What activity is crucial in the Monitoring and Controlling Phase to ensure quality compliance?**
    **Answer:** A) Regular inspections and tests
39. **How is project performance compared to the plan in the Monitoring and Controlling Phase?**
    **Answer:** C) By using Key Performance Indicators (KPIs)
40. **Which of the following is a tool used to track project progress and schedule in the Monitoring and Controlling Phase?**
    **Answer:** A) Earned Value Analysis
41. **What is the primary goal of the Closure Phase?**
    **Answer:** A) To complete final project tasks and ensure deliverables meet requirements
42. **What activity is involved in the Closure Phase to ensure financial obligations are settled?**
    **Answer:** A) Financial Closure

43. **What should be documented during the Closure Phase to improve future practices?**
    **Answer:** A) Lessons Learned
44. **Which activity in the Closure Phase ensures all contracts are closed?**
    **Answer:** A) Contract Closure
45. **What is typically reviewed at the end of the project in the Closure Phase?**
    **Answer:** D) Lessons learned and performance
46. **Which tool is commonly used to track client satisfaction during the Closure Phase?**
    **Answer:** A) Client Surveys
47. **What happens if deliverables are incomplete during the Closure Phase?**
    **Answer:** A) It may delay the final closure process
48. **What type of final report is prepared during the Closure Phase?**
    **Answer:** A) Final Closure Report
49. **What challenge can occur in the Closure Phase regarding client feedback?**
    **Answer:** A) Delays in providing final feedback
50. **Why is it important to evaluate project performance during the Closure Phase?**
    **Answer:** A) To ensure goals are met and to identify areas for improvement in future projects