

Q. Difference between PERT & CPM.

CPM

CPM (Critical Path Method) is used for projects with well-defined & predictable activities such as construction & manufacturing.

Follows a deterministic approach; Assumes fixed activities duration considering uncertainty in activities.

Uses a single time estimate for each activity, making it more rigid in scheduling.

Primary focus of CPM is on time-cost & trade-offs & optimizing resource allocation.

Critical path in CPM is determined by longest duration path, which dictates the project completion time.

CPM is more suitable for routine, repetitive & projects where time & cost estimations are straight forward.

PERT

- PERT (Program Evaluation & review technique) is used for projects with uncertain & research based activities such as R&D & product development.

- Follows a probabilistic approach to account for variability.

- Uses a 3-time estimate (Optimistic, Pessimistic & most likely) to account for variability.

- The primary focus of PERT is on managing uncertainty & minimizing risks in scheduling tasks.

- PERT is better suited for new & complex projects where task durations are uncertain.

Slack & Free Slack

Q.2. Explain difference

Total Slack

- Total slack (Total float) is the amount of time an activity can be delayed without delaying the project completion time or violating deadline.

- It affects the entire project schedule & can be impact multiple activities.

- If total slack is zero, the activity is on the critical path, & cannot be delayed.

- It is calculated as:

$$\text{Total Slack} = \text{Latest finish time} - \text{Earliest finish time}$$

Free Slack

- Free slack (free float) is the amount of time an activity can be delayed without delaying the start of its immediate successor activity.

- It affects only the specific activity & its immediate successors.

- Free slack is always less than or equal to Total slack.

- It is calculated as:

$$\text{Free Slack} = \text{Earliest Start next act} - \text{Earliest finish previous act}$$

i.

AON

In AON (Activity on Node) diagram, activities are

represented as nodes &

arrows show the dependencies between them.

AOA

- In AOA (Act. on arrow) diagram, activities are

represented as arrows nodes represents even

It is more commonly used in modern project management software (such as MS Project & Primavera).

- It was traditionally used w/ PERT & CPM networks but is less common now.

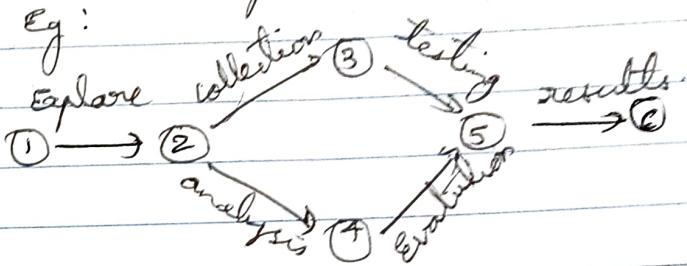
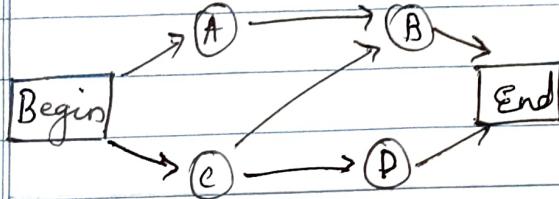
AON does not require dummy activities since dependencies are directly shown by arrows.

- AOA may require dummy activities to maintain correct logical relationships.

It is easier to understand & interpret to AOA diagrams.

- It can become complex due to dummy activities & is harder to interpret.

Eg: AON diagrams



(i) Q3. Explain Risk Identification, Risk projection, & RMMM plan in detail.

→ Risk Identification :

- It is the process of recognizing potential risks that could negatively impact a project. It involves systematically identifying sources of risk, analyzing past experiences & brainstorming possible threats.

→ Steps in Risk Management.

(i) Review Project scope & objectives.

(ii) Identify risk categories as technical, financial, operational, external or managerial.

- iii. Use risk identification techniques
- Brainstorming: Gather team to list potential risks
 - SWOT Analysis: Identify strengths, weaknesses, opportunities & threats
 - Expert Judgement: Consult experienced professionals for insights
 - Checklist Method: Use a predefined risk checklist
 - Historical data analysis: Learn from previous projects
- iv. Document risks: Create a risk register listing identified risks with details.

Risk Projection (Estimation / Assessment):

- Risk projection involves analysing identified risks to estimate their likelihood, impact & severity. The goal is to prioritize risks & develop mitigation strategies
- Aspects of Risk Projection:
 - (i). Likelihood Assessment:
 - Assign a probability score: (low, med, high)
 - ii. Impact analysis:
 - Evaluate how much damage the risk can cause (minor, moderate, severe).

iii. Risk exposure calculation:

$$\rightarrow \text{Risk exposure} = \text{probability} \times \text{Impact}$$

iv. Risk Prioritization:

- High exposure risks require immediate action
- Low exposure risks can be monitored with minimal intervention.

RMM Plan: It is a structured approach to handling risks by reducing their probability & impact, monitoring their status & defining management strategies. It plans for risk mitigation, monitoring & management plan.

→ Components of an RMM Plan:

i. Risk mitigation:

→ Strategies to reduce or prevent risks before they occur.
→ Eg: use automated backup systems to mitigate data loss.

ii. Risk Monitoring:

→ Ongoing tracking of risks to detect changes.
→ Eg: conduct regular performance audits to monitor budget risks.

iii. Risk management:

- Defines what actions to take if a risk materializes.
- Eg: If a key dev leaves, assign a backup resource.

a. 4. Consider an XYZ company undertake a project to computerized working of ABC city Bank, then

i. Develop W.B.S for the same project
ii. Develop responsibility matrix.

→ For XYZ company undertaking a project the computerizing ABC city bank.

(i) WBS (Work Breakdown structure) divides the project into manageable sections, ensuring a structured approach to implementation.

Level-wise WBS for the project :

1. Project Initiation & Planning.
 - 1.1. Requirement Analysis.
 - 1.2. Feasibility study.
 - 1.3. Risk Assessment & Planning.
 - 1.4. Project Schedule & Budgeting.
2. System Design & architecture.
 - 2.1. Database design.
 - 2.2. Software Architecture.
 - 2.3. Security Architecture.
 - 2.4. Hardware & Network Infrastructure.
3. Software Development :
 - 3.1. Core Banking system development.
 - 3.2. Customer Management Module.
 - 3.3. Transaction Processing system.
 - 3.4. Online & Mobile Banking.
4. Integration & testing.
 - 4.1. System Integration.
 - 4.2. Functional Testing.
 - 4.3. Security & performance testing.
 - 4.4. User Acceptance testing (UAT).
5. Deployment & Implementation.
 - 5.1. Server & Database setup.
 - 5.2. Software Installation.
 - 5.3. Data Migration from legacy systems.
 - 5.4. Go-Live & monitoring.

(A)

*3. Differentiate b/w cryptography & steganography.

6. Training & documentation.

6.1 Employee training sessions

6.2 User Manuals & technical documentation

6.3 Customer support training.

6.4 Troubleshooting guide.

7. Maintenance & support.

7.1 Bug fixes & updates 7.2 System performance monitoring
 7.3 Customer support & helpline. 7.4. Future enhancements &
 upgrades.

ii) Responsibility Assignment Matrix (RAM).

The Responsibility Matrix (RACI matrix) defines roles & responsibilities of different team members for each major task in the project.

Task / Project Activity	Project Manager	Business Analyst	Software Developers	Testers	IT Support	Bank Staff
Requirement analysis	R	A	C	-	-	I
System design	R	C	A	-	I	I
S.W dev	C	I	A	-	-	I
Testing	I	C	C	A	-	R
Integration & deployment	R	C	A	C	I	I
Training & documentation	R	A	C	-	I	C
Maintenance & support.	R	C	C	-	A	I

- Q.5. Explain Software Configuration Management in detail.
- SCM is a systematic approach to managing changes in software throughout its development lifecycle. It ensures that software modifications are well-tracked, controlled & documented to maintain consistency, integrity & reliability.
- Objectives of SCM:
- i. Version control: Tracks different versions of software & ensures smooth updates
 - ii. Change Management: Manages modifications in code, designs, & documentation systematically
 - iii. Configuration control: Ensures that changes are reviewed & approved before implementation
 - iv. Configuration Identification: Establishes a structured way to identify software components
 - v. Auditing & Status Accounting: Keeps record of software changes for transparency & traceability.
 - vi. Build & Release Management: Helps in controlled software releases & deployment.
- SCM Process components:
- (i) Configuration control
 - ii. Configuration identification
 - iii. Change Management
 - iv. Configuration audits & reviews

Tools & techniques used in SCM:

- i. Version Control Systems:
 - GIT - SVN - Mercurial

- ii. Build & release Management tools:
 - Jenkins, Github: automate sw builds & deployments
 - Maven, gradle - dependency management
- iii. Issue & change tracking tools:
 - Jira.

Q.6. Explain the significance of gantt charts in P.M.

- A gantt chart depicts the completion of each work as a project management using timeline.
- It is a visual P.M tool that represents a project's schedule over time.
- Provides clear timeline of tasks, their dependencies, & progress, making it easier for teams to track & manage projects effectively.

Features of Gantt chart:

1. Task representation: displays project tasks as horizontal bars along with a timeline.
2. Time scheduling: shows start & end dates for each task.
3. Dependencies: illustrates relationships b/w tasks.
4. Progress tracking: allows teams to update task completion status.
5. Resource allocation: helps in assigning resources efficiently.

Importance of Gantt charts:

- i. Clear Project Planning & scheduling:
 - Provides a structured breakdown of tasks & milestones
 - Helps in defining deadlines
- ii. Task dependencies & critical Path identification
 - Shows which tasks depend on others

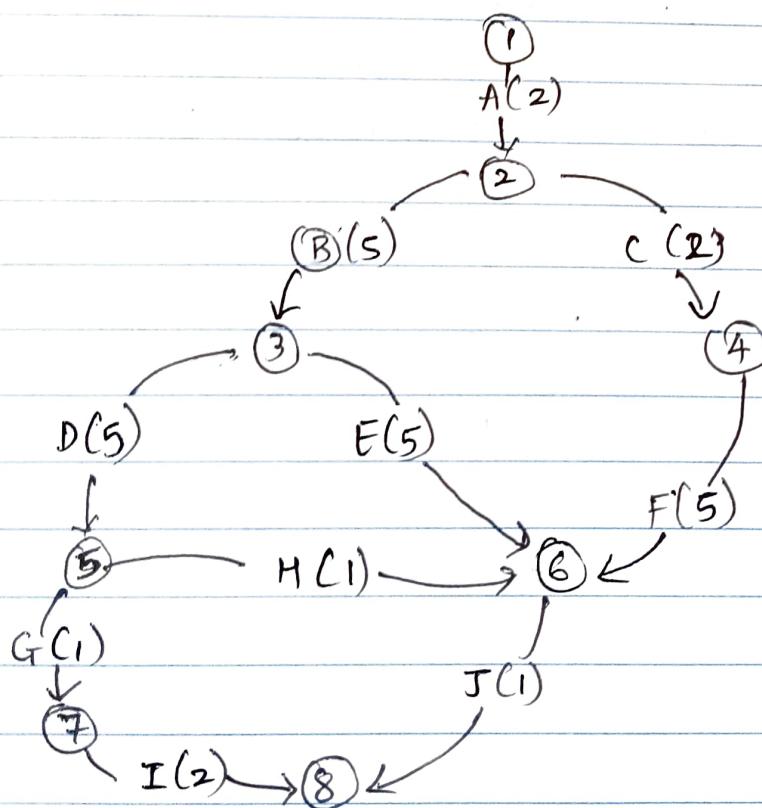
- Helps in identifying the critical path.
- iii. Resource allocation & workload balancing.
- iv. Real time progress tracking.
- v. Helps in Risk Management.
- Identifies potential bottlenecks & delays before execution
- allows for contingency planning.

Q.7. Draw AON & AOA network diagram for the fall. project & show the critical path.

Activity
Time
Immediate
Predecessor

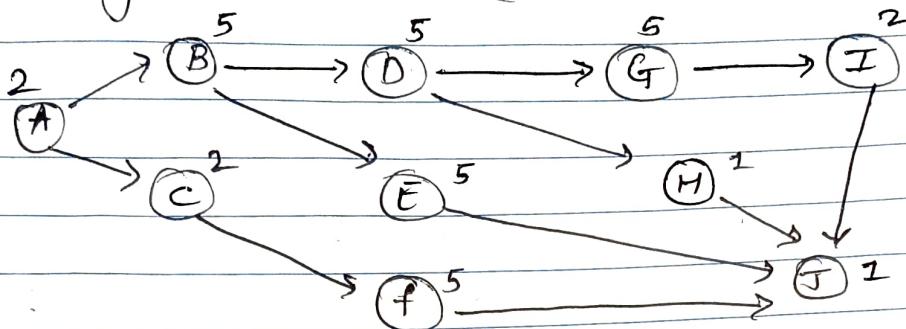
Activity	A	B	C	D	E	F	G	H	I	J
Time	2	5	2	5	5	5	1	1	2	1
Immediate Predecessor	-	A	A	B	B	C	D	D	G	E,F, H,I

Activity on Arrow (AOA)

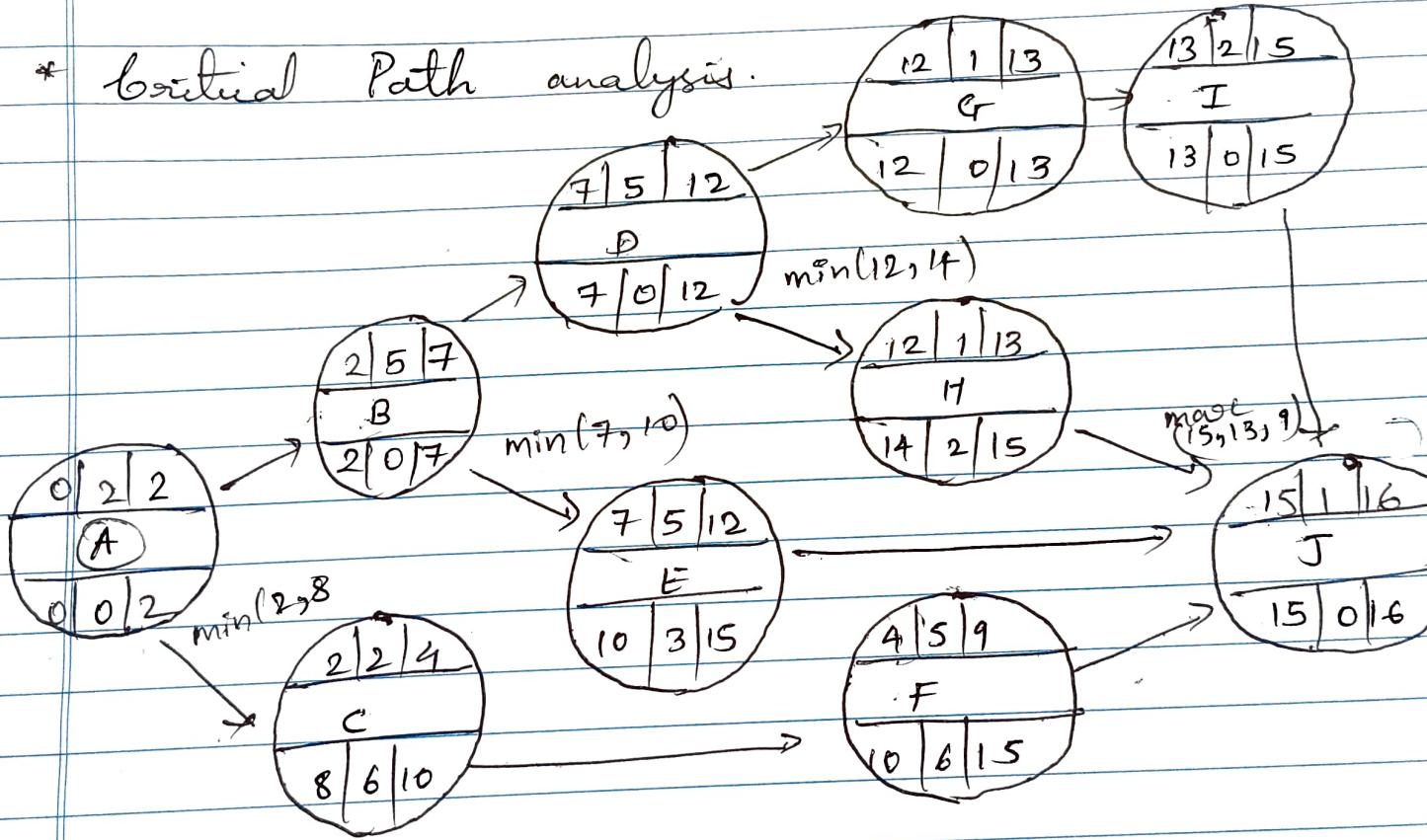


Q-1. Given : $p=7$, $q=17$, $e=5$, $M=5$
 To find : Publickey using RSA algo.

* Activity on Node (AOA)



* Critical Path analysis.



Activity

Duration

EST

EFT

LST

LFT

Total float

A	2	0	2	0	0	0
B	5	2	7	10	6	0
C	2	4	8	12	3	6
D	7	7	7	10	0	0
E	4	12	10	15	15	0
F	12	13	10	13	2	0
G	13	13	12	15	15	16
H	15	15	14	15	15	16
I	13	13	12	15	15	16
J	15	15	14	15	15	16

$$\begin{aligned}
 \text{Total float} &= LST - EST \quad \text{or} \quad LFT - EFT \\
 FF_{1,2} &= EST_2 - EST_1 - d_{1,2} \\
 FF_{2,2} &= EST_2 - LFT_1 - d_{1,2} \\
 \text{Free float} &= D \rightarrow G \rightarrow I \rightarrow J \\
 \text{Independent path} &= A \rightarrow B \rightarrow D \rightarrow G \rightarrow I \rightarrow J \\
 \text{Critical path} &= A \rightarrow B \rightarrow D \rightarrow G \rightarrow I \rightarrow J
 \end{aligned}$$