SEPM

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Q.1) Differentiate between CPM and PERT.

Ans:→ Project management can be understood as a systematic way of planning, scheduling, executing, monitoring, controlling the different aspects of project, so as to attain the goal made at the time of project formulation.

→ PERT and CPM are the 2 project management techniques, which exhibit the flow and sequences of activities and events.

PERT	CPM
i. PERT is a Project Management Technique whereby, scheduling, organising, and controlling uncertaining activities are done	i. CPM is a statistical technique of Project management in which planning, scheduling, organizing, coordination and control of well-defined activities take place
ii. PERT is a technique of planning & control of time	ii. CPM is a method to control costs and time.
iii. PERT is evolved as a research and development project.	iii. CPM evolved as a construction project.
iv. PERT is set according to events	iv. CPM is aligned towards activities.
v. PERT uses a probabilistic model	v. CPM uses a deterministic model.
vi. These PERT deals with unpredictable activities	vi. CPM deals with predictable activities

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Q.2 Explain the difference between:
(i) Total Slack and Free Slack.

Soln Total Slack and Free Slack are both project scheduling concepts used in Critical Path Method (CPM) to determine the flexibility of tasks within a project schedule. However, they serve different purpose and provide different insights into task dependencies

1. Total Slack.

- Definition:- Total Slack is the amount of time a task can be delayed without delaying the project's completion date.

- Calculation:-

Total Slack = Late Finish - Early Finish or
Late Start - Early Start.

- Impact on the Project:-
  - → If Total Slack = 0, the task is on critical path.
  - ⇒ If Total Slack is positive, the task has flexibility
  - → If Total Slack is negative, the task is causing a delay in schedule.

2. Free Slack

- Definition:- Free Slack is the amount of time a task can be delayed without delaying the start of its immediate successor

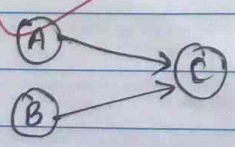
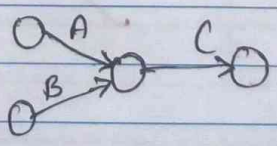
- Calculation: Free Slack = Earliest Start of Next Task - Earliest Finish of Current Task

• Impact on the Project:

• If Free Slack = 0, the task is tightly linked with the next activity.

• If Free Slack is positive, the task can be delayed without affecting depending risks.

(ii) AON & AOA Diagrams

AON (Activity on Node)	AOA (Activity on Arrow)
1. Activities are represented by nodes (typically boxes or circles)	1. Activities are represented by arrows.
2. Events are implicit, part of the flow between activities	2. Events are explicity shown as nodes (usually circles).
3. Focus is on the activities themselves.	3. Focus is on the events or milestones.
4. No need for dummy activities	4. Dummy activities may be required.
5. Easy to understand & more intuitive	5. Can be complex and harder to implement
6. Relatively simpler in representing dependencies	6. Complicated with multiple dependencies & dummy activities.
7. More commonly used in modern Project mangement	7. Was historically used, less common now
8. Example: 	8. Example 

Q.3 Explain Risk Identification, Risk Projection, Rmmm plan in detail.

Soln:- **Risk Identification** :- Risk Identification is the process of recognizing risks that may potentially affect the project's success. It involves analyzing internal and external factors that could cause project delay, cost overruns, or failure

⇒ Sources of Risk :→

(a) Technical Risks :- Incomplete requirements, new technology adoption.

(b) Financial Risks :- Budget overruns, funding shortages

(c) Schedule Risks :- Delayed deliverables, unrealistic deadlines.

(d) Operational Risks :- Staff shortages, Inadequate resources.

(e) External Risks :- Regulatory changes, Supplier issues.

⇒ Techniques for Risk Identification :⇒

i. Brainstorming Sessions

ii. SWOT analysis (Strengths, Weaknesses, Opportunities, Threats).

iii. Reviewing Past Projects

iv. Expert Judgement

v. Fishbone diagrams.

Risk Projection :- Risk Projection involves assessing the probability and impact of identified risks. This helps prioritize risks based on their severity.

⇒ Risk Impact Categories:⇒

(a) Low Impact :- Minimal effect on the Project

(b) Moderate Impact :- Can delay project components

(c) High Impact :- Can cause project failure

⇒ Risk Probability Levels :-

(a) Low (0-30%) :- Unlikely but possible

(b) Medium (30-70%) :- Likely to occur

(c) High (70-100%) :- Almost certain

⇒ Risk Assessment Methods :-

i. Qualitative Analysis :- Using Ranking Scales (High, Medium, Low)

ii. Quantitative Analysis :- Using Statistical models, Probability distributions.

iii. Risk matrix :- A 3×3 or 5×5 matrix mapping probability v/s impact

⇒ Risk Mitigation, Monitoring, and Management (RMMM) Plan :-

An RMMM Plan is a structured approach to managing risks throughout the project lifecycle

(A) Risk Mitigation (Prevention Strategies) :-

i. Avoiding high-risk activities

ii. Using backup plans.

iii. Allocating additional resources

(B) Risk Monitoring (Tracking & Review) :-

i. Continuous risk assessments

ii. Regular risk reports & meetings.

iii. Using Key Risk Indicators (KRIs)

(C) Risk Management (Action Plans) :-

i. Acceptance :- Proceeding with the risk while monitoring it.

ii. Transfer :- Outsourcing or insuring against risk.

iii. Reduction :- Implementing control measures.

Q.4) Consider a XYZ company undertake a project to computerize working of ABC City Bank, then - (i) Develop W.B.S for same project
(ii) Develop responsibility Matrix

Ans → XYZ company undertakes a project as follows:-

(i) Work Breakdown Structure (WBS) for Computerizing ABC City Bank:-
A WBS is a hierarchical decomposition of tasks required to complete a project. It breaks down the project into manageable components.

Level 1: Project - Computerization of ABC City Bank

[A] Requirements Analysis & Planning :- 1→ Gather business requirements
2→ Identify hardware/software needs.
3→ Define project scope and objectives
4→ Risk assessment and feasibility study.

[B] System Design & Architecture:- 1→ Database design (customer records, transactions)
2→ UI/UX design for banking interface
3→ Define security and encryption standards
4. Develop system workflow & backend architecture.

[C] Software Development & Integration :- 1→ Develop core banking software (accounts, loans)
2→ Implement ATM, internet banking, and mobile banking systems.
3→ Integrate with third-party services (UPI)
4→ Develop reporting and audit modules.

[D] Hardware Infrastructure Setup :- 1→ Install servers & network infrastructure.
2→ Setup branch infrastructure & computers
3→ Ensure disaster recovery setup (backup, fail over systems)

[E] Testing & Quality Assurance :- 1. Perform unit Testing, integration testing, System testing
2. Security testing (fraud detection, encryption validation)
3. Load and performance testing.
4. Fixing bugs and optimizing performance.

[F] Training & Deployment :- 1→ Employment training sessions (bank staff, IT Team)
2→ Conduct User Acceptance Testing (UAT)
3→ Deploy system in a controlled environment
4→ Full-Scale deployment and Go-Live

[G] Maintenance & Support :- 1. Continuous system monitoring
2. Implement software updates and patches
3. Helpdesk and Technical Support
4. Performance Analysis & Optimization.

→ (ii) Responsibility Matrix for the Project :- A responsibility Assignment matrix (RAM), also known as a RACI matrix, defines roles and responsibilities of team members for various tasks.

(a) R (Responsible) → Performs the task
(b) A (Accountable) → Approves the work, assures completion.
(c) C (Consulted) → Provides input, expert guidance
(d) I (Informed) → Needs updates but not actively involved.

Task	Project Manager	Business Analyst	Developers	IT Security Team	Testers	Bank Staff
Requirement Gathering	A	R	C	I	I	C
System Design	A	C	R	C	I	I
Software Development	I	I	R	C	I	I
Security Implementation	I	I	C	R	I	I
Testing & QA	I	C	C	R	R	I
Deployment	A	C	R	R	C	I
Training & Support	A	R	C	C	I	R

Q.5 → Explain Software Configuration Management in detail.

Ans → i→ Software Configuration management (SCM) is the process of managing software changes effectively.

ii→ It ensures consistency, traceability, and collaboration in software development.

iii→ Key Activities :→ Configuration Identification, Change Control, Auditing, Build & Release Management.

iv→ Tools & Techniques → (a) Version Control System (VCS) : Git, SVN, Mercurial
(b) Branching & merging : GitFlow, Feature Branching
(c) Build & Release Management : Jenkins, Github Actions
(d) Infrastructure as Code (IaC) : Ansible, Puppet, Chef
(e) Issue Tracking : Jira, Trello

v→ Benefits →
(a) Improves team collaboration
(b) Reduces Errors and enhances security
(c) Enables faster development and automated testing
(d) Ensures compliance and Regulatory tracking.

vi→ Limitations →
(a) Requires training and expertise
(b) Can be complex for small projects
(c) Risk of merge conflicts in large teams.

vii→ SCM is widely used in Software Development, DevOps and IT Operations to manage code changes, automate builds, and track software versions.

viii→ It ensures smooth collaboration in large teams by allowing multiple developers to work on same thing without conflict).

ix→ It is also essential in regulated industries like healthcare and finance, where audit trail & compliance are critical.

x→ Ex→ In Linux Kernel Development, thousands of developers use Git & Github to manage code changes, track versions, and merge updates efficiently. This ensures stable releases while allowing parallel development and collaboration.

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Q.6 → Explain the significance of Gantt-Charts in Project Management.

Ans → i→ A Gantt-Chart is a visual project management tool that displays tasks, thier durations, dependencies and progress over time using a bar chart format.

ii→ It plays a crucial role in planning, scheduling and tracking project activities.

iii→ Key Significance :→ <1> Visual Representation of Project Timeline :- Displays tasks, durations and deadlines in a bar chart format for better clarity.

<2> Task Scheduling & Dependencies :- Helps in organising tasks in correct sequence and identifying dependencies to avoid delays.

<3> Resource Allocation & Workload Management :- Ensures optimal use of resources by preventing overallocation or underutilization.

<4> Tracking Progress & Milestones :- Allows monitoring of task completion status and achieving key project milestones on time.

<5> Improves Communication & Co-ordination :- Acts as a common reference for teams and stakeholders to enhance collaboration.

<6> Risk Identification & Mitigation :- Helps in spotting potential bottlenecks early and making adjustments to keep the project on track.

iv→ Benefits of Gantt-Chart → (a) Provides a clear picture of entire project.
(b) Helps track deadlines & avoid delays
(c) Ensures all team members stay informed
(d) Flexible and Adaptable.

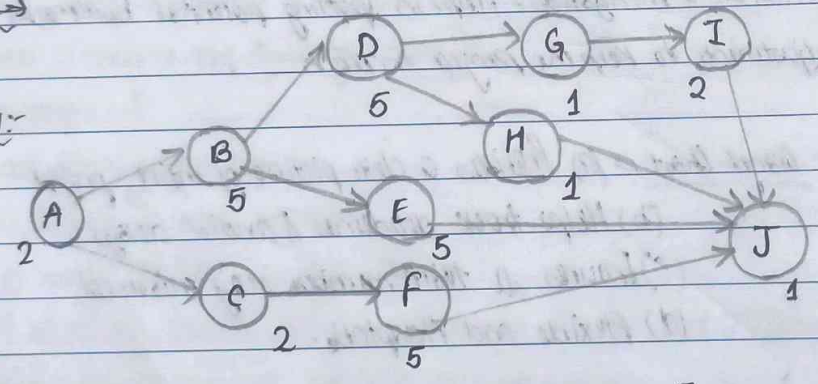
v→ Limitations of Gantt Chart → (a) Can become cluttered with too many tasks
(b) Time-consuming to update
(c) Shows what needs to be done but not how
(d) Changes in one task can impact multiple tasks

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

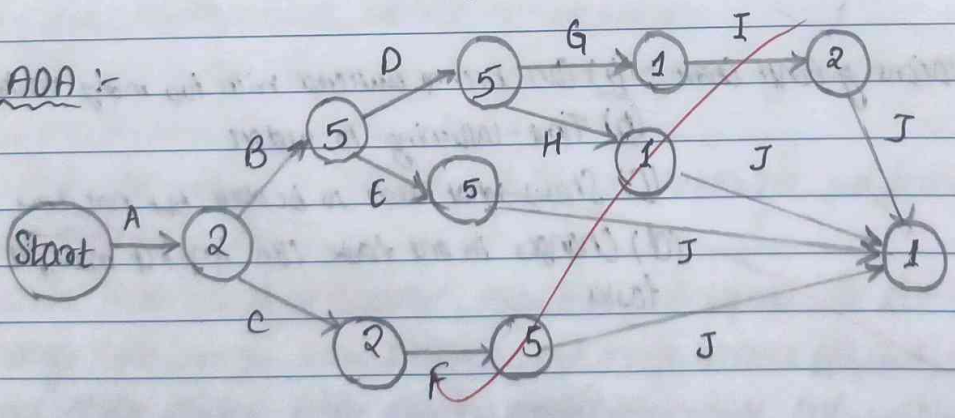
Activity	Time	Immediate Predecessors
A	2	–
B	5	A
C	2	A
D	5	B
E	5	B
F	5	C
G	1	D
H	1	D
I	2	G
J	1	E, G, H, I

Ans → Solution →

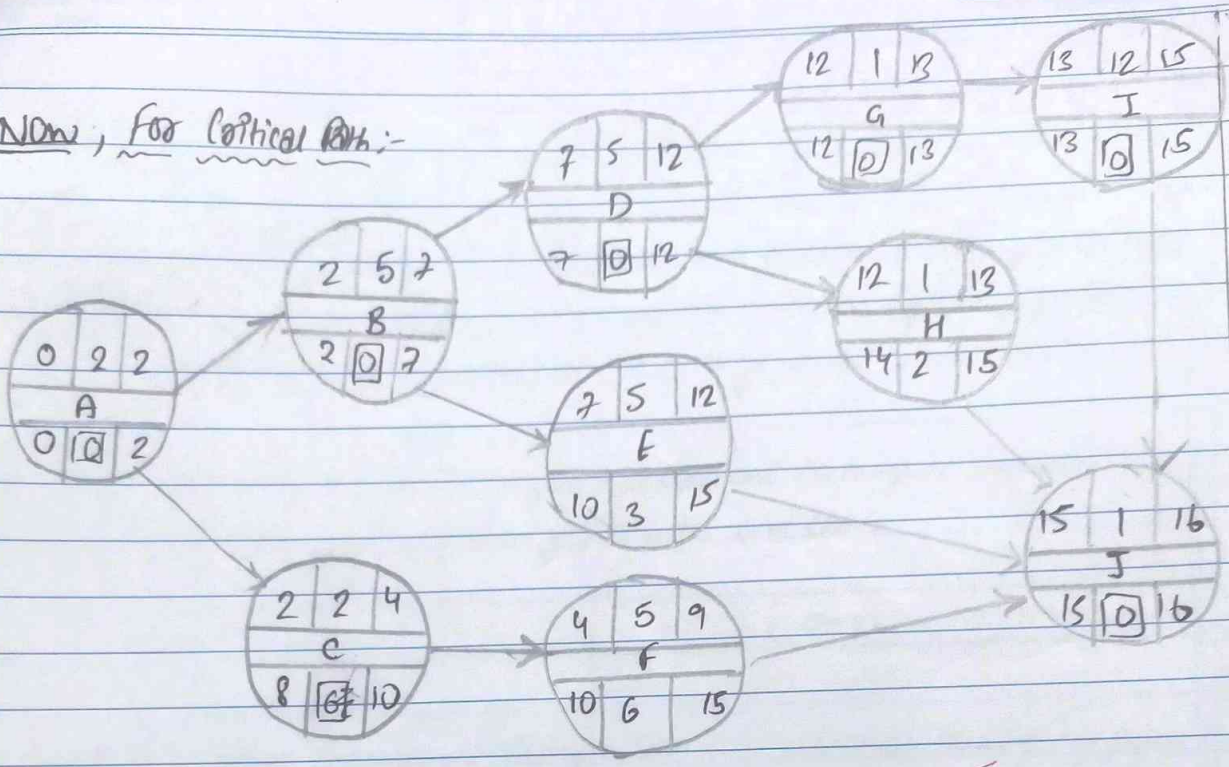
(i) AON :-



(ii) AOA :-



Now, For Critical Path :-



Critical Path :- A → B → D → E → I → J