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THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

# ASSIGNMENT - 2

Q1. Differentiate between CPM & PERT

| CPM | PERT |
|---|---|
| - CPM stands for Critical Path Method. | - PERT stands for Project Evaluation & Review technique. |
| - CPM is a technique of project management which is used to manage only certain activities of a project | - PERT is a technique of project management which is used to manage uncertain activities of a project |
| - It is a deterministic model | - It is a probability model |
| - It has repetitive nature of job. | - It has non repetitive nature of job. |
| - There may be crashing because of certain time bound | - There is no chance of crashing as there is no certainty of time. |
| - It is appropriate for reasonable time estimation | - It is appropriate for high precision time estimation. |
| - It uses dummy activities for representing sequence of activities | - It doesn't use any dummy activities |

Q2. Explain the difference between:

1. Total slack & Free slack

Total slack:

- Total slack is the amount of time a task can be delayed without delaying the project's overall completion date.
- It is calculated as the difference between the late finish & early finish of a task.
- If the total slack is zero, the task is on the critical path.
- If the total slack is negative, it means the project is behind schedule & needs compression techniques like crashing or fast tracking

Free slack:

- Free slack is the amount of time a task can be delayed without delaying

the start of any successor tasks
- It is useful for identifying tasks that can be postponed without affecting dependent activities.
- If free slack is zero, any delay in the task will immediately affect at least one successor task.

Key Differences:
- Total slack affects the entire project completion, whereas free slack only affects immediate successor tasks
- A task can have free slack but still have total slack, but not vice versa.
- Free slack is always equal to or less than total slack.

ii. AON & AOA diagrams

1. Activity On Node (AON):

Definition: In AON diagrams, activities are represented by nodes & dependencies between them are shown with arrows

Key characteristics:
- Nodes (rectangles) represent project activities
- Arrows indicate dependencies (precedence relationship) between activities
- Used in Predence Diagramming Method (PDM) which allows for different types of relationships:
  - Finish to start (FS)
  - Start to start (SS)
  - Finish to Finish (FF)
  - Start to Finish (SF)

Advantages:
- More flexible & widely used in Project Management
- Can represent lead & lag times effectively.

2. Activity on Arrow (AOA) Diagram:

Definition: In AOA diagrams, activities are represented by arrows while nodes represent the start & end points of activities.

Key characteristics:

- Arrows represent activities
- Nodes (circles) represent events
- Uses only finish to start (FS) relationship.
- Requires dummy activities to maintain correct sequencing.

Advantages:

- Clearly shows dependencies & the critical path
- Simpler for small projects.

3. 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 threads.

Steps in Risk Identification:

i. Review project scope & Objectives

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

iii. Use Risk Identification Techniques:

- Brainstorming: Gather team to list potential risks
- SWOT Analysis: Identify strengths, weaknesses, & threats
- Expert Judgement: Consult experienced professionals.

iv. Document Risks: Create a risk register listing identified risks with detail.

Risk Projection:

It involves analyzing identified risks to estimate their likelihood,

impact & security.

Aspects of Risk Projection

i. Likelihood Assessment: Assign a probability score
ii. Impact Analysis: Evaluate how much damage the risk can cause.
iii. Risk Exposure Calculation: Risk Exposure = Probability x Impact
iv. Risk Prioritization: High exposure risks require immediate action

RMMM Plan:

The RMMM plan is a structured approach to handling risks by reducing their probability & impact, monitoring their status & defining management strategies.

It stands for Risk Mitigation, Monitoring & Management

Components of an RMMM Plan:

i. Risk Mitigation:
Strategies to reduce or prevent risks before they occur.
ii. Risk Monitoring:
Ongoing tracking of risks to detect changes
iii. Risk Management:
Defines what actions to take if a risk materializes.

Q4. Consider a XYZ Company undertake a project to computerized accounting of ABC City Bank then -

i. Develop WBS for the same project
ii. Develop responsibility Matrix

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
2. 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 Fundamental 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
5.4 Go live

6. Transact training & Documentation.

6.1 Employee training service
6.2 Customer support training
6.3 Troubleshooting
6.4 Maintenance & support

ii Responsibility Assignment Matrix:
This matrix defines roles & responsibilities of different team members.

| Task/ 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 |
| Software Development | 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 |

Q5. Explain Software Configuration Management in Detail
Software Configuration Management is a systematic approach to managing changes in software throught its development lifecycle.
It ensures that software modifications are well tracked, controlled & documented to maintain consistency, integrity & reliability

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Objectives of SCM:

i. Version control: Tracks different versions of software & ensures smooth updates
ii. Change Management: Manages modifications in code, design & documentation systematically.
iii. Configuration Identification: Establishes a structured way to identify software components.
iv. Configuration control: Ensures that changes are reviewed & approved.
v. Auditing & status Accounting: Keeps record of software changes for transparency & traceability
vi. Build & Release Management: Helps in controlled software releases.

SCM Process Components:

i. Configuration Identification:
- Define all items in the software system that need to be managed.

ii. Configuration Control:
- Controls modifications to config items through an approval process.

iii. Version Control:
- Maintains different versions of software to avoid conflicts & loss of work

iv. Change Management:
- Tracks all changes made to software & ensures proper documentation.

v. Config Audits & Devices:
- Conducts audits to ensure software is in the expected state.

Tools & Techniques used in SCM:

i. Version Control Systems:
- Git - Over distributed version control
- SVN - distributed version control

ii. Build & Release Management Tools:
- Jenkins, GitLab - Automate software builds & deployments.
iii. Issue & change tracking tools:
- JIRA - tracks schedule, bugs, issues

Q6. Explain the significance of Gantt charts in project management.
A Gantt chart is a visual project management tool that represents a project's schedule over time.
Key Features of Gantt Charts:
- Task Representation: Displays Project tasks as horizontal bars along a pipeline
- Time scheduling: shows start & end dates for each task.
- Dependencies: Illustrates relationships between tasks.
- Progress tracking: Allow teams to update completion status.
- Resource Allocation: Helps in assigning resources efficiently.

Importance of Gantt charts:
1. Clear Project Planning & scheduling:
- Provides a structured breakdown of tasks & milestones
- Helps in defining deadlines & realistic expectations
2. Task Dependencies
- shows which tasks depend on others, ensuring proper sequencing
- Helps identify the critical path
3. Resource Allocation & Workload Balancing
- Ensures resources are allocated efficiently
- Avoids resource overloading.
4. Real time Progress tracking:
- Helps teams monitor progress by updating task completion percentages
- Identifies delays early.

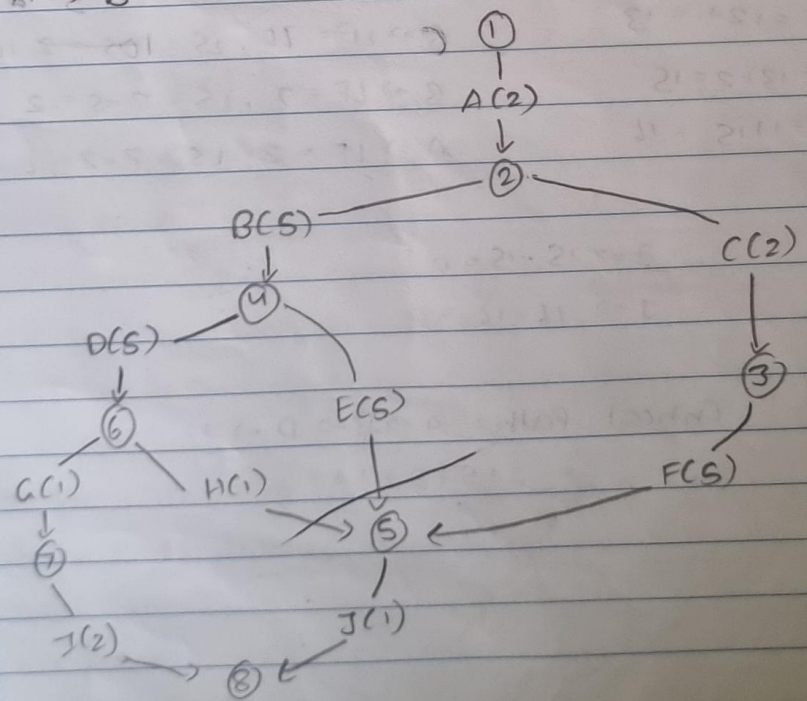
5. Helps in Risk Management
- Identifies Potential Bottlenecks & delays before they become critical issues
- Allows for contingency planning if tasks fall behind the schedule.

Q7. Draw the AON & AOA network diagram for the following project & show the critical path

| 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 |

AOA: Activity on Arrow Diagram (AOA):
For the given predecessors, we identify the various paths & calculate the duration.

- A → B → C → D → F → J = 2 + 5 + 2 + 5 + 5 + 1 + 1 = 19
- A → B → C → D → G → I →



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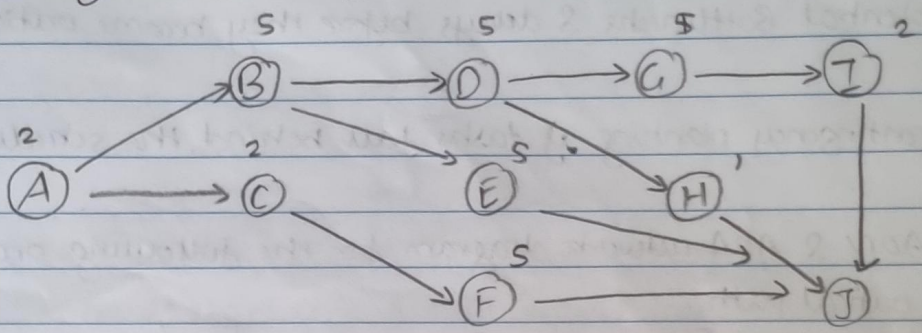
## Activity on Node Diagram: (AON)




### Critical Path Calculation

**Forward Pass:**

A ⇒ ES = 0, EF = 2

B ⇒ ES = 2, EF = 5+2 = 7

C ⇒ ES = 2, EF = 2+2 = 4

D ⇒ ES = 7, EF = 7+5 = 12

E ⇒ ES = 7, EF = 7+5 = 12

F ⇒ ES = 4, EF = 4+5 = 9

G ⇒ ES = 12, EF = 12+1 = 13

H ⇒ ES = 12, EF = 12+1 = 13

I ⇒ ES = 13, EF = 13+2 = 15

J ⇒ ES = 15, EF = 1+15 = 16

**Backward Pass:**

J ⇒ LF = 16, LS = 16-1 = 15

I ⇒ LF = 15, LS = 15-2 = 13

H ⇒ LF = 13, LS = 13-1 = 12

F ⇒ LF = 15 LS = 15-5 = 10

E ⇒ LF = 15 LS = 15-5 = 10

G ⇒ LF = 13 LS = 13-1 = 12

D ⇒ LF = 12 LS = 12-5 = 7

C ⇒ LF = 10, LS = 10-2 = 8

B ⇒ LF = 7, LS = 7-5 = 2

A ⇒ LF = 2 LS = 2-2 = 0

**Slack:**

A ⇒ 0-0 = 0

B ⇒ 2-2 = 0

C ⇒ 13-4 = 7

D ⇒ 7-7 = 0

E ⇒ 15-12 = 3

F ⇒ 15-9 = 6

G ⇒ 13-13 = 0

H ⇒ 12-12 = 0

I ⇒ 15-15 = 0

J ⇒ 16-16 = 0

Critical Path: A → B → D → H → J

= 2+5+5+1+1

= 14