Times asked: 6 times
5 times
4 times
3 times
2 times
1 time

# indicates 5-mark question

Link for complete PYQ analysis & Previous year papers

Project Management Question bank

1. Project Management Foundation

1. Explain the triple constraints in Project Management. #
2. Differentiate between Functional, Pure Project and Matrix organizations.
3. Why is project management essential in today's business environment, and how does it help achieve organizational goals?
4. What is the project life cycle? How is the cost of change, risk, and influence of stakeholders affected by project time during the life cycle of the project?
5. Write a short note on: Role of Project Manager. #

2. Initiating Projects

6. Explain the stages of team development and growth. #
7. NPV-Based Project Selection Problems,
   i. A project requires an initial investment of Rs. 30,000 in a project.
   The project generates annual cash inflows of Rs. 10,000, Rs. 12,000 and Rs. 15,000 for 3 years respectively. If rate of discount is 12% per annum, calculate Net Present Value. Comment on whether the project should be accepted or rejected.
   ii. ABC Industries has a potential project with an initial cost of Rs. 20,00,000. The capital budget allows to accept only one project. Using the NPV method, which project should be selected?

Cash Flows (Year)	Project A	Project B	Project C	Project D
1.	6,00,000	5,00,000	10,00,000	3,00,000
2.	6,00,000	5,00,000	8,00,000	5,00,000
3.	6,00,000	5,00,000	6,00,000	7,00,000
4.	6,00,000	5,00,000	4,00,000	9,00,000
5.	6,00,000	5,00,000	2,00,000	11,00,000
Discount Rate	9%	6%	15%	22%

8. What are the numeric and non-numeric models of project selection? #
9. Write a short note on: Project charter and Project sponsor. #
10. Write a short note on: Project portfolio process. #
11. What are the advantages of an effective team and barriers to team effectiveness? #

3. Project Planning and Scheduling

12. Problem on Project Network Diagram, Critical Path, Duration, Probabilities (PERT/CPM)
    i. The R & D project has a list of tasks to be performed whose time estimates are given below:

Activity	Predecessor Activity	t_o	t_m	t_p
A	-	2	4	6
B	A	3	6	9
C	A	8	10	12
D	B	9	12	15
E	C	8	9	10
F	D, E	16	21	26
G	D, E	19	22	25
H	F	2	5	8
I	G	1	3	5

    a) Draw the project network.
    b) Find the critical path.
    c) Find the time required to complete the project and identify the critical activities.

13. Write a short note on: Work Breakdown Structure (WBS). #
14. Explain and differentiate between top-down and bottom-up budgeting approaches. #
15. Explain GANTT chart with suitable example. #
16. Write a short note on: Project Management Information System (PMIS). #
17. Describe various project cost estimation and scheduling techniques. #

4. Planning Projects

18. Explain Goldratt's critical chain method. #
19. Explain the probability and impact matrix. What are the risk response strategies for negative risks (threats) and positive risks (opportunities)?

5. Project Executing, Monitoring & Controlling

20. Numerical EVM problems to find Schedule, Cost variance, SPI and CPI, PYQ: #
    i. A project in its 20th week has an actual cost of Rs. 250,000. It was scheduled to have spent Rs. 241,000. For the work performed to date, the budgeted value is Rs. 252,000. What are the cost and schedule variances for the project? What are the SPI and CPI? #
    ii. A consulting project has an actual cost of Rs. 35,000, scheduled cost of Rs. 27,000, and completed work of Rs. 31,000. Find the Scheduled and Cost Variance. Also find SPI and CPI. #
21. How is communication planned and managed in project management?
22. What are the responsibilities of the project auditor? What is essential for a successful project audit?
23. Write a short note on: Project procurement management. #

24. What are the different types of contracts? Draw the graph showing risk exposure to the buyer and seller in various contract types.
25. Define scope creep. What are two ways to control it in a project? #
26. Describe Earned Value Management technique in Project Management. #
27. Briefly describe the purchasing cycle. #

6. Project Leadership, Ethics and Closure

28. What is project termination? Discuss the various reasons for project termination and explain different types of project termination.
29. Explain the importance of ethics in projects. #
30. Explain multicultural and virtual projects. #

Module-wise Marks Weightage and Question Count

	1	2	3	4	5	6
2025 Aug	25 (3)	25 (3)	25 (3)	15 (2)	20 (3)	15 (2)
2025 May	20 (3)	25 (3)	25 (3)	15 (2)	25 (4)	20 (3)
2024 Dec	15 (2)	20 (3)	25 (4)	20 (3)	25 (3)	25 (3)
2024 May	5 (1)	25 (4)	30 (4)	20 (3)	25 (4)	20 (3)
2023 Dec	30 (4)	15 (2)	20 (3)	15 (2)	40 (5)	10 (1)
2023 May	10 (1)	35 (5)	15 (2)	20 (3)	35 (5)	15 (2)
Estimate	**15-20 (2-3)**	**25 (3)**	**25 (3)**	**15-20 (2-3)**	**25 (3-4)**	**15-20 (2-3)**
Total	105	145	140	105	170	105

Asked once:

1. Project Management Foundation

1. Explain conflicts in Project Management. Why are negotiations important in Project Management?
2. Describe the typical and atypical project life cycles, highlighting the stages in the stage-gate process.

2. Initiating Projects

3. Explain the significance of IRR method in project selection. #

3. Project Planning and Scheduling

4. What is concurrent engineering? #

4. Planning Projects

5. Who are the stakeholders in projects? Why is communication the most important part of a project manager's job?
6. Explain the project buffer. #
7. What is the difference between resource loading and resource levelling? #
8. Explain the risk breakdown structure. #

5. Project Executing, Monitoring & Controlling

9. Draw an Earned Value chart. Describe the three variances of it and explain their significance.
10. What are the advantages and risks of outsourcing in project management? #
11. What is the difference between contracting and outsourcing? #
12. What is the importance of vendor documents? How should vendor documents be preserved?
13. Why are meetings useful in project monitoring? What rules should be followed to maximize the effectiveness of meetings?

6. Project Leadership, Ethics and Closure

14. Explain the project management template with a sample template sheet.

Project Management Answer bank

# indicates 5-mark question

1. Project Management Foundation

1. Explain the triple constraints in Project Management. #

The Triple Constraint (also known as the Project Management Triangle) refers to the three key factors that must be balanced in any project: Scope, Time, and Cost. These constraints are interdependent, meaning a change in one affects the others.

Components of Triple Constraint

Scope

- Scope defines the total work to be completed in the project.
- It includes requirements, features, and final deliverables.
- It clearly specifies what is included and what is excluded in the project.

Example: Developing a mobile app with login, dashboard, and payment features.

Time

- Time refers to the duration required to complete the project.
- It includes scheduling, deadlines, and important milestones.
- It is managed using tools like Gantt charts and project timelines.

Example: Completing the mobile app within 3 months.

Cost

- Cost represents the total budget required for the project.
- It includes expenses like manpower, tools, and resources.
- Proper cost planning ensures the project stays within budget.

Example: Budget for developers, software tools, and testing.

Relationship Between Constraints

The three constraints are interdependent and directly related:

- **Increase in scope** → increases time and cost.
- **Reduction in time** → may increase cost or reduce scope.
- **Reduction in cost** → may reduce scope or increase time.

Hence, a project manager must balance all three constraints to ensure project success.

2. Differentiate between Functional, Pure Project and Matrix organizations.

Parameter	Functional Organization	Pure Project Organization	Matrix Organization
Structure	Based on departments (HR, IT, Finance)	Separate team for each project	Combination of pure project and functional
Authority	Functional manager controls departmental activities	Project manager has full control	Shared between functional & project manager
Project Manager Role	Little or no authority	Full authority over project	Moderate authority
Resource Allocation	Resources stay within departments.	Dedicated resources for project	Resources shared across projects.
Decision making	Slow (hierarchical)	Fast (Centralized)	Moderate
Communication	Vertical (department-based)	Direct and fast	Both vertical and horizontal
Flexibility	Low flexibility	High flexibility	Medium flexibility
Team Loyalty	Towards department	Towards project	Divided between both
Cost	Low-cost structure	High cost (duplicate resources)	Moderate cost
Complexity	Simple structure	Simple but projects operate independently	Complex to manage
Example	A college where teachers belong to departments like Computer or Mechanical.	A construction company building a bridge with a dedicated team.	An IT company where developers report to both a project manager and a functional manager.

3. Why is project management essential in today's business environment, and how does it help achieve organizational goals?

Project Management is the process of planning, organizing, executing, and controlling project activities to achieve specific goals within the constraints of time, cost, and scope.

A project is a temporary activity carried out to create a unique product, service, or result. Project management helps ensure that projects are completed successfully and efficiently.

Importance of Project Management

- **Handles increasing complexity**
  Helps manage large projects involving multiple teams and technologies.
- **Efficient use of resources**
  It ensures proper use of manpower, time, and budget without unnecessary wastage.
- **Completes work on time and within budget**
  Helps meet deadlines while keeping costs under control.
- **Improves quality of work**
  Ensures deliverables meet required standards and expectations.
- **Better risk management**
  Risks can be identified early and appropriate actions can be taken to reduce their impact.
- **Improves communication and coordination**
  It helps maintain smooth communication and coordination among teams and stakeholders.

How Project Management Helps Achieve Organizational Goals

- **Aligns projects with business objectives.**
  Project activities are planned in a way that supports the organization's overall goals and strategy.
- **Increases productivity and efficiency.**
  Proper planning and execution help organizations achieve better results with available resources.
- **Ensures customer satisfaction.**
  Timely delivery and quality results help improve customer trust and satisfaction.
- **Improves competitive advantage.**
  Organizations can deliver better products and services faster than competitors through effective project management.

Example: A software company developing an application uses project management to plan tasks, allocate resources, and meet deadlines, helping achieve customer satisfaction and business growth.

4. What is the project life cycle? How is the cost of change, risk, and influence of stakeholders affected by project time during the life cycle of the project?

The Project Life Cycle refers to the sequence of phases a project goes through from its beginning to its completion. It provides a structured approach to plan, execute, and control the project effectively.

Phases of Project Life Cycle

1. Initiation

- This phase focuses on identifying the project need and defining clear objectives.
- It includes feasibility analysis and identifying key stakeholders.

2. Planning

- In this phase, scope, schedule, cost, and resources are clearly defined.
- Risk planning and proper scheduling are also carried out.

3. Execution

- The actual work of the project is performed in this phase.
- Teams are managed and resources are utilized to complete tasks.

4. Monitoring & Controlling

- Project progress and performance are continuously tracked.
- Necessary actions are taken to control time, cost, and quality.

5. Closure

- The project is completed and the final output is delivered.
- Documentation is done and formal approval is obtained.

Effect of Project Time on

1. Cost of Change

- In the early stages, changes are easy to implement and involve low cost.
- As the project progresses, changes become harder and require more effort.
- In later stages, changes are very expensive due to rework and delays.

2. Risk Level

- Risk is highest at the beginning due to lack of clarity.
- It reduces gradually as the project progresses and planning improves.

3. Stakeholder Influence

- Stakeholders have maximum influence in the early stages.
- They can impact key decisions like scope and objectives.
- Their influence reduces in later stages as the project becomes fixed.

5. Write a short note on: Role of Project Manager. #

A Project Manager is responsible for planning, executing, and controlling a project to achieve its objectives within time, cost, and scope constraints. They ensure that the project is completed successfully.

Role of a Project Manager

1. **Planning the Project**

   Defines project objectives, scope, and budget to provide clear direction for the project.

2. **Organizing Resources**

   Allocates manpower, materials, and other resources efficiently to ensure smooth project execution.

3. **Leading the Team**

   Guides, motivates, and coordinates team members to maintain productivity and teamwork.

4. **Monitoring and Controlling**

   Tracks project progress and ensures activities are completed as per the planned schedule.

5. **Managing Risks**

   Identifies potential risks early and takes necessary actions to minimize their impact.

6. **Ensuring Quality**

   Maintains quality standards to ensure the final deliverables meet expectations.

7. **Communication Management**

   Ensures clear and effective communication among team members and stakeholders.

2. Initiating Projects

6. Explain the stages of team development and growth. #

Team development is the process through which a group of individuals gradually becomes a well-coordinated and effective team. As the team grows and gains experience, it usually passes through five stages of development.

1. Forming

- Team members come together and start understanding the project, but roles are still unclear and everyone is getting comfortable
- Members are usually polite and careful in their interactions

Example: A new project team meets for the first time and discusses basic project goals

2. Storming

- Differences in ideas and working styles lead to conflicts and disagreements among members
- This stage helps in bringing out issues and setting expectations

Example: Team members argue over which technology or approach should be used

3. Norming

- Team members begin resolving conflicts and develop better trust, and understanding.
- Roles become clearer and teamwork starts improving significantly.

Example: The team agrees on a common approach and starts collaborating smoothly

4. Performing

- The team works efficiently with good coordination and focuses on achieving project goals
- Members are confident and can handle tasks with minimal supervision.

Example: The team completes tasks on time with proper coordination and high productivity

5. Adjourning

- The project is completed and the team is formally disbanded.
- Members may move on to new projects after reviewing their work.

Example: After delivering the final product, the team wraps up and shifts to other projects

7. NPV-Based Project Selection Problems,
   i. A project requires an initial investment of Rs. 30,000 in a project. The project generates annual cash inflows of Rs. 10,000, Rs. 12,000 and Rs. 15,000 for 3 years respectively. If rate of discount is 12% per annum, calculate Net Present Value. Comment on whether the project should be accepted or rejected.

Given Data:

- Initial Investment = **Rs. 30,000**
- Discount Rate = **12% per annum**
- Cash Inflows:
  - Year 1: **Rs. 10,000**
  - Year 2: **Rs. 12,000**
  - Year 3: **Rs. 15,000**

Net Present Value (NPV) Calculation Table

Year (t)	Cash Inflow (Rs.)	PV Factor @12%	Present Value (Rs.)
1	**10,000**	$\frac{1}{(1+0.12)^1}$ = 0.893	8,930
2	**12,000**	$\frac{1}{(1+0.12)^2}$ = 0.797	9,564
3	**15,000**	$\frac{1}{(1+0.12)^3}$ = 0.712	10,680
			Total PV = Rs. 29,174

Net Present Value (NPV)

$$NPV = Total\ PV\ of\ Inflows - Initial\ Investment$$

$$= 29,174 - 30,000$$

$$= -Rs.\ 826$$

Final Interpretation:

Since NPV is **negative (- Rs. 826)**, the project should be **rejected**.

A negative NPV means the project does not generate enough returns to cover the initial investment.

ii. ABC Industries has a potential project with an initial cost of Rs. 20,00,000. The capital budget allows to accept only one project. Using the NPV method, which project should be selected?

Cash Flows (Year)	Project A	Project B	Project C	Project D
1.	6,00,000	5,00,000	10,00,000	3,00,000
2.	6,00,000	5,00,000	8,00,000	5,00,000
3.	6,00,000	5,00,000	6,00,000	7,00,000
4.	6,00,000	5,00,000	4,00,000	9,00,000
5.	6,00,000	5,00,000	2,00,000	11,00,000
Discount Rate	9%	6%	15%	22%

Initial Investment = Rs. 20,00,000.

NPV Calculation: (Use formula from problem i. to calculate PV)

Project A (Discount Rate = 9%)

Year (t)	Cash Inflow (Rs.)	PV Factor @9%	Present Value (Rs.)
1	6,00,000	0.917	5,50,200
2	6,00,000	0.842	5,05,200
3	6,00,000	0.772	4,63,200
4	6,00,000	0.708	4,24,800
5	6,00,000	0.650	3,90,000

Total PV = 23,33,400

NPV = 23,33,400 − 20,00,000

= Rs. 3,33,400

Project B (Discount Rate = 6%)

Year (t)	Cash Inflow (Rs.)	PV Factor @6%	Present Value (Rs.)
1	5,00,000	0.943	4,71,500
2	5,00,000	0.890	4,45,000
3	5,00,000	0.840	4,20,000
4	5,00,000	0.792	3,96,000
5	5,00,000	0.747	3,73,500

Total PV = 21,06,000

NPV = 21,06,000 − 20,00,000

= Rs.1,06,000

Project C (Discount Rate = 15%)

Year (t)	Cash Inflow (Rs.)	PV Factor @15%	Present Value (Rs.)
1	10,00,000	0.870	8,70,000
2	8,00,000	0.756	6,04,800
3	6,00,000	0.658	3,94,800
4	4,00,000	0.572	2,28,800
5	2,00,000	0.497	99,400

Total PV = 21,97,800

NPV = 21,97,800 − 20,00,000

= Rs.1,97,800

Project D (Discount Rate = 22%)

Year (t)	Cash Inflow (Rs.)	PV Factor @22%	Present Value (Rs.)
1	3,00,000	0.820	2,46,000
2	5,00,000	0.672	3,36,000
3	7,00,000	0.551	3,85,700
4	9,00,000	0.452	4,06,800
5	11,00,000	0.370	4,07,000

Total PV = 17,81,500

NPV = 17,81,500 − 20,00,000

= - Rs. 2,18,500

Final Interpretation

Project	NPV (Rs.)
Project A	3,33,400
Project B	1,06,000
Project C	1,97,800
Project D	-2,18,500

Project A should be selected as it has the highest NPV of **+Rs. 3,33,400.**

Other NPV based project selection problems asked:

1. Assume that ABC Inc. is considering two projects, namely Project X and Project Y, and wants to calculate the NPV for each project.
   Both Project X and Project Y are four-year projects, and the cash flows of both projects for four years are given below:

Year	Project A Cash Flows in Rs.	Project B Cash Flows in Rs.
1	5000	1000
2	4000	3000
3	3000	4000
4	1000	6750

   The firm's cost of capital is 10% for each project, and the initial investment amount is Rs. 10,000. Calculate the NPV of each project and determine in which project the firm should invest.

2. A project requires an initial investment of Rs. 200,000 and it is expected to generate a cash flow of Rs. 10,000 for 3 years.
   The target rate of return of the project is 12% per annum. Calculate the Net Present Value of the project. #

3. Consider a project having the following cash flow stream. The cost of capital (r) for the firm is 10%. Calculate NPV of the project and decide whether to accept or reject the project.

Year	0	1	2	3	4	5
CASH Flow in Rs.	10,00,000	2,00,000	2,00,000	3,00,000	3,00,000	3,50,000

8. What are the numeric and non-numeric models of project selection? #

Project selection models are methods used to evaluate different project options and choose the most suitable one. Numeric models focus on financial aspects, while non-numeric models consider strategic and qualitative factors.

Numeric Models of Project Selection

1. **Payback Period**
   Measures how long it takes to recover the initial investment made in the project
2. **Net Present Value (NPV)**
   Calculates the present value of future cash flows to check if the project is profitable
3. **Internal Rate of Return (IRR)**
   Determines the rate of return at which the project's cost and returns become equal

Non-Numeric Models of Project Selection

1. **Sacred Cow Model**
   A project is selected based on the preference or decision of top management, even if it may not be financially justified
2. **Operating Necessity Model**
   A project is undertaken because it is essential for the day-to-day functioning or survival of the organization
3. **Competitive Necessity Model**
   A project is chosen to remain competitive in the market or to match competitors' actions
4. **Comparative Benefit Model**
   Projects are compared based on their overall benefits, and the one with the highest advantage is selected

9. Write a short note on: Project charter and Project sponsor. #

Project Charter

A Project Charter is a formal document that officially starts a project. It gives approval to begin the project and authorizes the project manager to use organizational resources. It is prepared during the initiation phase.

Contents of Project Charter

- Includes the project name, brief description, and project objectives.
- Contains details about project scope, stakeholders, and the project manager.
- Includes estimated budget, timeline, major risks, and important assumptions related to the project.

Importance of Project Charter

- Clearly defines the purpose and direction of the project
- Provides official approval to start the project
- Acts as a reference document throughout the project

Project Sponsor

A Project Sponsor is a senior person in the organization who provides financial support and overall backing for the project. They provide necessary resources and ensure that the project aligns with business goals.

Role of Project Sponsor

- Approves the project and provides overall direction and support.
- Ensures availability of funds and required resources.
- Acts as a link between top management and the project team.

10. Write a short note on: Project portfolio process. #

Project Portfolio Process is a high-level management activity used to select, prioritize, and manage a group of projects (portfolio) so that they align with the organization's strategic goals.

Steps in Project Portfolio Process

1. Project Identification

- Possible projects are identified based on business needs, opportunities, or company goals

2. Project Evaluation

- Projects are evaluated using factors like cost, benefits, risk, and feasibility

3. Project Selection

- The most suitable projects are shortlisted based on their value and feasibility

4. Prioritization

- Selected projects are ranked based on importance, urgency, and business impact

5. Portfolio Balancing

- Projects are balanced to ensure proper use of resources and a mix of risk levels

6. Monitoring and Control

- Projects are regularly reviewed to track performance and make necessary adjustments

Example:
An IT company evaluating multiple project proposals and selecting only those that align with its strategic goals and available resources.

11. What are the advantages of an effective team and barriers to team effectiveness? #

Advantages of an Effective Team

- **Better performance and productivity**
  When team members work well together, tasks are completed faster and with better results.
- **Improved problem-solving**
  Different viewpoints help the team come up with more effective solutions.
- **Stronger communication**
  Clear communication helps avoid confusion and keeps everyone on the same page.
- **Higher motivation**
  A positive team environment keeps members motivated and willing to contribute.

Barriers to Team Effectiveness

- **Poor communication**
  Lack of proper communication can lead to misunderstandings and mistakes.
- **Conflicts and lack of trust**
  Frequent conflicts and low trust can affect teamwork and cooperation.
- **Unclear roles and responsibilities**
  When roles are not clearly defined, work may get delayed.
- **Lack of leadership**
  Without proper guidance, the team may lose direction and focus.

3. Project Planning and Scheduling

12. Problem on Project Network Diagram, Critical Path, Duration, Probabilities (PERT/CPM)

i. The R & D project has a list of tasks to be performed whose time estimates are given below:

Activity	Predecessor Activity	t_o	t_m	t_p
A	-	2	4	6
B	A	3	6	9
C	A	8	10	12
D	B	9	12	15
E	C	8	9	10
F	D, E	16	21	26
G	D, E	19	22	25
H	F	2	5	8
I	G	1	3	5

a) Draw the project network.
b) Find the critical path.
c) Find the time required to complete the project and identify the critical activities.

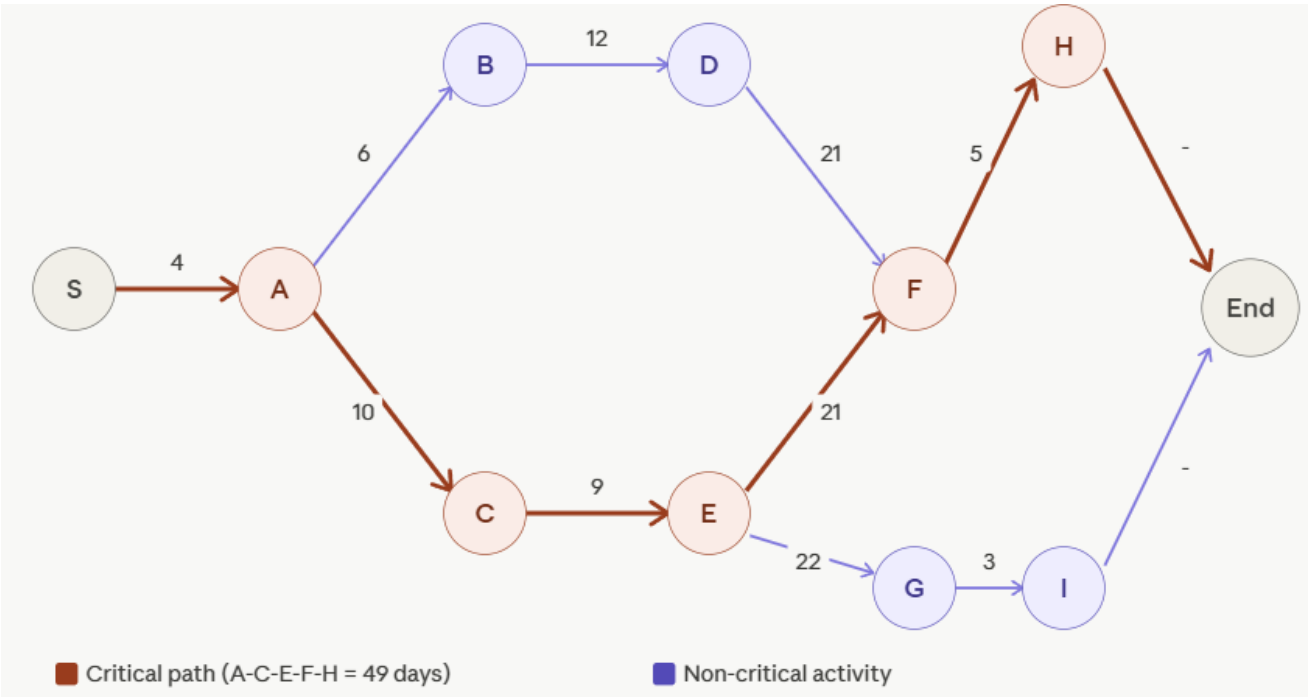
Step 1: Calculate Expected Time (te)

Formula:

$$t_e = \frac{t_o + 4t_m + t_p}{6}$$

Activity	**Predecessor**	**t_o**	**t_m**	**t_p**	**$t_e = (t_o + 4t_m + t_p) / 6$**
A	-	2	4	6	(2 + 16 + 6) / 6 = **4**
B	A	3	6	9	(3 + 24 + 9) / 6 = **6**
C	A	8	10	12	(8 + 40 + 12) / 6 = **10**
D	B	9	12	15	(9 + 48 + 15) / 6 = **12**
E	C	8	9	10	(8 + 36 + 10) / 6 = **9**
F	D, E	16	21	26	(16 + 84 + 26) / 6 = **21**
G	D, E	19	22	25	(19 + 88 + 25) / 6 = **22**
H	F	2	5	8	(2 + 20 + 8) / 6 = **5**
I	G	1	3	5	(1 + 12 + 5) / 6 = **3**

Step 2: Draw the Project Network



Step 3: Find the Critical Path

All possible paths and their total durations:

Path	**Activities**	**Total Duration**
Path 1	A - B - D - F - H	4+6+12+21+5 = **48**
Path 2	A - C - E - F - H	4+10+9+21+5 = **49**
Path 3	A - C - E - G - I	4+10+9+22+3 = **48**
Path 4	A - B - D - G - I	4+6+12+22+3 = **47**

Step 4: Critical Path and Project Duration

Critical Path: A - C - E - F - H

Total Project Duration = 49 days

The critical path is the longest path through the network. Any delay in activities A, C, E, F, or H will directly delay the project completion.

Critical Activities: A, C, E, F, H

Other Critical Path / PERT-CPM Problems Asked:

These questions are similar to the solved problem but may additionally include probability calculations, variance analysis, expected project duration, or manpower optimization in PERT/CPM networks.

1. A project has a list of tasks to be performed whose time estimates are given in the table as follows:

Activity	Activity Name	Time estimates in days		
		t_o	t_m	t_p
1-2	A	4	6	8
1-3	B	2	3	10
1-4	C	6	8	16
2-4	D	1	2	3
3-4	E	6	7	8
3-5	F	6	7	14
4-6	G	3	5	7
4-7	H	4	11	12
5-7	I	2	4	6
6-7	J	2	9	10

Draw the project network diagram. Determine the critical path for the activities.

2. A small project consisting of ten activities has the following characteristics:

Activity	*Preceding Activity*	*Time Estimate weeks*		
		Optimistic	*Most likely*	*Pessimestic*
A	–	4	5	12
B	–	1	1.5	5
C	A	2	3	4
D	A	3	4	11
E	A	2	3	4
F	C	1.5	2	2.5
G	D	1.5	3	4.5
H	B,E	2.5	3.5	7.5
I	H	1.5	2	2.5
J	F,G,I	1	2	3

Determine the critical path.

3. A project is composed of 8 activities, the time estimates for which are given below:

Activity	Predecessor	Duration		
		t_o	t_m	t_p
A	-	2	4	12
B	-	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B, C	9	9	9
G	D	3	3.5	7
H	E, F, G	5	5	5

Z	Probability (P)
0	0.5
0.5	0.6950
1	0.843

(i) Draw the network diagram.
(ii) Find the critical path and expected project duration.
(iii) Calculate the standard deviation and variance of the project.
(iv) What is the probability of completing the project on a 30-week deadline?

4. Following are the manpower requirements for each activity in a project:

Activity	Normal Time	Man Power Required
0 -1	2	4
1-2	3	3
1-3	4	3
2-4	2	5
3-5	4	3
3-6	3	4
4-7	6	3
5-7	6	6
6-8	5	2
7-9	4	2
8-9	4	9

i. Draw the project network diagram.
ii. Rearrange the activity suitably to reduce the existing total manpower requirement.

5. A small project is composed of 8 activities, whose time estimates are listed below:

Activity	Predecessor	t_o	t_m	t_p
A	-	3	6	9
B	-	5	7	8
C	A	6	9	12
D	A	6	12	15
E	B	9	12	18
F	B	12	18	24
G	C, D, E	6	9	12
H	C	3	6	9

i. Draw the project network diagram. Find the critical path and expected project duration.

ii. If the due date is 30 days, what is the probability that the project will be completed within the due date?

iii. Find the probability of completing the project between 26 to 31 days.

13. Write a short note on: Work Breakdown Structure (WBS). #

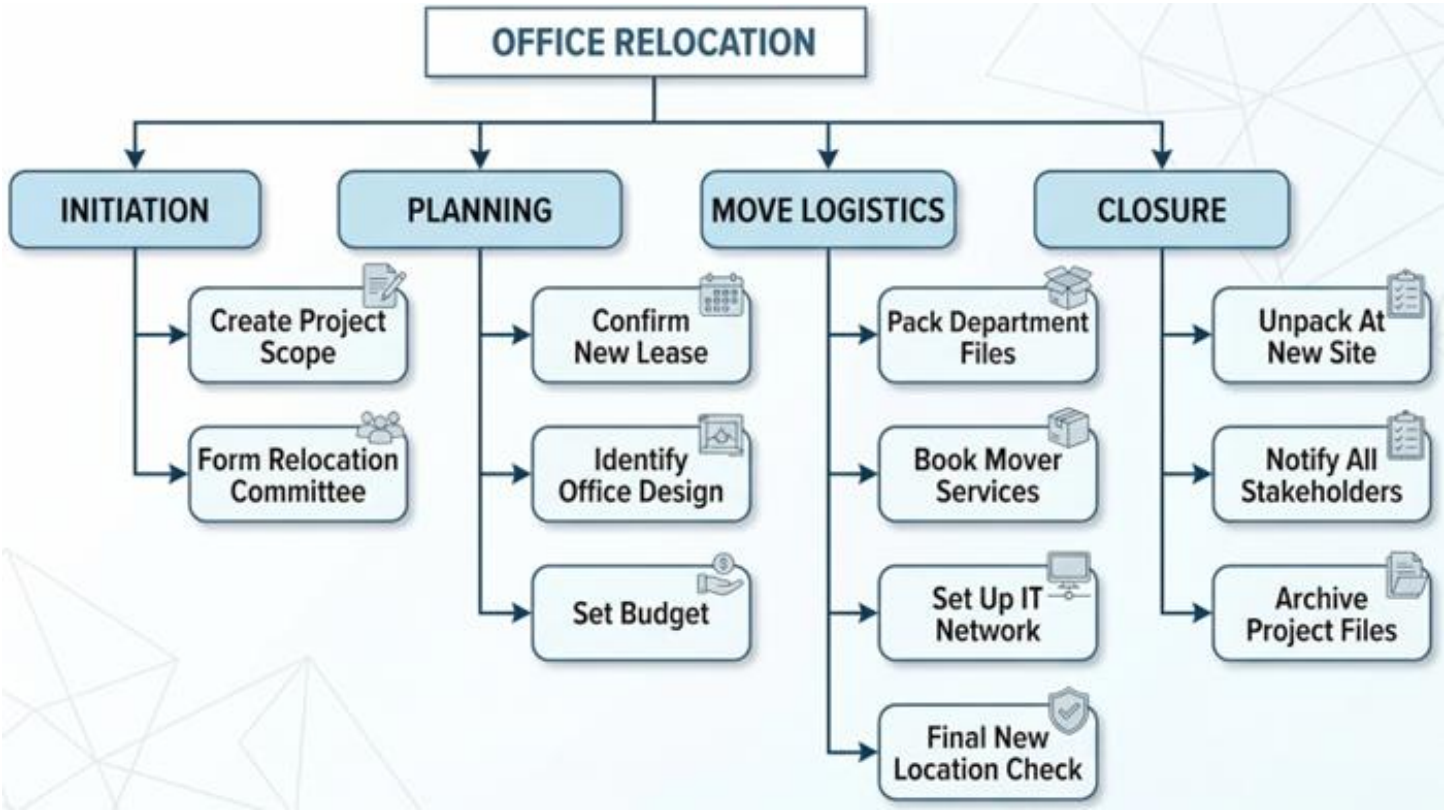
Work Breakdown Structure (WBS) is a project management tool used to divide a project into smaller, manageable parts so that the work can be planned and executed easily.

Explanation

- WBS breaks the project into smaller tasks in a step-by-step, hierarchical manner
- The lowest level is called a work package, where tasks are clearly defined and assigned
- It helps in better planning by improving estimation of time, cost, and resources
- It also ensures clarity of scope and helps in monitoring project progress

Example

An office relocation project is divided into phases like planning, moving, and closure, and further into smaller tasks like setting budget and booking movers.



14. Explain and differentiate between top-down and bottom-up budgeting approaches. #

Top-Down Budgeting

Top-down budgeting is a method where the budget is prepared by senior management and then distributed to different departments.

- Budget is decided at the top level based on overall organizational goals.
- Total project cost is estimated first and then divided among departments.
- Departments plan their activities within the given budget limits.

Bottom-Up Budgeting

Bottom-up budgeting is a method where departments prepare their own budgets and submit them for approval.

- Each department estimates its costs based on its tasks and activities.
- Individual budgets are combined to form the overall project budget.
- Final budget is reviewed and approved by top management.

Parameter	**Top-Down Budgeting**	**Bottom-Up Budgeting**
Approach	Based on overall organizational goals.	Based on department needs.
Flow	Budget flows from top management to departments.	Budget flows from departments to top management.
Estimation	Overall cost estimated first, then divided.	Detailed task-level estimates done first.
Involvement	Low employee involvement	High employee involvement
Accuracy	Less accurate due to lack of detailed input.	More accurate due to detailed estimation.
Time	Faster to prepare.	Takes more time to prepare.
Flexibility	Less flexible	More flexible
Focus	Focus on strategy.	Focus on practical needs and operations.
Control	Centralized control	Shared control
Example	Management fixing a Rs. 10 lakh budget for an IT project.	A development team estimating costs for each module and summing them up.

15. Explain GANTT chart with suitable example. #

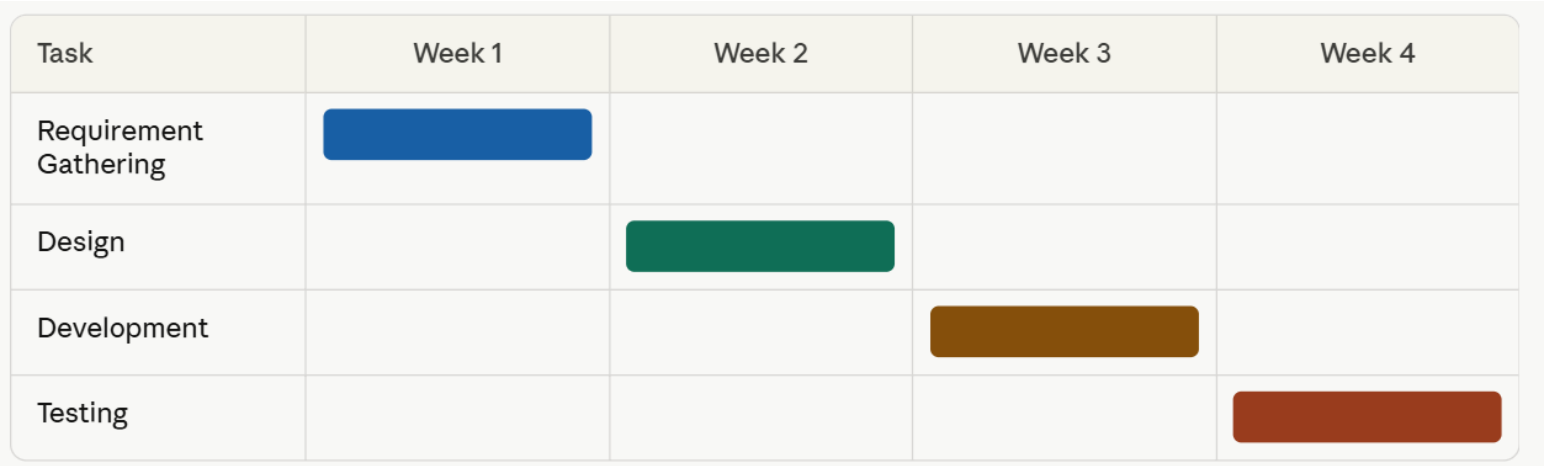
A Gantt chart is a project management tool used to show project tasks along a timeline. It shows when each task starts, how long it lasts, and when it is completed.

- It is a bar chart where tasks are listed on the vertical axis and time is shown on the horizontal axis
- Each task is shown using a horizontal bar indicating its start and finish time.
- It makes it easier to understand the sequence and duration of tasks.
- Overlapping bars show tasks that can be done at the same time.

Advantages

- Easy to understand and simple to create.
- Helps in tracking progress of tasks over time.
- Improves coordination by showing task timelines clearly.

Example



In this example, tasks like requirement gathering, design, development, and testing are scheduled across weeks, showing their duration and sequence clearly.

16. Write a short note on: Project Management Information System (PMIS). #

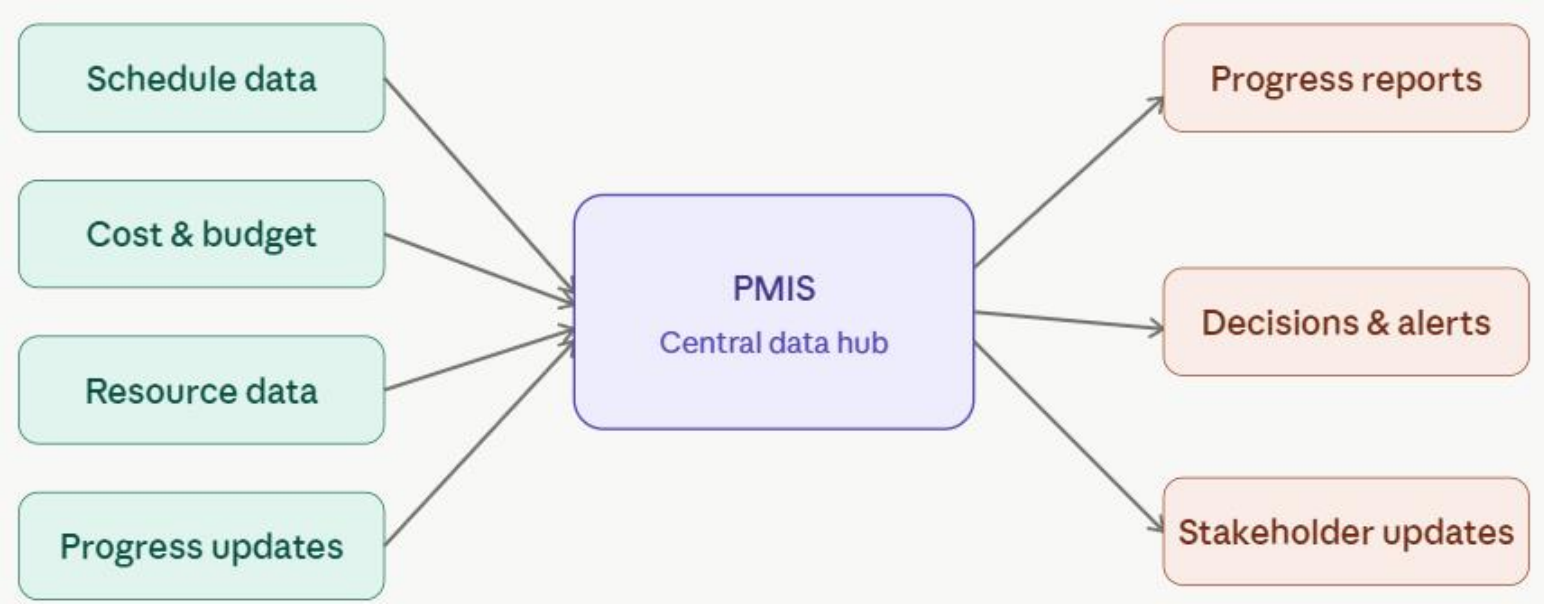
PMIS (Project Management Information System) is a system used to collect, store, process, and share project-related information. It supports planning, execution, and control of projects.

Explanation

- PMIS is a computer-based system that stores data like time, cost, resources, and progress.
- It helps in planning, scheduling, and tracking project activities.
- It provides updated information to support decision-making and communication.

Functions of PMIS

- Collects and stores project data.
- Supports planning and scheduling.
- Tracks performance and progress.



17. Describe various project cost estimation and scheduling techniques. #

Cost Estimation Techniques

Analogous Estimation

- Uses data from similar past projects to estimate cost quickly, especially in early stages.
- It is simple and fast but less accurate due to reliance on past data.

Bottom-Up Estimation

- Cost is estimated for individual tasks and then combined to get total project cost.
- It is more accurate but time-consuming as each activity is analyzed in detail.

Parametric Estimation

- Uses mathematical models and parameters (like cost per unit) to estimate cost.
- It is reliable when accurate data is available for calculations.

Scheduling Techniques

Gantt Chart

- Uses bar charts to show tasks along a timeline, helping in planning and tracking progress.
- It is easy to understand and widely used for scheduling project activities.

CPM (Critical Path Method)

- Identifies the longest sequence of tasks that determines the minimum project duration.
- Tasks on the critical path cannot be delayed without affecting the entire project.

PERT (Program Evaluation Review Technique)

- Uses different time estimates to handle uncertainty in task durations.
- It is useful for projects where activity durations are difficult to predict accurately.

4. Planning Projects

18. Explain Goldratt's critical chain method. #

Goldratt's Critical Chain Method is a project scheduling technique developed by Eliyahu Goldratt that focuses on managing resource constraints and reducing delays so that projects can be completed on time.

- It identifies the critical chain, which is the longest sequence of tasks considering both task dependencies and resource availability.
- It focuses on resource constraints, unlike traditional methods that only consider task sequence.
- It removes extra safety time from individual tasks and manages it at the project level for better control.

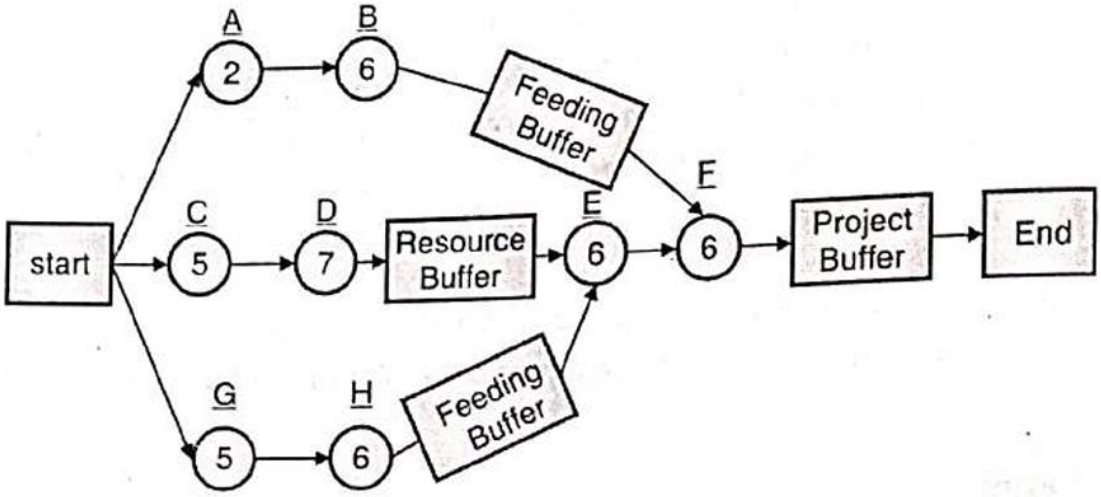


Fig. 4.7.2 : Critical Chain Network Diagram

Types of Buffers in CCM

- **Project Buffer:** Added at the end of the critical chain to protect the final project completion date from delays.
- **Feeding Buffer:** Placed where non-critical tasks join the critical chain, so their delays do not affect the main chain.
- **Resource Buffer:** Acts as a warning before critical tasks to ensure required resources are available on time.

19. Explain the probability and impact matrix. What are the risk response strategies for negative risks (threats) and positive risks (opportunities)?

Probability & Impact Matrix

A Probability and Impact Matrix is a tool used in project management to evaluate and prioritize risks based on their likelihood (probability) and effect (impact) on project objectives.

- Risks are assessed on two factors:
  - **Probability** - Chance of occurrence (Low, Medium, High)
  - **Impact** - Effect on project (Cost, Time, Quality)
- The matrix helps classify risks into levels like Low, Medium, High risk.
- Risks with high probability and high impact are given the highest priority.
- It helps in identifying critical risks and planning suitable responses.

Matrix Representation

Impact \ Probability	Low Probability	Medium Probability	High Probability
High Impact	Medium	High	Very High
Medium Impact	Low	Medium	High
Low Impact	Low	Low	Medium

The values (Low, Medium, High, Very High) indicate the overall risk level or priority.

Example

Risk: Delay in module delivery
Probability: High, Impact: High → Very high priority risk

Risk Response Strategies

1. For Negative Risks (Threats)

- **Avoid**
  Eliminating the risk by changing the plan.
  Example: Cancelling a risky feature to avoid delays.
- **Mitigate**
  Reducing the chance or impact of the risk.
  Example: Conducting regular testing to reduce software bugs.
- **Transfer**
  Shifting the risk to another party.
  Example: Taking insurance or outsourcing a risky task.

- **Accept**
  Accepting the risk and handling it if it occurs
  Example: Keeping extra time in case of minor delays

2. For Positive Risks (Opportunities)

- **Exploit**
  Taking action to ensure the opportunity definitely happens
  Example: Assigning the best team to complete a high-value feature.
- **Enhance**
  Increasing the chances or benefits of the opportunity.
  Example: Adding more resources to finish work faster
- **Share**
  Sharing the opportunity with another party.
  Example: Partnering with another company to gain more profit
- **Accept**
  Taking advantage if the opportunity occurs.
  Example: Using unexpected extra time to improve quality.

5. Project Executing, Monitoring & Controlling

20. Numerical EVM problems to find Schedule, Cost variance, SPI and CPI, PYQ: #

    i. A project in its 20th week has an actual cost of Rs. 250,000. It was scheduled to have spent Rs. 241,000. For the work performed to date, the budgeted value is Rs. 252,000. What are the cost and schedule variances for the project? What are the SPI and CPI? #

Given Data

- **Actual Cost (AC)** = 250,000
- **Planned Value (PV)** = 241,000
- **Earned Value (EV)** = 252,000

Formulas Used:

$$CV = EV - AC, \qquad SV = EV - PV, \qquad CPI = \frac{EV}{AC}, \qquad SPI = \frac{EV}{PV}$$

Calculations

1. Cost Variance (CV)

CV = EV − AC
= 252,000 − 250,000 = **+2,000**

Positive → Project is **under budget.**

2. Schedule Variance (SV)

SV = EV − PV
= 252,000 − 241,000 = **+11,000**

Positive → Project is **ahead of schedule.**

3. Cost Performance Index (CPI)

CPI = EV / AC
= 252,000 / 250,000 = **1.008**

CPI > 1 → **Cost efficiency is good.**

4. Schedule Performance Index (SPI)

SPI = EV / PV
= 252,000 / 241,000 = **1.046**

SPI > 1 → **Ahead of schedule.**

Final Interpretation

- Project is under budget and ahead of schedule.
- Both CPI and SPI are greater than 1, indicating good performance.

ii. A consulting project has an actual cost of Rs. 35,000, scheduled cost of Rs. 27,000, and completed work of Rs. 31,000. Find the Scheduled and Cost Variance. Also find SPI and CPI. #

Given Data

- **Actual Cost (AC)** = 35,000
- **Planned Value (PV)** = 27,000
- **Earned Value (EV)** = 31,000

Formulas Used

$$CV = EV - AC, \qquad SV = EV - PV, \qquad CPI = \frac{EV}{AC}, \qquad SPI = \frac{EV}{PV}$$

Calculations

1. Cost Variance (CV)

CV = EV − AC
= 31,000 − 35,000 = **−4,000**

Negative → Project is **over budget.**

2. Schedule Variance (SV)

SV = EV − PV
= 31,000 − 27,000 = **+4,000**

Positive → Project is **ahead of schedule.**

3. Cost Performance Index (CPI)

CPI = EV / AC
= 31,000 / 35,000 = **0.89**

CPI < 1 → **Cost efficiency is low.**

4. Schedule Performance Index (SPI)

SPI = EV / PV
= 31,000 / 27,000 = **1.15**

SPI > 1 → Project is progressing **faster than planned.**

Final Interpretation

- Project is over budget and ahead of schedule.
- CPI is less than 1 and SPI is greater than 1, indicating poor cost performance but good schedule performance.

Other EVM based numerical problems asked:

1. A project to develop a country park has an actual cost of Rs. 350,000, a planned cost of Rs. 475,000 and a value completed of Rs. 300,000. Find the cost variance, schedule variance and three indices. #

2. A consulting project has an actual cost of Rs. 45,000, scheduled cost of Rs. 35,000, and the value of completed work is Rs. 31,000.
   Find the Schedule and Cost Variance. Also, find SPI and CPI. #

21. How is communication planned and managed in project management?

Project Communication Management is the process of planning, sharing, and monitoring project information. It ensures smooth communication and coordination among team members and stakeholders throughout the project.

Communication Planning

Communication planning is done before project execution to decide how information will flow during the project. It helps create a proper structure for sharing updates and coordinating with stakeholders.

- **Identifying stakeholder needs.**
  Identifies who needs information and how frequently updates should be shared.
- **Selecting communication channels.**
  Suitable channels such as meetings, emails, or reports are selected for communication.
- **Defining roles and responsibilities.**
  Defines who will send updates and who will receive important information.
- **Creating a communication schedule.**
  Timelines are decided for reports, meetings, and project updates.

Communication Management

Communication management focuses on implementing the communication plan during project execution. It helps maintain smooth communication and coordination among stakeholders.

- **Sharing project progress.**
  Project updates and important information are regularly shared with stakeholders.
- **Monitoring communication flow.**
  Ensures the right information reaches the right people at the right time.
- **Managing feedback and issues.**
  Feedback and project issues are handled properly to avoid misunderstandings.
- **Maintaining project records.**
  Reports and communication records are stored for future reference.

Example

In a software project, the team may use regular meetings for updates, emails for client communication, and a shared dashboard to track project progress.

22. What are the responsibilities of the project auditor? What is essential for a successful project audit?

Project Auditor

- A project auditor is a person responsible for independently reviewing and evaluating the performance of a project
- The auditor checks whether the project is being carried out as planned and meeting its objectives

Responsibilities of Project Auditor

- **Evaluate project performance**
  Checks whether the project is meeting targets in terms of time, cost, and quality
- **Verify compliance with plans**
  Ensures project activities are carried out according to defined plans and standards.
- **Identify issues and risks**
  Finds problems, deviations, and potential risks that may affect the project.
- **Review documentation**
  Examines project reports and records for accuracy and completeness.
- **Suggest improvements**
  Recommends corrective actions to improve project performance.

Essentials for a Successful Project Audit

- **Clear objectives**
  Audit goals should be well-defined before starting.
- **Independence of auditor**
  Auditor should be unbiased and not part of the project team.
- **Proper documentation**
  Complete and accurate records must be available.
- **Effective communication**
  Clear interaction between auditor and stakeholders is necessary.
- **Timely execution**
  Audit should be conducted at the right time to correct issues early.

23. What are the different types of contracts? Draw the graph showing risk exposure to the buyer and seller in various contract types.

Contracts are formal agreements between the buyer and seller that define the scope of work, cost, responsibilities, and terms of the project.

Different contract types are used depending on how risk is shared between the buyer and seller.

1. Fixed Price Contract

In this type of contract, the total project cost is fixed before the work begins. The seller bears most of the project risk.

- **Firm Fixed Price (FFP).**
  A fixed amount is paid for the entire project regardless of actual cost.
- **Fixed Price Incentive Fee (FPIF).**
  Seller receives incentives for meeting targets related to cost, schedule, or performance.
- **Fixed Price with Economic Price Adjustment (FP-EPA).**
  Contract price can be adjusted due to changes in market conditions like inflation or material cost.

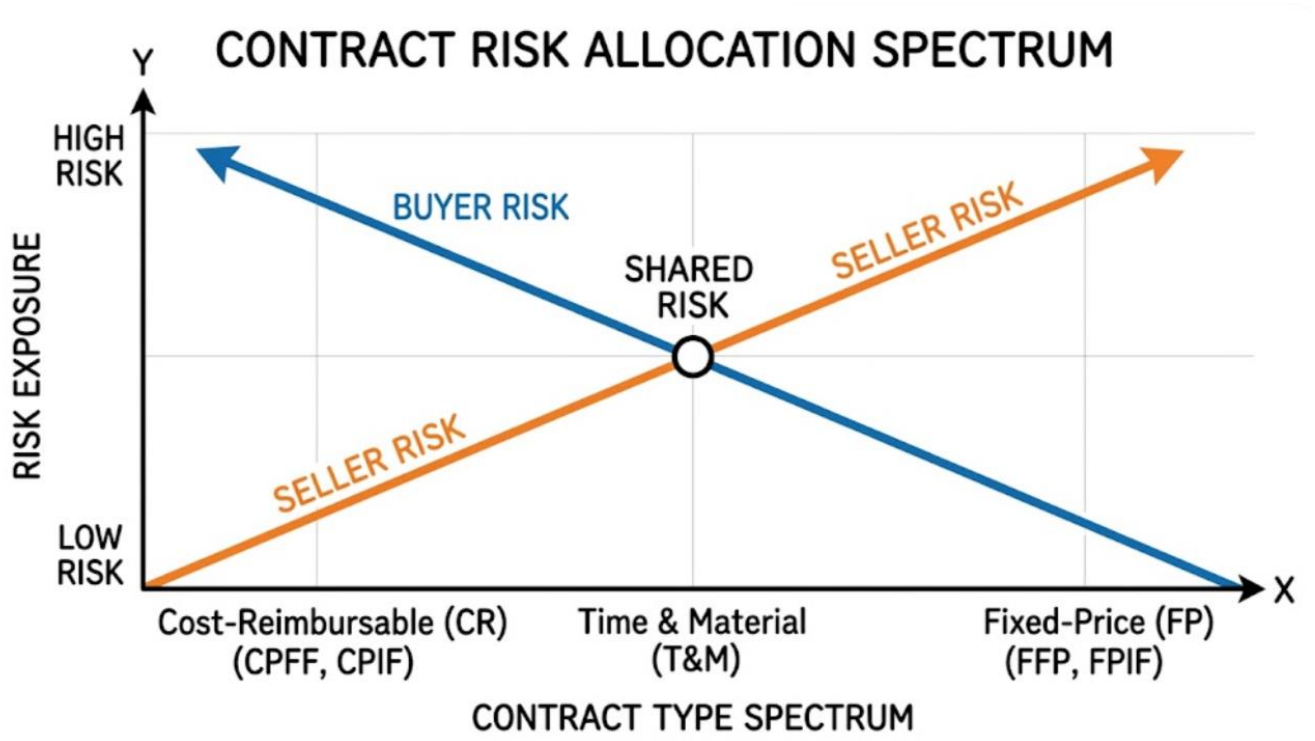
2. Cost Reimbursable Contract

In this contract, the buyer pays the seller for actual project costs along with an additional fee. The buyer bears most of the risk.

- **Cost Plus Fixed Fee (CPFF).**
  Seller is reimbursed for costs along with a fixed profit amount.
- **Cost Plus Incentive Fee (CPIF).**
  Seller receives incentives for controlling cost or achieving performance targets.
- **Cost Plus Award Fee (CPAF).**
  Seller receives an additional award based on performance evaluation by the buyer.

3. Time and Material (T&M) Contract

- Payment is made based on time spent and materials used during the project.
- Risk is shared between buyer and seller, making it a balanced contract type.
- It is commonly used when the project scope is not fully clear at the beginning.



Risk Exposure in Different Contract Types

- The diagram shows that in a **Cost Reimbursable Contract**, buyer risk is high and seller risk is low because the buyer pays the actual project cost.
- In a **Time and Material Contract**, risk is shared between both buyer and seller, as payment depends on time and resources used.
- In a **Fixed Price Contract**, seller risk is high and buyer risk is low because the seller must complete the project within the agreed fixed cost.

24. Write a short note on: Project procurement management. #

Project Procurement Management refers to the process of obtaining goods and services from outside the organization, such as vendors or suppliers, to help complete the project successfully.

Key Activities in Project Procurement Management

- **Planning Procurement**
  Deciding what work should be done externally and what can be handled within the organization.
- **Vendor Selection**
  Choosing suitable vendors by comparing factors like cost, quality, and reliability.
- **Contracting**
  Preparing a formal agreement that clearly defines scope, cost, and responsibilities.
- **Managing Vendors**
  Vendor performance is monitored to ensure work is delivered as per contract.
- **Contract Closure**
  The contract is formally closed after all deliverables are completed and accepted.

25. Define scope creep. What are two ways to control it in a project? #

Scope Creep refers to the uncontrolled expansion of a project's scope without adjustments to time, cost, or resources. It occurs when additional features or functions are added to a project that were not part of the original plan.

Ways to Control Scope Creep

1. Change Control Process

- Any scope change must go through a formal approval process before work begins.
- The impact on cost, time, and resources is evaluated before accepting the change.

Example: A client requesting a new feature must submit a formal change request before it is added.

2. Clear Scope Definition

- A detailed scope document at the start sets clear boundaries on what is and is not included.
- When scope is well defined, unauthorized additions are easier to identify and reject.

Example: A project charter listing all deliverables and explicitly stating what is out of scope.

26. Describe Earned Value Management technique in Project Management. #

Earned Value Management is a technique used to objectively measure project performance and progress by comparing planned work, actual work completed, and actual cost.

Explanation

- It integrates scope, schedule, and cost to give a clear view of project performance.
- It uses three key values: Planned Value (PV), Earned Value (EV), and Actual Cost (AC).
- By comparing these values, it shows whether the project is on schedule and within budget.

Core Components of EVM

To perform EVM, three key data points are required:

1. **Planned Value (PV):** The authorized budget assigned to the work scheduled to be completed by a specific date.
2. **Actual Cost (AC):** The total cost actually incurred for the work performed during a specific period.
3. **Earned Value (EV):** The measure of work actually performed expressed in terms of the budget authorized for that work.

Key Measures

- **Cost Variance (CV)**
  Difference between earned value and actual cost, showing cost performance.
- **Schedule Variance (SV)**
  Difference between earned value and planned value, showing schedule performance.
- **CPI and SPI**
  Performance indices used to measure cost and schedule efficiency.

27. Briefly describe the purchasing cycle. #

The purchasing cycle is a series of steps followed by an organization to purchase goods or services from external vendors. It helps ensure that materials are procured properly and delivered on time.

Steps in Purchasing Cycle

- **Identifying Requirements.**
  The organization identifies the need for materials, goods, or services required for the project.
- **Preparing Purchase Request.**
  A formal request is prepared mentioning the required quantity and specifications.
- **Vendor Selection.**
  Suitable vendors are identified and selected based on cost, quality, and reliability.
- **Purchase Order Creation.**
  An official purchase order is issued to the selected vendor with details of the order and delivery terms.
- **Receiving and Inspection.**
  The delivered goods are checked to ensure they meet the required quality and specifications.
- **Payment and Record Keeping.**
  Payment is made to the vendor and all purchase records are stored for future reference.

6. Project Leadership, Ethics and Closure

28. What is project termination? Discuss the various reasons for project termination and explain different types of project termination.

Project Termination

- Project termination is the process of formally ending a project after its objectives are achieved or when it is decided that the project should not continue further.
- It includes closing project activities, completing documentation, releasing resources, and reviewing overall project performance.
- Proper project termination helps ensure smooth closure of the project and better utilization of organizational resources.

Reasons for Project Termination

- **Project objectives achieved.**
  The project is completed successfully and all goals and deliverables are achieved.
- **Lack of resources or budget.**
  The project may be stopped due to shortage of funds, manpower, or other resources.
- **Technical or performance issues.**
  The project may fail because of technical difficulties or inability to meet required standards.
- **Change in business priorities.**
  Changes in organizational goals or market conditions may make the project unnecessary.
- **Poor project performance.**
  Continuous delays, high costs, or low productivity may lead to project termination.
- **Legal or external factors.**
  Government regulations, competition, or external risks may force the project to stop.

Types of Project Termination

1. Termination by Extinction

- The project is completely closed either after successful completion or due to failure.
- Resources and team members are released from the project.

Example: A software development project ends after the final product is delivered to the client.

2. Termination by Addition

- The project becomes a permanent part of the organization.
- A separate department or unit may be created to continue the project work.

Example: A company creates a new department after a successful AI product project.

3. Termination by Integration

- Project outcomes are integrated into the existing operations of the organization.
- Team members and resources are distributed among different departments.

Example: An online payment system developed as a project is integrated into the company's existing operations.

4. Termination by Starvation

- The project is slowly stopped by reducing budget, staff, or resources over time.
- Usually happens when management loses interest in the project.

Example: A mobile app project is gradually stopped after funding and team size are continuously reduced.

29. Explain the importance of ethics in projects. #

Ethics in project management refers to following moral values, professional standards, and fair practices while managing and executing a project.

Importance of Ethics in Projects

- **Builds Trust and Credibility**
  Ethical behaviour helps create trust between the project team, clients, and stakeholders.
- **Fair Decision Making**
  Ethics help project managers make honest and unbiased decisions in the best interest of the project.
- **Boosts Team Morale and Productivity**
  A fair and respectful work environment keeps team members motivated and improves their performance.
- **Enhances Professional Reputation**
  Ethical practices improve the reputation and credibility of both the project manager and the organization.
- **Reduces Conflicts and Misconduct**
  Following ethical practices helps avoid corruption, favouritism, and misuse of resources.
- **Ensures Legal and Professional Compliance**
  Ethics help organizations follow rules, regulations, and professional standards properly.

Example
A project manager honestly informing the client about project delays instead of hiding issues is an example of ethical behaviour in project management.

30. Explain multicultural and virtual projects. #

1. Multicultural Projects

Multicultural projects are projects in which team members from different countries, cultures, or backgrounds work together to achieve common project goals.

Explanation

- Team members may have different languages, work styles, and cultural values.
- Working with people from different backgrounds brings new ideas and creative solutions.
- Cultural differences can sometimes lead to misunderstandings or conflicts if not managed properly.

Example
A software project where developers from India, Japan, and the USA work together on the same application is an example of a multicultural project.

2. Virtual Projects

Definition

Virtual projects are projects where team members work from different locations and communicate mainly through online tools and digital platforms.

Explanation

- Team members work remotely instead of being present in the same office.
- Communication is done using emails, video meetings, messaging apps, and collaboration tools.
- Limited face-to-face interaction may sometimes create coordination or communication challenges.

Example
A company managing a project through Zoom meetings and shared online tools with employees working from different cities is an example of a virtual project.

Asked once:

1. Project Management Foundation

1. Explain conflicts in Project Management. Why are negotiations important in Project Management?

Conflict in project management means disagreements between team members or stakeholders while working on a project. It is common because people work together with different ideas and expectations.

Causes / Types of Conflicts

- **Resource conflicts:** Occur when limited resources like time, budget, or manpower are needed by multiple tasks at the same time.
- **Schedule conflicts:** Arise when there are differences in deadlines or when delays in one task affect others.
- **Technical conflicts:** Happen when team members disagree on methods, tools, or ways of solving a problem.
- **Priority conflicts:** Different stakeholders may focus on different priorities such as cost, time, or quality.

Importance of Negotiation

- **Helps resolve conflicts smoothly:** Allows both sides to reach a solution that is acceptable to everyone.
- **Ensures better use of resources:** Helps in fairly allocating limited resources without affecting project progress.
- **Improves stakeholder satisfaction:** Aligns expectations between team members, clients, and management.
- **Leads to better decisions:** Encourages discussion and results in more practical and balanced outcomes.
- **Useful in dealing with vendors:** Helps in setting clear and beneficial terms with suppliers or external parties.

2. Describe the typical and atypical project life cycles, highlighting the stages in the stage-gate process.

A project life cycle defines the sequence of phases a project goes through from start to completion. Depending on the nature of the project, the life cycle can be typical (predictable) or atypical (flexible).

1. Typical Project Life Cycle

A typical life cycle is linear and structured, where phases are clearly defined and follow a fixed sequence.

Phases:

- **Initiation:** The project idea is identified and feasibility is checked.
- **Planning:** Scope, schedule, cost, and resources are defined.
- **Execution:** Actual work of the project is carried out
- **Monitoring & Controlling:** Progress is tracked and necessary corrections are made.
- **Closure:** The final output is delivered and project is completed.

Suitable for projects with clear requirements (e.g., construction projects)

2. Atypical Project Life Cycle

An atypical life cycle is flexible and iterative, where phases may overlap or repeat based on project needs.

Key Characteristics

- Phases are not strictly sequential and may overlap or run in parallel.
- Requirements may change during the project.
- Continuous feedback and improvements are involved.

Suitable for projects with uncertain or evolving requirements (e.g., software development using Agile)

Stage-Gate Process

The stage-gate process divides the project into stages separated by decision points called gates, where progress is reviewed.

Stages

- **Idea Stage:** The initial concept is generated and evaluated.
- **Development Stage:** Detailed planning and design are carried out.
- **Testing Stage:** The product or solution is tested and validated.
- **Launch Stage:** The final product is delivered or rolled out.

2. Initiating Projects

3. Explain the significance of IRR method in project selection.

Internal Rate of Return (IRR) is a project selection method used to measure the expected profitability of a project. It is the discount rate at which the project's Net Present Value (NPV) becomes zero.

Significance of IRR in Project Selection

Project Comparison

- IRR helps in comparing projects based on the returns they are expected to generate.
- Projects with higher IRR values are usually considered more profitable.

Time Value of Money

- IRR considers the time value of money, giving a more realistic financial evaluation.
- It helps organizations understand the future value of project returns.

Investment Decision Making

- It helps management decide whether investing in a project is financially worthwhile.
- Projects are generally accepted if their IRR is higher than the required rate of return.

Easy to Understand

- IRR is widely used because it is simple to understand and easy to compare across projects.
- It provides a clear percentage return, making decision-making easier.

Example

If one project has an IRR of 15% and another has an IRR of 10%, the project with 15% IRR is usually preferred because it is expected to give better return

3. Project Planning and Scheduling

4. What is concurrent engineering?

Concurrent Engineering is an approach where different project activities such as design, development, and testing are carried out simultaneously rather than one after the other. It helps in reducing project time and improving coordination.

Explanation

- Different departments work together during the project instead of waiting for one stage to completely finish.
- Activities such as design, production planning, and testing can happen at the same time.
- Regular communication between teams helps in reducing mistakes and avoiding rework.
- It shortens the overall development time and allows faster delivery of the product.
- Early involvement of different teams also helps in improving product quality.

Example

In automobile manufacturing, design, testing, and production planning are often done simultaneously to reduce development time.

4. Planning Projects

5. Who are the stakeholders in projects? Why is communication the most important part of a project manager's job?

Project Stakeholders

- Stakeholders are individuals, groups, or organizations that have an interest in or are affected by the project. They play an important role in the success of the project.
- Stakeholders include project managers, team members, customers, sponsors, suppliers, and government authorities.
- They can be internal stakeholders (within the organization) or external stakeholders (outside the organization).

Roles of Stakeholders

- **Project Sponsor**
  Provides funding, approvals, and overall direction for the project.
- **Project Manager**
  Plans, manages, and controls project activities to achieve project objectives.
- **Project Team**
  Performs the actual project work and completes assigned tasks.
- **Customers/Clients**
  Define project requirements and evaluate the final deliverables.
- **Suppliers/Vendors**
  Provide materials, services, or technical support required for the project.
- **Government Authorities**
  Ensure that the project follows laws, regulations, and standards properly.

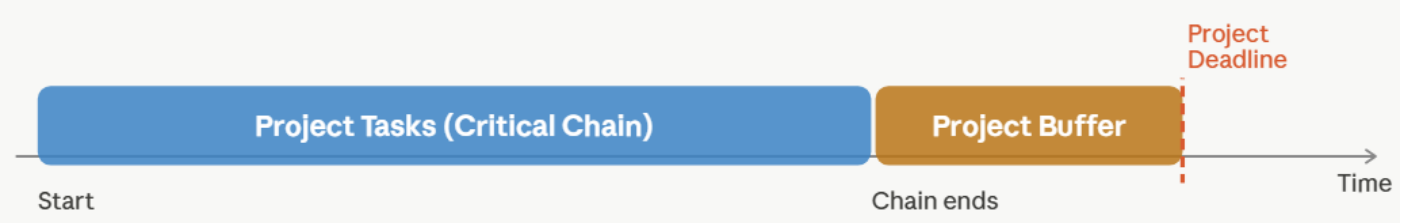
Why Communication is the Most Important Part of a Project Manager's Job

Effective communication is an essential part of project management. It helps maintain smooth coordination among team members and stakeholders throughout the project.

- **Ensures proper coordination**
  Communication helps team members and stakeholders work together effectively.
- **Reduces misunderstandings**
  Clear communication avoids confusion about project goals, tasks, and responsibilities.
- **Improves stakeholder satisfaction**
  Regular updates help maintain trust and confidence among stakeholders.
- **Helps manage risks and issues**
  Problems and project issues can be identified and resolved quickly through proper communication.

6. Explain the project buffer.

A project buffer is extra time added at the end of a project schedule to protect the project completion date from unexpected delays or uncertainties. It is mainly used in Critical Chain Project Management (CCPM).



Explanation

- **Placement of Buffer**
  A project buffer is placed at the end of the critical chain before the final project deadline.
- **Handling Delays**
  It helps manage delays caused by uncertain task durations, resource issues, or unexpected problems.
- **Centralized Safety Time**
  Instead of adding extra safety time to every task, the buffer is managed at the overall project level.
- **Improved Schedule Reliability**
  It increases the chances of completing the project on time and improves schedule reliability.
- **Performance Monitoring**
  Project managers monitor buffer usage to track delays and overall project performance.

Example

If a software project is planned to finish in 90 days, an additional 10-day buffer may be added to manage unexpected delays without affecting the final delivery date.

7. What is the difference between resource loading and resource levelling?

Parameter	Resource Loading	Resource Levelling
Meaning	Refers to the amount of work assigned to resources during a specific time period.	Refers to adjusting the schedule to balance resource usage and avoid overloading.
Focus	Focuses on resource allocation and workload.	Focuses on balancing resource utilization.
Objective	Helps identify how much work is assigned to each resource.	Helps reduce resource conflicts and overutilization.
Impact on Schedule	Usually does not affect schedule.	May increase project duration.
Resource Usage	Resources may become overloaded.	Resources are used evenly.
Complexity	Easier to calculate and analyze.	More complex as schedules may need modification.
Example	A developer is assigned multiple tasks in the same week.	Some tasks are shifted to later dates to reduce the developer's workload.

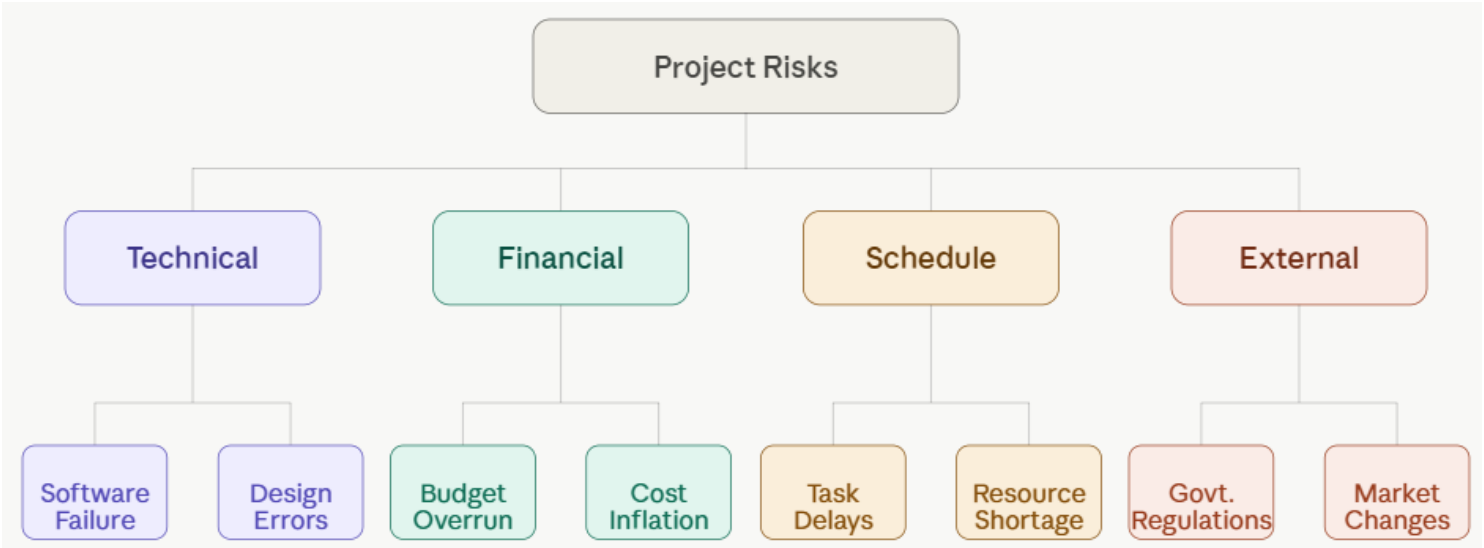
8. Explain the risk breakdown structure.

Risk Breakdown Structure (RBS) is a hierarchical structure used to identify and classify project risks into different categories. It helps project managers organize and analyze risks systematically.

Explanation

- **Categorization of Risks**
  Risks are grouped into categories and subcategories based on their source or type.
- **Structured Risk Identification**
  It provides a systematic way to identify possible risks in a project.
- **Better Risk Management**
  RBS helps in risk analysis, monitoring, and planning suitable risk responses.
- **Improved Understanding**
  It helps project managers understand major risk areas affecting the project.
- **Types of Risks**
  Common categories include technical risks, financial risks, schedule risks, and external risks.

Example:



The diagram shows how project risks are classified into different categories and subcategories in a structured manner. It helps project managers identify major risk areas and plan suitable risk response strategies effectively.

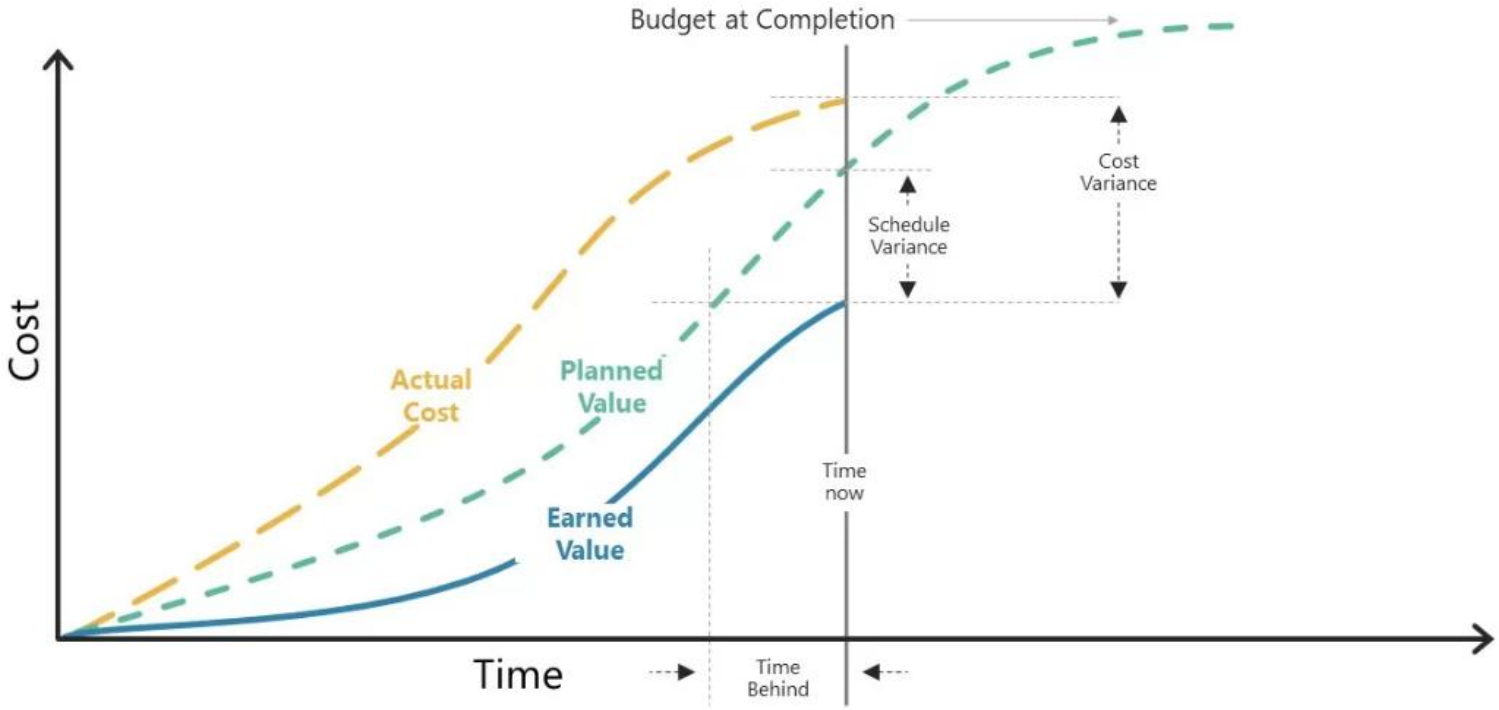
5. Project Executing, Monitoring & Controlling

9. Draw an Earned Value chart. Describe the three variances of it and explain their significance.

Earned Value Management is a project management technique used to measure project performance by comparing planned work, completed work, and actual cost. It helps determine whether the project is on schedule and within budget.

In EVM:

- **PV (Planned Value):** Planned cost of scheduled work.
- **EV (Earned Value):** Value of actual work completed.
- **AC (Actual Cost):** Actual cost spent on the completed work.



Variances in EVM

1. Cost Variance (CV)

Cost Variance measures the difference between the earned value of work completed and the actual cost spent on that work. It helps determine whether the project is under budget or over budget.

Formula:

$$CV = EV - AC$$

Significance

- Positive CV → Project is under budget.
- Negative CV → Project is over budget.
- Zero CV → Project cost is exactly as planned.

2. Schedule Variance (SV)

Schedule Variance measures the difference between the earned value and the planned value of the project work. It helps determine whether the project is progressing ahead of schedule or behind schedule.

Formula:

$$SV = EV - PV$$

Significance

- Positive SV → Project is ahead of schedule.
- Negative SV → Project is behind schedule.
- Zero SV → Project is progressing as planned.

3. Variance at Completion (VAC)

Variance at Completion measures the expected difference between the planned project budget and the estimated final project cost after completion. It helps predict the overall budget performance of the project.

Formula:

$$VAC = BAC - EAC$$

Where:

- **BAC (Budget at Completion):** Total planned project budget.
- **EAC (Estimate at Completion):** Estimated total project cost at completion.

Significance

- Positive VAC → Project is expected to finish under budget.
- Negative VAC → Project is expected to exceed budget.
- Zero VAC → Project is expected to finish exactly within budget.

10. What are the advantages and risks of outsourcing in project management?

Outsourcing in project management means assigning certain project tasks or services to external vendors or organizations instead of handling them within the company.

Advantages of Outsourcing

- **Cost Reduction**
  Outsourcing can help organizations reduce labour and operational costs.
- **Access to Expertise**
  Companies can benefit from the specialized skills and experience of external professionals.
- **Focus on Core Activities**
  It allows the organization to focus more on its main business functions and priorities.
- **Faster Project Completion**
  External vendors may help complete project tasks more quickly and efficiently.

Risks of Outsourcing

- **Communication Issues**
  Poor communication between the company and vendor may lead to misunderstandings or delays.
- **Loss of Control**
  The organization may have less direct control over the quality and progress of outsourced work.
- **Security and Confidentiality Risks**
  Sharing project information with external vendors may create data security concerns.
- **Dependency on Vendors**
  Relying too much on external vendors may affect the project if the vendor faces problems.

11. What is the difference between contracting and outsourcing?

Parameter	Contracting	Outsourcing
Meaning	Hiring an external party for a specific task.	Assigning business activities to an external organization.
Purpose	Used for completing a specific project task.	Used to reduce workload and focus on core activities.
Duration	Usually short-term.	Can be long-term.
Scope of Work	Limited to defined tasks.	May involve complete business functions.
Control	Organization has more control.	Vendor has greater control.
Relationship	Contract-based and task-oriented.	Service-based and strategic.
Risk Involvement	Lower risk due to clear scope.	Higher risk due to vendor dependency.
Example	Hiring a freelance developer to build a specific module of an app.	Outsourcing customer support services to an external company.

12. What is the importance of vendor documents? How should vendor documents be preserved?

Vendor documents are records provided by vendors or suppliers related to the purchase of goods or services for a project. These documents help maintain proper tracking, communication, and control during procurement activities.

Importance of Vendor Documents

- **Provides procurement details**
  Vendor documents contain important information such as cost, specifications, delivery schedules, and contract terms.
- **Helps track vendor performance**
  They help monitor whether the vendor is meeting expected quality and delivery requirements.
- **Useful for audits and legal purposes**
  These records act as proof during audits, disputes, or legal verification.
- **Helps in future reference**
  Vendor documents can be referred to in future projects while selecting vendors or making procurement decisions.

How Vendor Documents Should be Preserved

- **Centralized Storage**
  Vendor documents should be stored in a single organized location so they are easy to access and manage.
- **Version Control**
  Documents should be updated with proper version numbers and dates to ensure the latest version is used.
- **Access Control**
  Access to vendor documents should be limited to authorized personnel to protect sensitive information.
- **Backup and Security**
  Important documents should be backed up regularly and protected from data loss or unauthorized access.

13. Why are meetings useful in project monitoring? What rules should be followed to maximize the effectiveness of meetings?

Meetings are an important part of project monitoring because they help project managers and team members review progress, discuss issues, and coordinate project activities. Regular meetings improve communication and help keep the project on track.

Meetings support project monitoring by helping teams to:

- **Review project progress**
  Meetings help check completed work and compare project progress with the planned schedule.
- **Identify problems and risks**
  Project issues, delays, and risks can be discussed and resolved more quickly during meetings.
- **Improve coordination**
  Meetings help team members and stakeholders stay updated and work together more effectively.
- **Support decision-making**
  Important project decisions can be discussed and finalized through meetings.

Rules for Effective Meetings

- **Set a clear agenda**
  Meeting topics and objectives should be decided before the meeting begins.
- **Invite only relevant participants**
  Only people related to the discussion should attend the meeting.
- **Start and End on Time**
  Meetings should begin and finish at the scheduled time to avoid wasting time.
- **Assign a Facilitator**
  A facilitator should guide the discussion and ensure the meeting stays focused on the agenda.
- **Avoid Distractions**
  Phones and unrelated work should be avoided during meetings to maintain full attention.

Example
In a software project, weekly meetings may be conducted to review progress, discuss delays, and assign tasks for the next stage of the project.

6. Project Leadership, Ethics and Closure

14. Explain the project management template with a sample template sheet.

PROJECT MANAGEMENT TEMPLATE

▶ SECTION 1 — PROJECT INFORMATION

Project Name	ERP System Implementation	**Project Manager**	Rohit Sharma
Start Date	01 June 2025	**End Date**	30 November 2025
Department	IT & Operations	**Priority**	HIGH
Objective	Implement a fully integrated ERP system across all departments to streamline operations.		

▶ SECTION 2 — TASK BREAKDOWN & STATUS

#	Task Name	Assigned Team	Start Date	End Date	Status	Progress
1	Requirements Gathering	Analysis Team	01 Jun 2025	15 Jun 2025	Done	100%
2	System Design & Architecture	Design Team	16 Jun 2025	30 Jun 2025	Done	100%
3	Module Development	Dev Team	01 Jul 2025	30 Sep 2025	In Progress	60%
4	User Acceptance Testing (UAT)	QA Team	01 Oct 2025	31 Oct 2025	Not Started	0%

▶ SECTION 3 — RISK REGISTER

#	Risk Description	Likelihood	Impact	Priority	Mitigation Plan
1	Scope creep during development	High	High	HIGH	Strict change control process.
2	System integration issues	Low	Medium	LOW	Early system testing.

▶ SECTION 4 — BUDGET SUMMARY

Category	Estimated Cost (₹)	Actual Cost (₹)	Variance (₹)
Software Licenses	5,00,000	4,80,000	-20,000
Development & Testing	12,00,000	13,50,000	+1,50,000
Training & Deployment	2,00,000	2,00,000	0
TOTAL	**19,00,000**	**20,30,000**	**+1,30,000**

Last updated: June 2025

A project management template is a pre-designed document used to plan, organize, monitor, and manage project activities. It helps project managers track progress, manage resources, monitor risks, and maintain project information in a structured manner.

Components of the Sample Project Management Template

- **Project Information Section**
  This section contains basic project details such as the project name, project manager, department, start date, end date, priority level, and overall project objective.
- **Task Breakdown and Status Section**
  This section displays the different project tasks along with the assigned teams, project schedules, task status, and progress of work being completed.
- **Risk Register Section**
  This section lists possible project risks and includes details such as likelihood, impact, priority level, and mitigation plan to reduce the risks.
- **Budget Summary Section**
  This section shows the estimated cost, actual cost, and budget variance for different project activities and resources.
- **Project Monitoring Support**
  The template helps project managers monitor overall project progress, identify delays or risks, and support better decision-making throughout the project lifecycle.

~ *AJ*