SOFTWARE ENGINEERING & PROJECT MANAGEMENT (SEPM)

MODULE 6 – IT Project Management & Scheduling

Based on Mumbai University PYQs (2023–2025)

This document contains detailed descriptive answers for ALL Module 6 questions from the uploaded SEPM question bank.

Covered Questions:

1. Explain Project Management in detail.
2. Explain W5HH Principle.
3. Explain 4 P’s of Project Management.
4. Explain Project Scheduling.
5. Explain PERT and CPM.
6. Difference between PERT and CPM.
7. Explain Gantt Chart.
8. Explain Timeline Chart and Tracking.
9. Explain Capability Maturity Model (CMM).
10. Explain PMBOK Knowledge Areas.
11. Explain Project Management Life Cycle.
12. Explain Earned Value Analysis.
13. Explain Staffing and Team Structure.
14. Explain Software Metrics.
15. Explain Size-Oriented Metrics and Function-Oriented Metrics.

Q1. Explain Project Management in Detail.

Introduction

Software projects are complex and require proper planning, coordination, scheduling, and control.

Project Management helps organizations complete projects:

- Within budget
- Within schedule
- With required quality

Definition of Project Management

Project Management is the process of planning, organizing, monitoring, and controlling project activities to achieve project objectives.

Objectives of Project Management

1. Complete project on time.
2. Reduce project cost.
3. Improve software quality.
4. Manage resources efficiently.
5. Reduce project risks.
6. Improve customer satisfaction.

Activities in Project Management

1. Project Planning
2. Cost Estimation
3. Scheduling
4. Risk Management
5. Team Management
6. Quality Management
7. Project Monitoring

Importance of Project Management

1. Better Planning

Helps define project scope and objectives.

2. Efficient Resource Utilization

Proper allocation of manpower and resources.

3. Reduced Risks

Identifies risks early.

4. Improved Communication

Enhances coordination among team members.

5. Better Quality Control

Ensures software quality.

Challenges in Project Management

1. Requirement changes.
2. Budget limitations.
3. Schedule delays.
4. Technical complexity.
5. Communication issues.

Advantages of Project Management

1. Better project control.
2. Increased productivity.
3. Improved software quality.
4. Better customer satisfaction.
5. Reduced development risk.

Conclusion

Project Management is essential for successful software development and efficient project execution.

Q2. Explain W5HH Principle.

Introduction

The W5HH Principle was proposed by Barry Boehm.

It helps project managers ask important questions before starting a software project.

W5HH Principle Questions

1. Why is the system being developed?

Defines project objectives and business goals.

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2. What will be done?

Defines project scope and tasks.

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3. When will it be accomplished?

Defines project schedule and milestones.

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4. Who is responsible?

Defines team responsibilities.

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5. Where are organizationally located?

Defines team structure and communication.

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6. How will the work be done technically and managerially?

Defines development methods and management techniques.

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7. How much of each resource is needed?

Defines required resources and budget.

Importance of W5HH Principle

1. Better planning.
2. Improved communication.

3. Better resource allocation.
4. Reduced project risk.

Conclusion

W5HH Principle helps project managers plan software projects systematically.

Q3. Explain 4 P’s of Project Management.

Introduction

The success of software projects depends on proper management of:

1. People
2. Product
3. Process
4. Project

These are known as:

4 P’s of Project Management

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1. People

People are the most important factor in software development.

Categories of People

1. Senior Managers
2. Project Managers
3. Practitioners
4. Customers
5. End Users

Importance

- Better coordination
- Improved communication
- Efficient teamwork

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2. Product

Product defines the software to be developed.

Product Objectives

1. Understand requirements.
2. Define scope.
3. Define functionality.

Importance

- Clear project goals
- Better requirement analysis

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3. Process

Process defines framework for software development.

Examples

- Waterfall Model
- Agile Model
- Spiral Model

Importance

- Structured development

- Improved quality

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4. Project

Project involves planning and management activities.

Activities

1. Scheduling
2. Risk Management
3. Cost Estimation
4. Monitoring

Importance

- Better project control
- Reduced delays

Diagram of 4 P’s

Conclusion

The 4 P’s provide a complete framework for effective software project management.

Q4. Explain Project Scheduling.

Introduction

Project Scheduling is one of the most important activities in project management.

Scheduling helps organizations:

- Complete projects on time
- Allocate resources properly
- Monitor project progress

Definition of Project Scheduling

Project Scheduling is the process of dividing project work into tasks and assigning time for each task.

Objectives of Scheduling

1. Define project timeline.
2. Allocate resources.
3. Track progress.
4. Reduce delays.
5. Improve coordination.

Scheduling Activities

1. Task Identification
2. Task Sequencing
3. Resource Allocation
4. Timeline Estimation
5. Monitoring and Control

Scheduling Principles

1. Compartmentalization
2. Interdependency
3. Time Allocation
4. Effort Validation
5. Defined Responsibilities

Project Scheduling Tools

1. Gantt Chart
2. PERT Chart
3. CPM
4. Timeline Chart

Advantages of Scheduling

1. Better project planning.
2. Improved resource utilization.
3. Better tracking.
4. Reduced delays.

Conclusion

Project Scheduling ensures systematic execution and successful completion of software projects.

Q5. Explain PERT and CPM.

Introduction

PERT and CPM are project scheduling techniques used for planning and monitoring projects.

PERT

PERT stands for:

Program Evaluation and Review Technique

PERT is used when activity completion time is uncertain.

Features of PERT

1. Probabilistic model.
2. Used for research projects.
3. Event-oriented.
4. Handles uncertainty.

PERT Formula

```
TE = (O + 4M + P) / 6
```

Where:

- O = Optimistic Time
- M = Most Likely Time
- P = Pessimistic Time
- TE = Expected Time

Example

O = 2 days M = 4 days P = 8 days

```
TE = (2 + 4×4 + 8)/6
   = 26/6
   = 4.33 days
```

Advantages of PERT

1. Handles uncertainty.
2. Better planning.
3. Useful for large projects.

CPM

CPM stands for:

Critical Path Method

CPM is used when activity times are fixed.

Features of CPM

1. Deterministic model.
2. Activity-oriented.
3. Identifies critical path.
4. Used for construction and software projects.

Critical Path

Critical path is the longest path in project network.

Activities on critical path cannot be delayed.

Advantages of CPM

1. Better scheduling.
2. Improved resource management.
3. Identifies critical activities.

Difference Between PERT and CPM

PERT	CPM
Probabilistic	Deterministic
Event-oriented	Activity-oriented
Handles uncertainty	Fixed activity time
Used in research projects	Used in construction/software

Conclusion

PERT and CPM are effective project scheduling techniques used for planning and controlling software projects.

Q6. Explain Gantt Chart.

Introduction

Gantt Chart is a graphical scheduling tool used for project planning and monitoring.

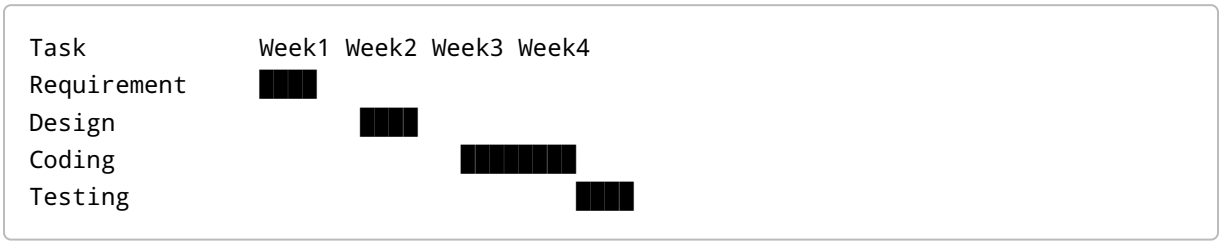
It represents:

- Tasks
- Timelines
- Dependencies
- Progress

Structure of Gantt Chart

- Horizontal axis → Time
- Vertical axis → Tasks

Example of Gantt Chart



Advantages of Gantt Chart

1. Easy visualization.
2. Better scheduling.
3. Easy progress tracking.
4. Improved coordination.

Disadvantages of Gantt Chart

1. Difficult for large projects.
2. Dependency tracking is limited.

Conclusion

Gantt Chart is a simple and effective project scheduling tool.

Q7. Explain Capability Maturity Model (CMM).

Introduction

Capability Maturity Model (CMM) measures software process maturity.

It was developed by:

Software Engineering Institute (SEI)

Objectives of CMM

1. Improve software quality.
2. Improve process management.
3. Increase productivity.
4. Reduce development cost.

Levels of CMM

Level 1 – Initial

• Unpredictable process
• Poor management

Level 2 – Repeatable

• Basic project management
• Repeatable processes

Level 3 – Defined

• Standardized processes
• Documented procedures

Level 4 – Managed

• Quantitative process control
• Performance measurement

Level 5 – Optimizing

- Continuous improvement
- Defect prevention

CMM Diagram

```
Level 5 → Optimizing
Level 4 → Managed
Level 3 → Defined
Level 2 → Repeatable
Level 1 → Initial
```

Advantages of CMM

1. Better quality management.
2. Improved productivity.
3. Reduced defects.
4. Better process control.

Conclusion

CMM helps organizations improve software development processes systematically.

Q8. Explain PMBOK Knowledge Areas.

Introduction

PMBOK stands for:

Project Management Body of Knowledge

It defines project management best practices.

PMBOK Knowledge Areas

1. Integration Management
2. Scope Management
3. Schedule Management
4. Cost Management
5. Quality Management
6. Resource Management
7. Communication Management
8. Risk Management
9. Procurement Management
10. Stakeholder Management

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1. Integration Management

Coordinates all project activities.

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2. Scope Management

Defines project boundaries.

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3. Schedule Management

Controls project timeline.

---

4. Cost Management

Manages project budget.

---

5. Quality Management

Ensures software quality.

---

6. Resource Management

Manages manpower and resources.

---

7. Communication Management

Improves team communication.

---

8. Risk Management

Handles project risks.

---

9. Procurement Management

Manages external purchases.

---

10. Stakeholder Management

Manages customer and stakeholder expectations.

Advantages of PMBOK

1. Standardized management.
2. Better planning.
3. Improved communication.
4. Better quality control.

Conclusion

PMBOK provides a complete framework for effective project management.

Q9. Explain Earned Value Analysis.

Introduction

Earned Value Analysis (EVA) measures project performance using:

- Cost
- Schedule
- Work completed

Important Terms

1. Planned Value (PV)

Expected project cost.

2. Earned Value (EV)

Value of completed work.

3. Actual Cost (AC)

Actual project expenditure.

Important Formulas

Schedule Variance

```
SV = EV - PV
```

Cost Variance

```
CV = EV - AC
```

Schedule Performance Index

```
SPI = EV / PV
```

Cost Performance Index

```
CPI = EV / AC
```

Advantages of EVA

1. Better project tracking.
2. Improved cost control.
3. Better schedule monitoring.

Conclusion

Earned Value Analysis helps project managers measure project performance effectively.

Q10. Explain Software Metrics.

Introduction

Software Metrics are quantitative measures used to evaluate software quality and productivity.

Objectives of Software Metrics

1. Measure productivity.
2. Estimate cost.
3. Improve quality.
4. Monitor project progress.

Types of Software Metrics

1. Product Metrics

Measures software characteristics.

Examples

- LOC
- Complexity

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2. Process Metrics

Measures development process.

Examples

- Defect Removal Efficiency

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3. Project Metrics

Measures project management activities.

Examples

- Cost estimation
- Schedule tracking

Size-Oriented Metrics

Based on Lines of Code.

Function-Oriented Metrics

Based on functionality.

Example

Function Points.

Advantages of Software Metrics

1. Better planning.
2. Improved quality.
3. Better productivity measurement.

Conclusion

Software Metrics help organizations measure and improve software development processes.

END OF MODULE 6