

Unit – V Software Project Management

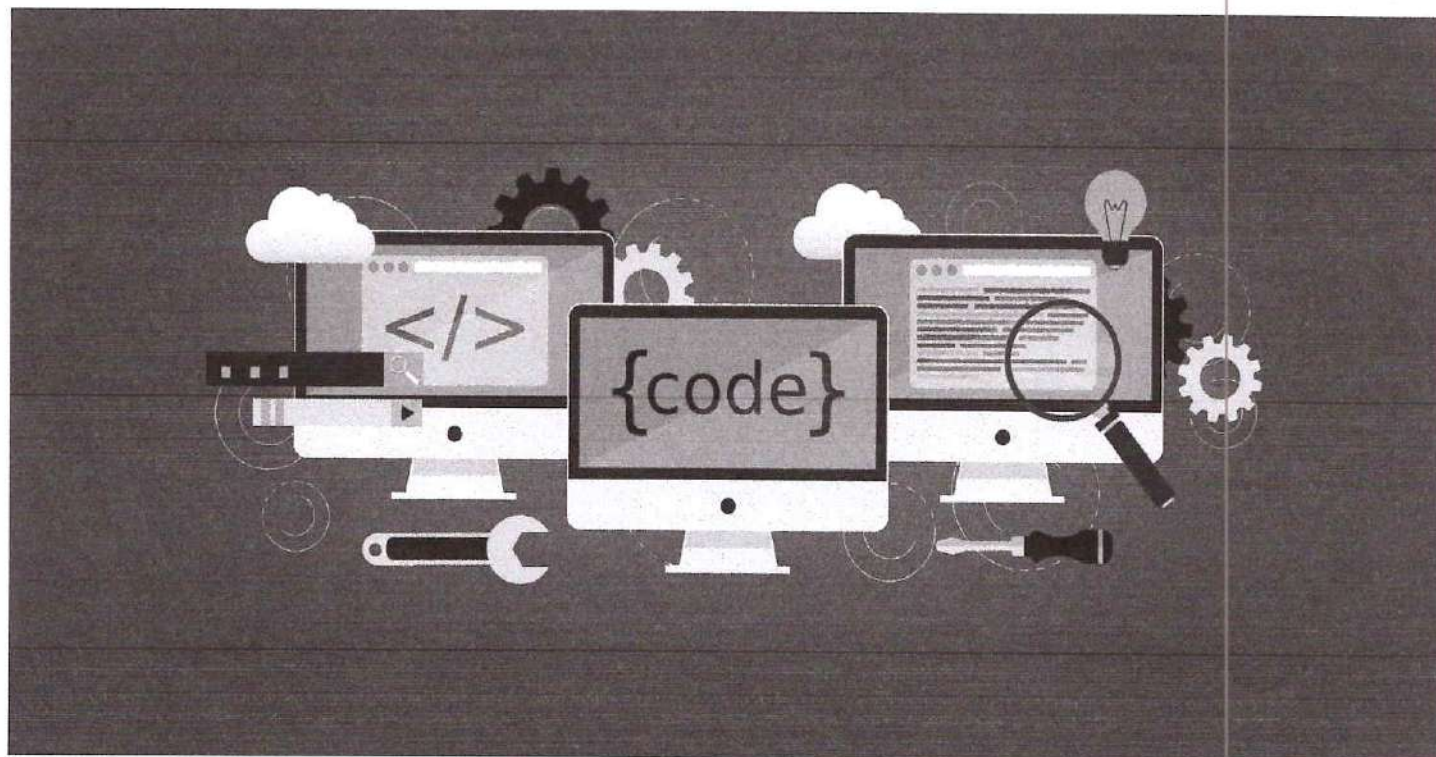
Course Title–Software Engineering (STE)

Course Code - 315323

Programme Name - Computer & Computer Science and Engineering

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Software project Management5.1 Project Scheduling

- project scheduling is a project refers to all activities to be done with specified order and within time slot allotted to each activities.
- project scheduling is the process of putting together a timeline for all activities in project.
- It provides start and end of the project, milestone and task for project.

Basic principles of scheduling :-

Compartmentalization : project must be compartmentalized into a number of manageable activities and task, to accomplish, both product and process are decomposed.

Interdependency : The interdependency of each activities or task must be determined. Some activities must occur in sequence, while other in parallel. Other activities can occur independently.

Time Allocation : Each task to be scheduled must be allocated some number of work units. Each task must be assigned a start and completion date.

Effort validation :- Every project has a define number of staff members.

- As time allocation occurs the project managers must ensure that no more than allocated no. of people has been scheduled at any given time.

Defined responsibilities :- Every project has a defined task that is scheduled must be assigned to a specific team member.

Defined outcomes : Every task that is scheduled must have a defined outcome.

Defined milestones : Every task or group of tasks should be associated with a project milestone.

There are many different method of scheduling

1. Critical path method (CPM)
2. Program Evaluation Review Technique (PERT)
3. Gantt chart.

Factor that delay project schedule :-

- unrealistic deadline established outside the team.
- changing customer requirement not reflected in schedule changes.
- understanding the resources required to complete the project.
- Risks that were not considered when project start.
- Human difficulties not have been predicted in advance
- Miscommunication among project staff resulting in delay.

WORK Break Down structure (WBS):

- WBS is used to decompose a given task set recursively into small activities.
- It provide a notation for representing the major task needed to be carried.
- The root of the tree is labelled by problem name
- Each node of the tree is broken down into smaller activities.

Following are few reasons for creating a WBS in project

- 1) Accurate & readable project organization.
- 2) Accurate assignment of responsibilities to the project team.
- 3) Indicates the project milestones and control points.
- 4) Helps to estimate the cost, time & risk.
- 5) It illustrates the project scope.
- 6) Identifying the main deliverable of a project is starting point for deriving a work break down structure.

Working of WBS:-

- Splits the project into major components. In the process of breaking down the task, one can break them into different level of details.
- Break each component into smaller tasks or work packages that can be assigned, scheduled and managed.
- Estimates time and resources.

- WBS is used to create project schedules, track progress, manage budget, control changes.

	Task 1	Subtask 1.1	work package 1.1.1
			work package 1.1.2
		Subtask 1.2	work package 1.2.1
			work package 1.2.2
	Task 2	Subtask 2.1	work package 2.1.1
			work package 2.1.2

diag:- Representation of WBS.

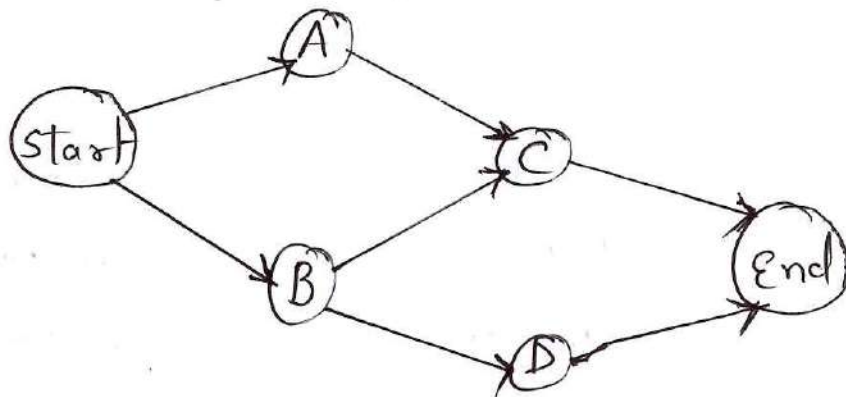
Activity Network :-

- After the creation of WBS, the next step is to find dependencies among activities.
- Activity N/w is a graphical representation of project schedule.
- WBS representation of a project is transformed into an activity N/w.
- Activity N/w shows, different activities making a project, their estimated duration and interdependencies.
- An Activity is represented by a rectangular node and its duration is shown alongside each task.
- An Activity N/w is labelled graph with nodes corresponding to activities, Arrows labelled with estimated times, Activities are linked if there is a dependency between them.
- A task N/w, also called as Activity network.

1) Example:-

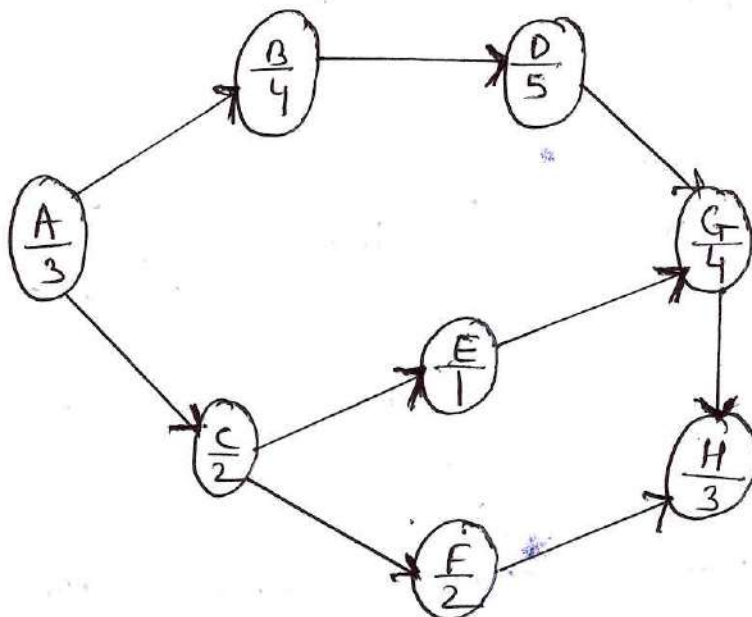
Draw Activity diagram or N/w diagram for the given project

Activity	Predecessor Activity
A	—
B	—
C	A, B
D	B



2) Example:-

Draw Activity diagram or N/w diagram



Activity	Predecessor	Duration (day)
A	—	3
B	A	4
C	A	2
D	B	5
E	C	1
F	C	2
G	D, E	4
H	F, G	3

Project Tracking:-

It involves monitoring the progress of software project to ensure that it stay on schedule within budgets & meets its quality goals.

- Timeline charts:-

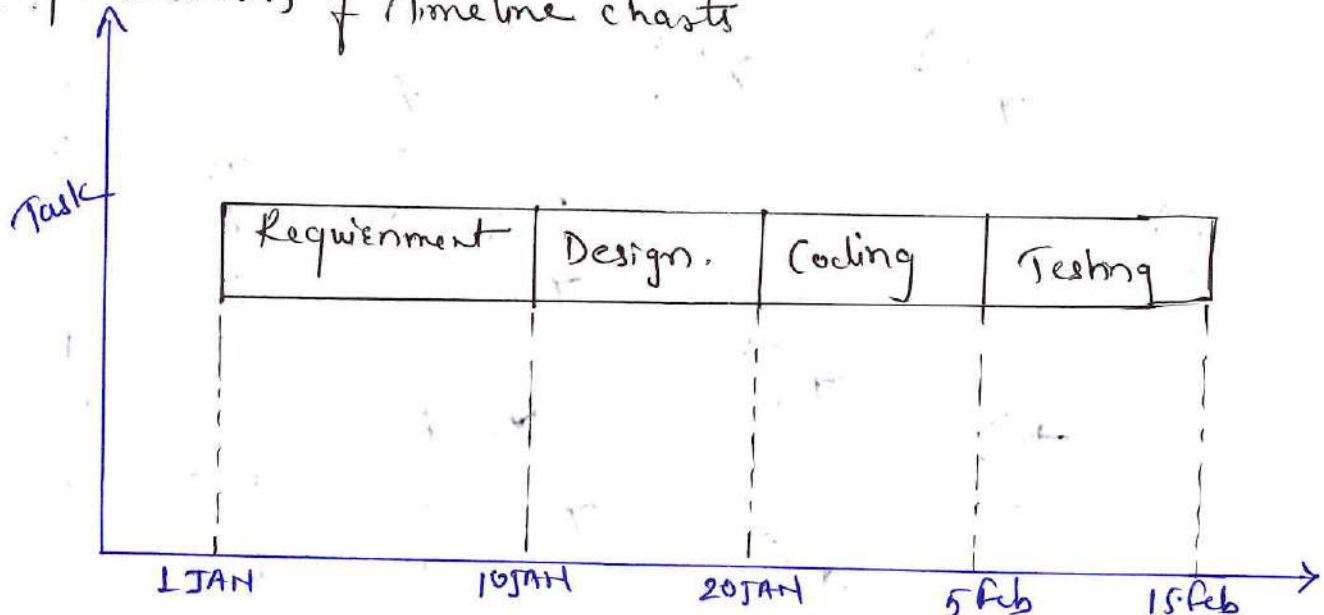
It shows the sequence of tasks or milestones in a horizontal time based layout.

- Task are shown along a timeline.
- Helps visualise start and end dates.
- Shows task dependencies and overlaps.

Example 1:

Task Name	Start date	End date
1) Requirement	JAN 1	JAN 10
2) Design	JAN 11	JAN 20
3) Coding	JAN 21	Feb 5
4) Testing	Feb 6	Feb 15

Representation of Timeline charts



Earned Value Analysis (EVA)

- EVA is a method to measure project performance comparing planned work with actual work completed and cost incurred.

Here,

Planned value (PV) — cost of work planned to be done by certain time.

Earned value (EV) — cost of work actually completed by that time.

Actual cost (AC) — Actual cost spent on work completed.

Schedule Variance (SV) = $EV - PV$.

which indicate, if you are ahead or behind schedule.

Cost Variance (CV) = $EV - AC$

which indicate if you are under / over budget.

Schedule performance Index (SPI) = EV / PV .

$SPI > 1$ — ahead of schedule

$SPI < 1$ — Behind schedule

Cost performance Index (CPI) = EV / AC

$CPI > 1$ — Under Budget.

$CPI < 1$ — Over Budget.

Cost Variance (CV): — Difference between budgeted cost of work performed of Actual cost of that work.

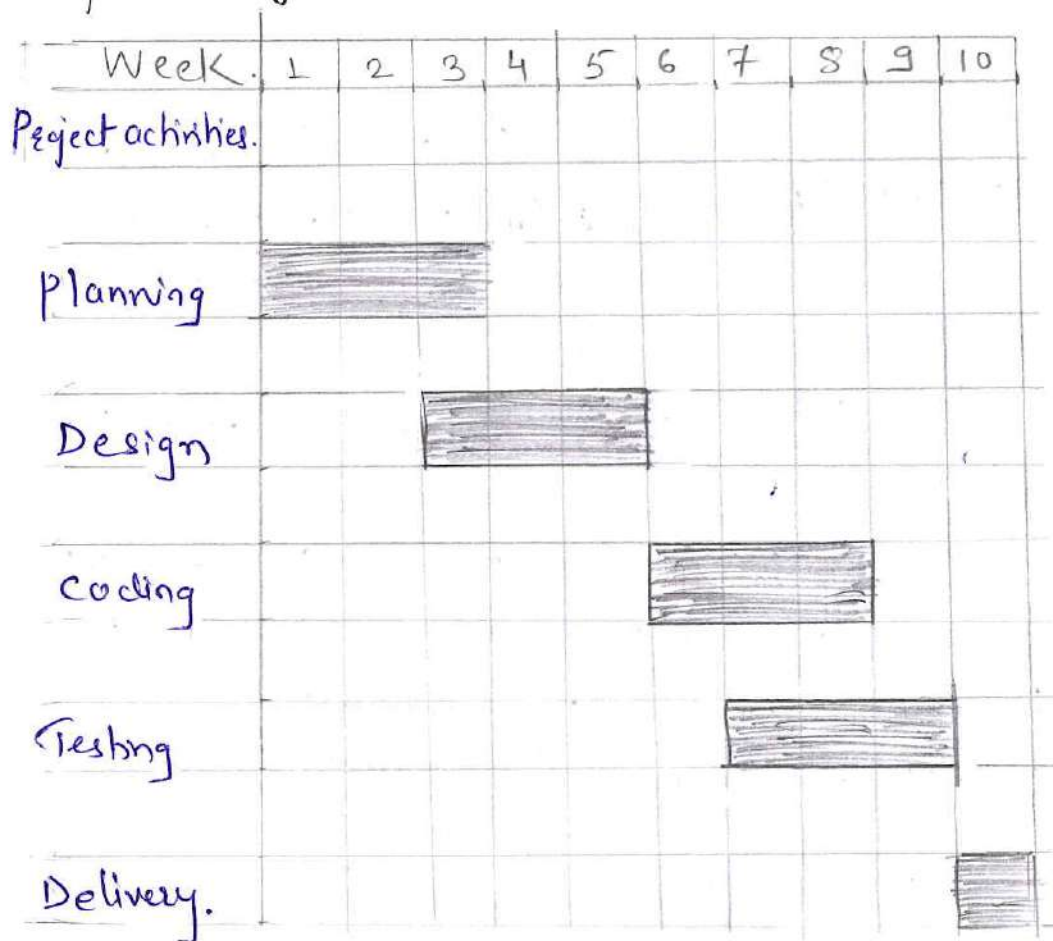
Schedule variance (SV): — Difference betn budgeted cost of work performed of Budget cost of work scheduled.

Time Variance (TV): — Difference between Time scheduled for work performed of Actual time to perform that work.

Gantt chart:-

Gantt chart is a horizontal bar chart developed as a production control tool in 1917, by Henry L. Gantt

- Gantt chart is constructed with a horizontal axis, representing the total time span of the project, break down into increment and a vertical axis representing the task that makes up the project.



Advantages:-

- It provides a visual for the task that needs to be completed.
- It helps to manage organization.
- Gantt chart is a simple & inexpensive method.
- monitoring & control are easier.
- Can be changed & updated quickly at a lower cost.
- clearly shows the decided time & work schedule for every job.

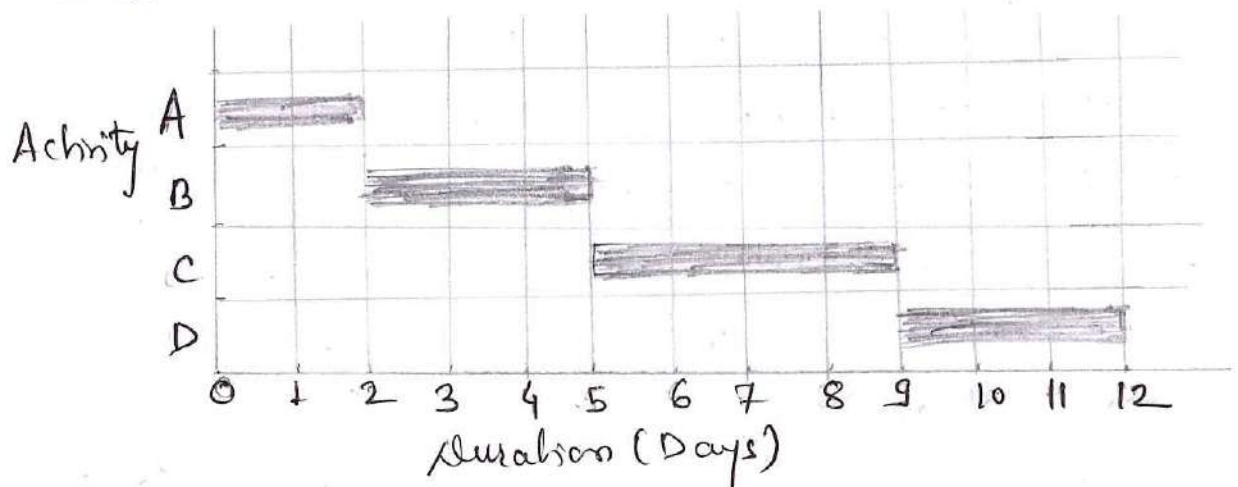
Disadvantage :-

- for major project Gantt chart may become difficult.
- Requires frequent updates.
- not show interrelationship and interdependence.

Example ① Draw Gantt chart for following.

Activity	Predecessor	Duration (day)
A		2
B	A	3
C	B	4
D	C	3

Solution :-



Scheduling Techniques :-

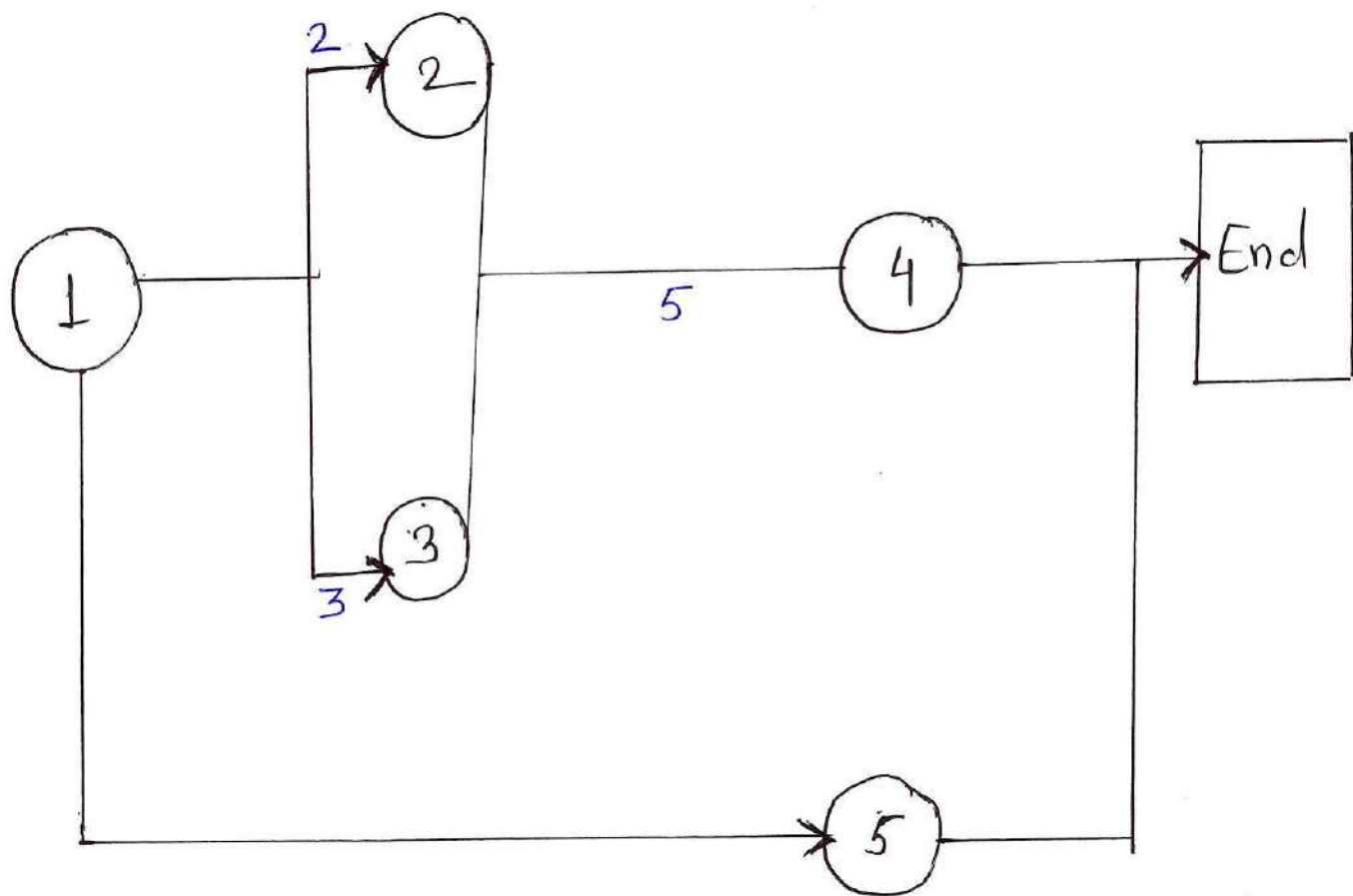
1) Critical path method (CPM)

- project management tool used to plan, schedule and control complex projects.
- It is used in project that have predictable activities and tasks.
- It allows planners to control both time & cost.

- critical path - longest sequence of dependent tasks with zero extra time (float).

2) PERT (Program Evaluation & Review Technique):-

- It is used in project that have unpredictable task and activities such as in research and development projects.
- It utilizes three estimates of the time to complete project, the most probable, the most promising, & the most unfavorable.
- PERT is a project management technique, used to manage uncertain activities of project.
- It is technique of planning and control of time.
- It focuses on event.
- It is probabilistic model.
- PERT chart represent another view of project.
- Task & milestones are included in chart symbol such as circle, square are used to depict task & milestones.
- Microsoft uses rectangle to represent task.
- Each task rectangle is divided into sections with task name at the top and task id / duration in the middle.



— Five Task

- Task four is dependent on the completion of task 2 & 3.
- Task five is independent of all task except for first task.
- Once task four & five completed.
- we arrive at the finish line.

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Question Bank (Unit-5).

1. State any two advantages of work breakdown structure (WBS). (WIM-2025)
2. Differentiate between Software quality management & software quality assurance (any two points) (SUM-2024)
3. Differentiate quality control & quality assurance (Any two). (WIM-2024/2023)
4. List the phases of software quality assurance (WIM-2023)
5. Define software quality control & quality assurance. (WIM-2023) (SUM-2022)
6. List the phases of software quality assurance (WIM-2023) (SUM-2025).
7. Describe Earned value Analysis with respect description, formula and Interpretation of the following terms : 1) Schedule variance (SV), 2) Cost Variance (CV) 3) Schedule performance Index (SPI) 4) Cost performance Index (CPI). (WIM-2025).

8. Explain CMMI Levels with respect to following
1) Diagram 2) description of each level (WIN-2025)

9. Explain the three times estimates of PERT.
Draw Network diagram and find the critical path & duration for the following data. (WIN-2025)

Activity	1-2	1-3	2-4	2-5	3-4	4-5
Duration (Days)	8	2	4	6	5	4

10. Describe Six Sigma Strategy in details (SUM-2022)

11. Explain CMMI in detail with neat diagram (SUM-2022)

12. Prepare Macro Timeline chart for 20 days of Hotel Management System (6 day a week) & consider broad phase of SDLC (SUM-2022)

13. Describe work breakdown structure with diagram. (SUM-2023)

14. Prepare Gantt chart for hotel management system (5 days a week). consider phases of SDLC (SUM-2023)

15. Describe Six Sigma & state the phases of DMAIC & DMADV (SUM-2023) H/ 8/6/16

16. Explain GANTT chart & its application for project tracking with e.g. (WIN-2023)

17. Describe CMMI. Give significance of each level. (WIN-2023)

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