

## CS587

### Midterm Exam

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**Q1.** Explain the difference between desk review and group review when performing peer-review for the different software artifacts produced as a result of following the project plan and the development process. Give examples for when we should use desk reviews and when we should use group reviews.

**Answer:** - Review are the most effective method to improve quality by identifying defects in the origination phase of the artifacts. Reviews can be used to track the progress and prevent defects discovered by Customer. Review can come in different forms, it can be Formal Group Review or inspection and Desk Review

Desk Review is used for inspection small task like inspecting 50 lines of code or not more than 2 pages. In desk review involved in the review

For inspecting more task like 1000 lines of code or around 10 -20 pages then we use formal group review also called inspection.

Example: - If I have a developer who wrote 3000 Line of Code. I expect 100 defects to be caught for a good inspection per 1000 line of code. So, I have 3000 line of code which is a big number. Here we will use group review since the number of lines of code need to be inspected are more. If there were only 300 line of code and I expect 10 defects to be caught for a good inspection per 100 line of code, we would have used desk review.

**Q2.** Quantitative process management is one of the KPA in CMM level 4, explain.

**Answer:** -

The **Capability Maturity model (CMM)** for software is a framework that was developed by the Software Engineering Institute (SEI), by observing the best practices in software and other organizations. The Capability Maturity Model (CMM) is a methodology used to develop and refine an organization's software development process.

In quantitative process management CMM level 4, following things are performed or done. The model describes a five-level evolutionary path of increasingly organized and systematically more mature processes.

The purpose of **quantitative process management** is to control the process performance of a software project. Software process performance is the actual results achieved by following a software process

In quantitative process management CMM level 4, following things are performed or done.

- The process collects and records the data for selected process. For example, if a developer writes 3000 line of code and after the inspection, 200 defects are found per 3000 line of code then it will be documented. In CMM Level 4, artifacts and quality records are documented.
- Reduce process variation by analyzing software process being followed by a software project and bring under quantitative control according to a documented procedure. By doing this, service quality, performance and product can be improved.
- Control process variation by collecting measurement data. And store these data in organization's measurement repository to support fact-based decision in future.
- The reports having the results of any software project's quantitative process management activities are prepared and distributed
- Such quantitative process management group is responsible for coordinating the quantitative process management activities for organization. Also, quantitative process management group is trained to perform such activities.
- Establish and Maintain the process capability baseline for the organization standard software process.

**Q3.** What is the purpose of the work package? Who will create it?

**Answer:** - A work package is a document prepared by the activity manager in which he or she describes the details of how he or she will accomplish the work of the activity. Once the project plan has been approved, it is the activity manager's responsibility to generate the work package documentation

**Purpose of Work package:** -

- It describes in detail the tasks, start/end dates, that need to be done in order to complete the work for an activity.
- The work package manager, or activity manager, may choose to include the start and end dates for each task in the package but that may allow others to micromanage your work items.
- The work package also can be adapted to status reporting. Some organizations use the percent of tasks completed as the percent of activity completion.

Work package are created by **activity manager or work package managers**.

**Q4.** For a software development organization that has the quality records for projects it executed for the past 10 plus years, what is/are method(s) to estimate activity durations for new projects? Explain.

**Answer:** - The duration of a project is the elapsed time in business working days, not including weekends, holidays, or other nonworking days. There are six methods Estimating Activity Duration we will describe each of them:

**Historical Data:** As part of the project development process there will be quality record that saved in a common document repository of the estimated and actual activity duration. This historical record can be used in other projects. The recorded data become your knowledge base for estimating activity duration. This differs from the Similarity to Other activity technique in that it uses a record, rather than depending on memory.

**Similarity to other activities:** This technique does not depend on any stored documents for estimation of durations. They rely on personal experience related to similar previous projects or seek information from peers who have experience for estimation. If the company has carried out a similar activity, it may be possible to adapt the duration to the current case. Project managers must study the similarities of the two activities and adjust for any features that may result in differences in duration.

**Expert Advice:** When the project involves a technology that is being used for the first time in the organization, and the lack of skilled engineers in that technology within the organization. Rely on outside sources for advice and consultation; mainly the vendors and high-tech consulting firms.

**Delphi technique:** This technique is used when there is lack of expert advice. Firstly, the team members are briefed on the nature of the new project. Then everyone is asked to guess the activity durations. The results are discussed in the team meeting. This is done three times. The average of the third guess is considered as the final estimate.

**Three – point technique:** If this method is used to estimate the activity duration for new project then estimate optimistic, pessimistic and most likely. Optimistic (O) is the shortest duration when everything happens as expected. Pessimistic (p) is the duration wherein everything will be going wrong. Most Likely (M) is the time usually experienced. These 3 estimates are done by the collective memory of professionals who have worked on similar activities earlier but for which there is

no record history or data. Estimate can be calculated by, Estimate=

$$E = \frac{O + 4M + p}{6}$$

**Wide-band Delphi technique:** Combining the Delphi and the three-point methods results in the wide-band Delphi technique. It involves a panel, as in the Delphi technique, but rather than a single estimate that the panel members are asked to give at each iteration, they are asked to give their optimistic, pessimistic, and most likely estimates for the duration of the chosen activity at each iteration. The results are compiled, and any extreme estimates are removed. Averages are computed for each of the three estimates, and the averages are used as the optimistic, pessimistic, and most likely estimates of activity duration. Finally, you

$$E = \frac{O + 4M + p}{6}$$

apply the formula:

**Q5.** Who controls the design review meeting? What are the different metrics collected in the design review meeting?

**Answer:** - Moderator controls the design review meeting. Our requirement must meet the Completeness, Correctness and Consistency.

Different metrics collected in the design review meeting are Doability, Testability and correctness which are as follows: -

- Doability: - Check whether the data is feasible or not.
- Testability: - Testability is the method for Testing.
- Correctness: - data correctness is check in this.
- Review: Error and defects will be identified which are collected from review meeting form.
- Changed Request: - Collected automatically as they are entered in Change Management database.
- Additional Metrics: - give the details of Work Breakdown Structure.
- Publishing and archiving of metrics: The above collected metrics will be then collected will be published and is archived as project reduction.
- Number of major defects, minor defects, critical defects.
- Number of defects found during preparation.
- Start/End Time of session
- Effectiveness of the reviews.

**Q6.** Can reviews and inspections tasks replace/eliminate the testing tasks? Explain.

**Answer:** - No, reviews and inspections tasks replace/eliminate the testing tasks.

The goal of inspection is to identify the defects. Here are some following reasons by which we can say that reviews and inspections tasks cannot replace/eliminate the testing tasks:

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- Test cases written by the test engineer. The testing is performed on based of these test cases while, reviews or inspection are done based on project specification.
- Testing to done to find new error and to check whether the previous error is resolved or not whereas during inspection we only check for the specification.
- Inspection is done manually while testing can be automated or some, we can use any software for testing.
- Defects are found in both testing and inspection but the defects which are found in testing are reported immediately.
- Unlike software testing, in inspection or reviews, four engineers with at least one engineer from every department is required.

**Q7.** Which one is better, a network diagram with few Zero-Slack activities or many Zero-Slack activities? Explain

**Answer:** - A network diagram with few Zero-slack activities is better when compared to many Zero-Slack activities.

- Slack time can be defined as the amount of time a task can be delayed without causing another task to be delayed or impacting the completion date of your project.
- If there are activities which are having zero slack time, then it affects the critical path of the project. So due to this, the project must be completed on the earliest schedule. So ultimately this results in affecting project completion date. So, if any slippage or delay occurs in the project, then project manager will be forced to reschedule the project which costs the company a lot.
- If there are a greater number of zero-slack activities, then the burden to complete the project on time would be increased.
- When there are few activities having zero slack time it means that the activities can be delayed without affecting the project completion date since the critical path will be having at least a few activities having greater than zero slack times. It is better to have these kinds of activities since they allow the manger to adjust the activities for any delay that might be caused by numerous situations.
- Therefore, it is always better to have few numbers of zero-slack activities.

**Q8.** What are the possible actions that the project manager and review moderator might consider to take for the following outcomes of design reviews?

1. Rework and defect fixes turned out to require more than 80% of the original effort to write the design.

**Answer:** - Rework and defect fixes have upper bound of 50%. More than 80% rework and defect fixes means that there are lots of bugs and inconsistencies in coding. This indicates a bad sign to software development team one of the reasons can also be that they are not technically sound. The PM and design team schedule a meeting and identify the cause of large number of defects. More skillful resources will be allocated to the project to improve the software development. Once work is done or artifacts are produced by another engineer then again schedule a group review for the newly produced artifact.

2. Rework and defect fixes turned out to require 25% of the original effort to write the design.

**Answer:** - Rework and defect fixes have upper bound of 50% and a lower bound of 10% which means 25% is not bad not good. The design can be accepted and if require some changes may be acceptable. There is no need to take any appropriate action by Project Manager and design team, PM will only ask to rework efficiently will no new resources allocation.

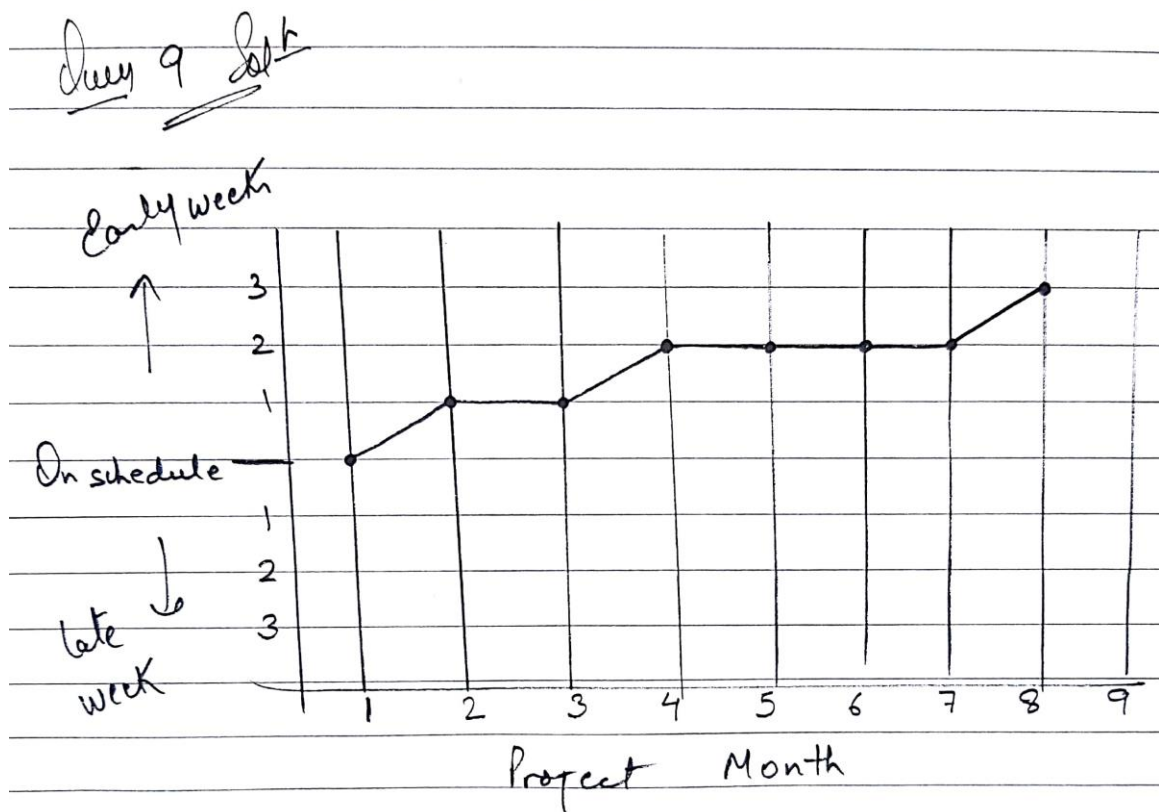
3. Rework and defect fixes turned out to require 5% of the original effort to write the design.

**Answer:** - Lower bound is 10% which means 5% is a good job done by team. Moderator reviews the rework and will approve if no defects are found after fixes

**Q9.** Consider the following milestone table, what is the milestone trend chart that the following project follows? Name and draw the milestone trend chart.

Milestone	Expected Delivery	Actual delivery
Project Planning	1st month	On time
Requirement Phase	2nd month	early 1 week
Environment and Lab setup	3rd month	early 1 week
Analysis & Design phase	4th month	early 2 week
Coding	5th month	early 2 weeks
Testing	6th month	early 2 weeks
Documentation	7th month	early 2 weeks
Installation/Training	8th month	early 3 weeks

Answer: -



**Q10.** Consider the following data; calculate the effort and duration required for every task, considering the following constraints:

1. An artifact is produced by only one author
2. Every review “meeting” task shall be carried by 5 engineers including the author
3. Every review “preparation” task shall be carried by 4 engineers excluding the author
4. Any “Rework” task can be executed by the author of the original task

Tasks	Amount of Work	Productivity	Effort	Duration
High Level Design (HLD)				
Write HLD Document	120 pages	4 page/Hour	3.75 days/1Head Count	3.75 days for 1 Head Count
Review HLD Document				
Preparation for HLD Document		4 pages/Hour	15 days/4 Head Count	3.75 days for 4 Head Count
Review Meeting		5 pages/Hour	15 days/5 Head Count	3 days for 5 Head Count
Rework	110 defects	4 defect/Hour	3.4375 days/1 Head Count	3.4375 days for 1 Head Count
Low Level Design (LLD)				
Write LLD Document	72 pages	1 page/Hour	9 days/1 Head Count	9 days for 1 Head Count
Review LLD Document				
Preparation for LLD Document		5 pages/Hour	7.2 days/4 Head Count	1.8 days for 4 Head Count
Review Meeting		8 pages/Hour	5.625 days/5 Head Count	1.15 days for 5 Head Count
Rework	44 defects	1 defect/Hour	5.5 days/1 Head Count	5.5 days for 1 Head Count
Testing				
Write Test Plan	69 pages	5 pages/Hour	1.725 days/1 Head Count	1.725 days for 1 Head Count
Review Test Plan				
Preparation for Test Plan		5 pages/Hour	6.9 days/4 Head Count	1.725 days for 4 Head Count
Review Meeting		8 pages/Hour	5.39 days/5 Head Count	1.078 days for 5 Head Count
Rework	73 defects	5 defects/Hour	1.825 days/1 Head Count	1.825 days for 1 Head Count

Effort = (Amount of work /Productivity) \* resources allocated

Duration = (Amount of work/ Productivity)/ 8)

\*1 day = 8 hour