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TE comps 'B'

SE. Assignment - 1

Q1) What is the significance of recognizing software equipments in the software engineering process?

→ As the technology changes, the user requirements and environment on which software is working also changes. So every organisation is ranked based on the software engineering principles used by that organization.

- Implementing and managing large size of software, programmer requires a specific method modularizing the task so that size of software can't harm the software quality.

- Software engineering provides methodology for implementing complex software systems with high quality.

- without any standard method or management, it is difficult to address defects in the product and correct them as early as possible. Software engineering provides this functionality.

- Extending the previous software to add new functionality requires more cost in terms of time to develop and efforts taken by people, as compare to the process of developing new software to provide that functionality.

- Software engineering provides a way in which software system can be able to scale as needed in future.

Q2] Describe the main characteristics of different process models of Software development.

→] •] Waterfall model:- sequential & Linear approach. Each phase must be completed before moving to the next one.

1] Clear and structured, suitable for projects with well-defined requirements, minimal changes and stable scope.

2] Limited flexibility for changes, difficult to adapt to evolving requirements, Potential for late-stge errors discovery.

•] V-model (Validation and Verification model):- Parallel development and testing approach. Each development phase is followed by a corresponding testing phase. Strong emphasis on validation and verification. Clear documentation, reduces risk by identifying issues early. Limited adaptability to changing requirements, potential for miscommunication between development and testing phase.

•] Incremental model:- Similar to iterative models but the software is built in increments, each delivering specific functionality. Early delivery of functional modules, reduced time to market, allows for better integration testing Requires careful planning to define increments, possible integration challenges.

•) Iterative model:- Similar to agile, but with, more structured and defined phases. Each iteration may include a subset of the softwares functionality. Allows for iterations, redefined features, and early feedback, suitable for projects with evolving requirements. Requires clear planning and co-ordination between iterations, potential for scope creep.

Q3] How does the capability maturity model (CMM) contribute to improving software development process?

→] The CMM model's application in software development has sometimes been problematic. Applying multiple models that are not integrated within and across an organisation could be costly in training appraisals and improvement activities.

] The capability maturity model integration (CMMI) projects was formed to sort out the problem of using multiple models for software development processes. Thus the CMMI model has superseded the CMM model. Though the CMM moded continues to be a general theoretical process capability model used in the public domain.

] CMMI framework consists of a collection of computer programs based on knowledge engineering, software engineering, integrated product and process development and provider sourcing.

CMMI framework has three groups as:

1] CMMI for development (CCMMI-DEV)

2] CMMI for service (CMMI-SVC).

3] CMMI for acquisition (CMMI-ACQ).

Q4] Explain the differences between prescriptive process models and evolutionary process models.

Prespective Process Model	Evolutionary Process Model
Developed to bring order and structure to the software development process	Stages consist of growing increments of an operational software product with evolution.
It can accomodate changing requirement.	Improvement is required in the product
It is more popular.	It is less popular.
Waterfall model and incremental models are a few examples of prespective process model.	Eg:- Spiral and prototyping model as well as RAD model

Q5] Provide examples of situations where using a specific process model would be more suitable.

] Incremental model:- When a project can be divided into smaller functional increments allowing certain modules to be developed and delivered independently while ensuring integration and testing along the way.

] RAD model:- When there is a need to quickly produce a working prototype to gather user feedback and make refinements before proceeding with full development.

] Waterfall model:- When requirements are stable and changes are minimal, making it possible to plan and execute the project in a linear sequence of phases.

] Agile model (Scrum):- When flexibility and adaptibility are crucial and the project can be divided into smaller increments with frequent iterations, allowing for continuous feedback and changes.

Q6] Compare and contrast the waterfall model and agile methodologies in terms of project planning and process tracking.

- Waterfall model is the first approach used in software development process.
- It is also called as classical life cycle model or linear sequential model.
- In waterfall model any phase of development process begins only if previous phase is completed.
- Agile software development describes an approach to software development under which requirements and solutions evolve through the collaborative effort of self-organising and cross functional teams and their customers.
- It advocates adaptive planning, evolutionary development, early delivery and continual improvement, and it encourages rapid and flexible response to change.
- The term agile was popularized, in this context, by the manifesto for agile software development.

Q7] Apply process matrics to evaluate the efficiency and effectiveness of waterfall, agile (both scrum & kanban) methodologies, considering factors such as development speed, adaptibility to change and customer satisfaction.

- Waterfall:-
- Development speed:-

Waterfall is a linear and sequential methodology where each phase must be completed before moving on the next. This can lead to longer development cycles.

Metrics: time taken for each phase.

- Adaptability to change:-
  Waterfall is less adaptable to change in requirements due to its rigid structure.
  Metrics: Number of change, requests, impact analysis. time.
- Customer satisfaction:-
  Waterfall may have limited customer involvement until the end, which could affect satisfaction
  Metrics:- deployment support requirements.

2] Agile (Scrum & Kanban):-

- Development speed:-
  Agile methodology emphasise incremental development, allowing for quicker delivery of working features.
  Metrics: No. of user stories completed per sprint
- Adaptability to change:-
  Agile methodologies are highly adaptable to charging requirements due to regular iterations and flexibility,
  Metrics: No. of changes incorporated per sprint
- Customer satisfaction:-
  Agile methodologies involve continuous customer feedback and collaborations, leading to improved satisfaction,
  Metrics: Regular customer feedback scores.

Q8] Justify the relevancy of the following comparision for software development models.

Features	Waterfall Model	Incremental Model	Prototyping Model	Spiral Model
1) Requirement specification.	Well Understood.	Not well understood	Not well understood	Well Understood
2) Understanding requirement	Well understood	Not well understood	Not well understood	well understood.
3) Availability of reusable components.	No	Yes	Yes	Yes.
4) Risk Analysis.	Only at beginning	No risk analysis	NO Risk Analysis	Yes
5) User Involvement	Only at beginning	Intermediate	High	High
6) Implementation time	Long	Less	Less	Depends on Project.
7) Flexibility	Rigid	Less	High	Flexible
Expertise Req.	High	High	Medium	High
Cost control	Yes	NO	No	Yes.
Resource control	Yes	Yes	No	Yes.