

Sri SaiRam Engineering College, Ch – 44
Dept of MCA
Sub: Software Engineering MC 1703

PART - A

1) Define Software Engineering

The establishment and use of sound engineering principles in order to obtain economically software that is reliable and works efficiently on real machines.

2) Differentiate Software engineering methods, tools and procedures.

Methods: Broad array of tasks like project planning, cost estimation etc..

Tools: Automated or semi automated support for methods.

Procedures : Holds the methods and tools together. It enables the timely development of computer software.

3) Write the disadvantages of classic life cycle model.

Disadvantages of classic life cycle model :

(i) Real projects rarely follow sequential flow. Iteration always occurs and creates problem.

(ii) Difficult for the customer to state all requirements

(iii) Working version of the program is not available. So the customer must have patience.

4) What do you mean by task set in spiral Model?

Each of the regions in the spiral model is populated by a set of work tasks called a task set that are adopted to the characteristics of the project to be undertaken.

5) What is the main objective of Win-Win Spiral Model?

The customer and the developer enter into the process of negotiation where the customer may be asked to balance functionality ,performance and other product against cost and time to market.

6) Which of the software engineering paradigms would be most effective? Why?

Incremental / Spiral model will be most effective. Reasons:

(i) It combines linear sequential model with iterative nature of prototyping

- (ii) Focuses on delivery of product at each increment
- (iii) Can be planned to manage technical risks.

7) Who is called as the Stakeholder?

Stakeholder is anyone in the organization who has a direct business interest in the system

8) Define Software Engineering.

Software Engineering :

The Application of systematic, disciplined, quantifiable

Approach to the development, operations, and maintenance of software

9) What is a Process Framework?

Process Framework :

Establishes foundation for a complete software process. By identifying a small number of framework activities that are applicable for all software projects regardless of their size and complexity.

10) What are the Generic Framework Activities?

Generic Framework Activities

- . Communication
- . Planning
- . Modeling
- . Construction
- . Deployment

11) Define Stakeholder.

Stakeholder :

- . Anyone who has stake in successful outcome of Project Business Managers, end-users, software engineer, support people

12) How the Process Model differ from one another?

- . Based on flow of activities
- . Interdependencies between activities
- . manner of Quality Assurance
- . Manner of Project Tracking
- . Team Organization and Roles
- . Work Products identify an requirement identifier

13) Write out the reasons for the Failure of Water Fall Model?

Reasons For The Failure Of Water Fall Model :

Real Project rarely follow Sequential Flow. Iterations are made in indirect manner

- . Difficult for customer to state all requirements explicitly
- . Customer needs more patients as working product reach only at Deployment phase

14) What are the Drawbacks of RAD Model?

Drawbacks of RAD Model :

Require sufficient number of Human Resources to create enough number of teams Developers and Customers are not committed, system result in Failure Not Properly Modularized building component may Problematic

- . Not applicable when there is more possibility for Technical Risk

15) Why Formal Methods are not widely used?

- . Quite Time Consuming and Expensive
- . Extensive expertise is needed for developers to apply formal methods
- . Difficult to use as they are technically sophisticated maintenance may become risk

16) What is Cross Cutting Concerns?

Cross Cutting Concerns :

- . When concerns cut across multiple functions, features and Information

17) What are the different Phases of Unified Process?

Different Phases of Unified Process :

- . Inception Phase
- . Elaboration Phase
- . Construction Phase
- . Transition Phase
- . Production Phase

18) Define the terms :

a) Agility

b) Agile Team

a) Agility :-

- . Dynamic, Content Specific, Aggressively Change

Embracing and Growth Oriented

b) Agile Team :-

. Fast Team

. Able to Respond to Changes

19) Define the terms:

a) Agile Methods

b) Agile Process

a) Agile Methods :-

. Methods to overcome perceived and actual weakness in conventional software engineering to accommodate changes in environment, requirements and use cases

b) Agile Process :-

. Focus on Team Structures, Team Communications, Rapid Delivery of software and its de-emphasis on importance of intermediate product

20) What is the Use of Process Technology Tools?

Use of Process Technology Tools :

. Help Software Organizations

1. Analyze their current process
2. Organize work task
3. Control And Monitor Progress
4. Manage Technical Quality

21) Define the term Scripts.

Scripts :

. Specific Process Activities and other detailed work functions that are part of team process

22) What are the Decomposition Techniques?

Decomposition Techniques :

. Software Sizing Problem – Based Estimation Process – Based Estimation

. Estimation With Use – Cases reconciling Estimates

23) How do we compute the “Expected Value” for Software Size?

. Expected value for estimation variable (size), S , can be computed as Weighted Average of Optimistic (S_{opt}), most likely (S_m), and Pessimistic (S_{pess}) estimates

. $S = (S_{opt} + 4S_m + S_{pess}) / 6$

24) What is an Object Point?

Object Point count is determined by multiplying original number of object instances by weighting factor and summing to obtain total object point count

25) What is the difference between the “Known Risks” and Predictable Risks” ?

Known Risks :-

- . That can be uncovered after careful evaluation of the project plan, the business, and technical environment in which the product is being developed
- . Example : Unrealistic delivery rate
- . predictable Risks :-
- . Extrapolated from past project experience
- . Example : Staff turnover

26) List out the basic principles of software project scheduling ?

Basic Principles Of Software Project Scheduling :-

- . Compartmentalization
- . Interdependency
- . Time Allocation
- . Effort Validation
- . Defined Responsibilities
- . Defined Outcomes
- . Defined Milestones

Part – B

1. Explain Linear Sequential Model and prototyping model in detail

Linear Sequential Model :

Explanation, Diagram , Advantages, Disadvantages

Prototyping model:

Explanation, Diagram , Advantages, Disadvantages

2. Explain Spiral model and win-win spiral model in detail. .

Spiral Model :

Six Task Regions : Customer Communication

Planning

Risk Analysis

Engineering

Construction and Release

Customer Evaluation

Diagram , Details of four circles

Win-Win spiral model:

The customer and the developer enter into the process of negotiation, where the

customer may be asked to balance functionality, performance, and other product against

cost and time to market.

Activities, diagram , explanation

3. Explain incremental model in detail

Explanation of increments in the stages of Analysis, Design, Code, Test.

4. Discuss about fourth generation techniques.

4GT :

It encompasses a broad array of software tools. Each tool enables the software developer to

specify some characteristics of software at a higher level.

Explanations of : 4GT Tools

4GT Paradigm

Current state of 4GT approaches

General Important topics with the exact Answers

Software Engineering (IEEE Definition)

The application of a systematic, disciplined, quantifiable approach to the development, operation and maintenance of software; that is, the application of engineering to software.

Software engineering layers

Quality Focus, Process, Methods, Tools

5 generic process framework activities

Communication, Planning, Modeling, Construction, Support

Umbrella activities

Software project tracking and control, Risk management, Software Quality Assurance, Formal Technical Reviews, Measurement, Software Configuration management, Reusability management, Work product preparation and production

Capability Maturity Model Integration (CMMI)

Level 0: Incomplete, Level 1: Performed, Level 2: Managed, Level 3: Define, Level 4: Quantitatively managed, Level 5: Optimized.

Process Assessment techniques

CMM-Based Appraisal for Internal Process Improvement (CBA IPI), SPICE (ISO/IEC 15504), ISO 9001:2000

Team Software Process (TSP)

The goal of TSP is to build a 'Self-directed' project team that organizes itself to produce high-quality software.

Personal Software Process (PSP)

PSP represents a disciplined, metrics-based approach to SE. When PSP is properly introduced to the software engineers, the resulting improvement in SE productivity and software quality are significant.

Five framework activities involved in PSP process model

Planning, High-Level design, High-Level design review, Development, Postmortem

Five framework activities involved in TSP process model

Launch, High-level design, Implementation, Integration and Test, Postmortem

Product And Process

If the process is weak, the end product will suffer. People derive as much satisfaction from the creative process as they do from the end-product.

A template for describing a process pattern (Ambler):

Pattern Name, Intent, Type, Initial Context, Problem, Solution, Resulting Context, Related Patterns, Known Uses/Examples

Different Process Models

- Waterfall / Classic Life Cycle / Linear Sequential
- Incremental Process Models
 - o Incremental, Rapid Application Development
- Evolutionary Process Models
 - o Spiral, Prototyping / Build and Fix , Concurrent Development Model
- Specialized Process Models
 - o Component Based Development, Formal Methods Model, Aspect-Oriented Software Development

Agility

Agility is dynamic, content specific, aggressively change embracing and growth oriented.

Agile Process

Process models that emphasize project agility and follow a set of principles that lead to a more informal approach to software process have been proposed in recent years. These Agile Process Models emphasize maneuverability and adaptability.

Agile Process Models

Extreme Programming (XP), Adaptive Software Development (ASD), Dynamic Systems Development Method (DSDM), Scrum, Crystal, Feature Driven Development (FDD), Agile Modeling (AM)

Extreme Programming (XP)

Planning, Design, Coding, Testing

Adaptive Software Development (ASD)

Speculation, Collaboration, Learning

Dynamic Systems Development Method (DSDM)

Feasibility Study, Business study, Functional model iteration, Design and Build iteration, Implementation

Scrum

Backlog, Sprints, Scrum meetings, Demos

Feature Driven Development (FDD)

The FDD approach defines five collaborating framework activities

1. Develop an overall model
2. Build a features list
3. Plan by feature
4. Design by feature
5. Build by feature

Agile Modeling (AM)

AM suggests a wide array of Core and Supplementary modeling principles:

Model with a purpose, Use multiple models, Travel light, Content is more important than representation, Know the models and the tools you use to create them, Adapt locally

SOFTWARE PROJECT PLANNING

- set of activities for software project management.
- Planning involves estimation
 - o Estimate
 - The work to be done
 - The resources required
 - The time required
 - The money required

Decomposition techniques

- Two approaches for decomposition
 - o Decomposition of problem
 - o Decomposition of process

SOFTWARE PROJECT ESTIMATION

- Human, technical, environmental, political variables affect the estimation.
- To achieve reliable cost & effort estimate :
 - o Delay the estimation until late in the project.
 - Is not practical
 - o Consider similar projects
 - Reasonably works well
 - Always not a good indicator
 - o Use decomposition techniques
 - Divide & conquer
 - o Use empirical models
 - Complement of decomposition tech
 - Based on historical data
 - $d = f(v_i)$
 - $d \rightarrow$ estimated value (effort, cost, time)
 - $v_i \rightarrow$ independent parameter (LOC, FP)
 - o Automated Estimation tools

RISK ANALYSIS AND MANAGEMENT

Categories of Risk

- Project Risk
 - o Threaten the project plan

- Identify
 - Potential budgetary, schedule, personnel, resource, customer, requirement pbms, project complexity.
- Technical Risk
 - Threaten the quality
 - Identify
 - Potential design, implementation, interface, verification, maintenance pbms.
 - Occurs because the pbm. is harder to solve.
- Business Risk
 - Threatens the viability of s/w
 - Top 5 risks
 - Market risk – building a product that no one really wants
 - Strategic risk – building a product that no longer fits into the business strategy
 - Building a product that the sales force doesn't know how to sell
 - Management risk – losing support of senior management
 - Budget risk – losing budgetary or personnel commitment
- Known Risk
 - Uncovered after careful evaluation of the project plan
 - Lack of documentation required, poor development environment
- Predictable Risk
 - Extrapolated from past project experience
- Unknown Risk
 - Difficult to identify in advance

Risk Analysis

4 distinct activities

1. Risk identification
2. Risk Projection
3. Risk Assessment
4. Risk Management

Risk Mitigation

Steps :

1. meet the current staff to determine the cause
2. mitigate to identify the causes that are under our control before the project starts
3. develop techniques to ensure continuity when people leave
4. organize project teams
5. define documentation standards
6. conduct reviews of all work
7. assign a backup staff member

Risk Monitoring

- is a project tracking activity

3 primary objectives

1. to assess whether a predicted risk occur
2. to ensure that risk aversion steps defined for the risk are being properly applied
3. to collect inf. that can be used for future risk analysis.

Factors that should be monitored

1. general attitude of team members
2. degree to which the team has jelled
3. interpersonal relationships among team members
4. availability of jobs within company
5. the effectiveness of the risk mitigation steps

SOFTWARE PROJECT SCHEDULING ACTIVITY

Proper scheduling requires

1. all tasks appear in network
2. effort and time are allocated to each task
3. interdependencies between tasks are properly indicated
4. resources are allocated for the work
5. closed spaced milestones are provided to tract the progress

Basic principles that guide s/w. project schedule

1. Compartmentalization
 - divided into no. of manageable activities and tasks
 - product and process are decomposed
2. Interdependency
 - of each activity or task must be determined
3. Time allocation
 - no. of work units must be allocated
 - assign start date and completion date
4. Effort validation
 - no. of people
5. Defined responsibilities
 - tasks are assigned to specific team managers.
6. Defined outcomes
 - work products
7. Defined milestones
 - a milestone is accomplished when one or more work products has been reviewed for quality

Project scheduling methods

- are graphical notations which are used to illustrate the project schedule

- Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM) are two methods.