823/SRINIVASAN ENGINEERING COLLEGE, PERAMBALUR-621212

DEPARTMENT OF COMPUTER SCIENCEAND ENGINEERING

CS1023 – SOFTWARE QUALITY MANAGEMENT

TWO MARKS AND SIXTEEN MARKS

1)Define software quality?

source	definition
OED,1990	Degree of excellence
Crosby,1979	Zero defects
ISO,1986	The totality of features and characteristics of a product or service that bear on its ability to satisfy specified or implied needs
Fruhauf	Quality is when the customer comes back,not the product.

2)Write down the different views of quality?

- The transcendent view
- The product based view
- The value based view
- The manufacturing view
- The user based view

3)Describe the three areas addressed by Mccals model?

- Product operation
- Product revision
- Product transition

4)Define Mccall's quality criteria

- Usability
- Integrity
- Efficiency
- Correctness
- Reliability
- Maintainability
- Flexibility
- Testability
- Portability
- Reusability
- Interoperability

5)How the quality criteria interrelated?

- Inverse
- Neutral
- Direct

6)Give the conditions that quality metrics should met?

- Be clearly linked to the quality criterion.
- Be sensitive to the different degrees of the criterion.
- Provide objective determination of criterion.

7)Define Structuredness?

Structuredness α Modularity α $\frac{\text{Lines of code}}{\text{Number of modules}}$

8)What are the two types of metrics?

Predictive Metrics
Descriptive Metrics

9)Give the characteristics of quality of software?

- Quality is not absolute
- Quality is multidimensional.
- Quality is subject to constraints
- Quality is about acceptable compromises.
- Quality criteria are not independent.

10)Why software is considered to be problematical?

- Software has no physical existence
- The lack of knowledge of client needs
- The change of client needs.
- The rapid change in hardware and software.
- High expectation of customers

11)what are the seven criteria suggested by watts for a good metric?

- **Objectivity**
- Reliability
- Validity
- Standardization
- Comparability
- Economy
- Usefulness

12)How the metrics are classified?

- Readability asa ameasure of usability
- Error prediction as a measure of correctness
- Error detection as a measure of correctness
- MTTF as a measure of reliability
- Complexity as a measure of reliability.
- Complexity as a measure of mainatanability
- Readability of a code as a measure of mainatanability
- Modularity as a measure of maintainability.
- Testability as a measure of maintainability

13)Write down the limitations of metrics?

- They cannot be validated.
- They are not generally objective.
- Quality is relative.,not an absolute quantity.
- They depend upon a small set of measurable properties.
- The do not measure the complete set of quality criteria.

- The metrics measure more than one criterion.

14)What are the problem areas associated with implementation of the method?

- The method is different.
- The need for training and retraining.
- The need for effective management.
- The need to measure progress.
- Piciking up errors earlier may cause frustration.

15)write down the gilb's quality attributes?

- Workability
- Availability
- Adaptability
- Usability

16)Define workability?

Workability is defined as the raw ability of the system to do work.workability may considered in terms of

- Process capacity-It's the ability to process transactions within a given unit of time.
- Storage capacity-It's the ability of the syatem to store things such as information.
- Responsiveness-It's the measure of the response to single event.

17)Define Availability?

Availability is concerned with the proportion of elapsed time that a system is able to be used.The sub attributes are

- Reliability
- Mainatainability.
- Integrity

18)Define Adaptability?

Adaptability may considered in terms of improvability,extendability,and portability.

- Improvability-the time taken to make minor changes to the system where the term system is taken to include items such as documentation.
- Extendability-It's the ease of adding new functionality to system.
- Portability-It's the ease of moving a system from one environment to another.

19)Gilb's approach become obselent.State reason.

- Use of a template rather than rigid model.
- Explicit recognition of constraints upon quality.
- Recognition of critical resources
- Use of locally defined measures.
- Close links with the development process.

20)Write down the five methods suggested by waats for measuring quality?

- Simple Scoring.
- Weighted Scoring.
- Phased Weighting factor method.
- The Kepner-Tregoe method.
- The Cologne combination method.

21)Define Methodology?

A methodology may be defined as a frame work for the systematic organization of a collection of methods.

21)Write down the features of methodology?

- It can be taught.
- It can be scheduled.
- It can be measured.
- In can be compared.
- It can be modified.

22)Define SSADM.Write down the principle behind SSADM.

SSADM-Structured System And Design Methodology.The aim of SSADM is to ensure that user requirements are reflected in the design of the sysytem.The three principle behind SSADM is

- User Involvement.
- Quality Assurance.
- Seperation of logical and Physical design.

23)What are the stages involved in SSADM?

- Analysis of current system.
- Requirement specification.
- Selection of technical options.
- Data design.
- Process design.
- Physical design.

24)What are techniques used in SSADM?

SSADM make use of a number of techniques,both diagrammatic and non diagrammatic.

Diagrammatic Techniques	Non-Diagrammatic Techniques
1)Data Flow Diagram 2)Logical data structures 3)Entity life histories 4)Logical dialogue outlines	1)Relational Data Analysis 2)First-cut rules. 3)Physical design control. 4)Project Estimation. 5)QA Reviews

25)Write down the seven phases involved in IEM ?

- Information Strategy Planning.
- Business Area Analysis.
- Business System Design.
- Technical Design.
- Construction.
- Transition and Production.

26)Write down the advantages of IEM?

- It links system development to business needs.
- It covers the whole life cycle.
- It facilitates the use of a case tool.

27)Define CASE tool?

CASE-Computer Aided Software Engineering.CASE tools are computer based tools to assist in the software engineering process.CASE tool is made up of set of tools.

28)What are advantages of CASE Tools?

- Productivity.
- Consistency.
- Methodology Automation.
- Encourages Good Practice.
- Documentation.
- Maintenance.

29)What are different types of CASE tools.

- Front end or upper case tools.
- Back end or lower case tool
- Integrated case tools.

30)Define QMS?

The organisational structure,responsibilities,procedures,processes and resources for implementing quality management.

31)Write down the SPC techniques?

- Process flow chart
- Tally chart.
- Histogram.
- Pareto Analysis.
- Cause-and Effect diagram.
- Scatter diagram.
- Control charts.

32)Define Quality Control.

A systematic mathod of economically providing products or services that met the user's requirements.

33)Define DRE?

$$DRE=\frac{\text{Errors found by an inspection}}{\text{Total Errors in the product before Inspection}} * 100\%$$

34)Name the two metrics for DRE?

- Total defect containment Effectiveness(TDCE)
- Phase containment Effecetiveness(PCE)

$$TDCE=\frac{\text{Number of pre release defects}}{\text{Numberof prerelease defects+number of post release defects}}$$

$$PCE=\frac{\text{Number of phase i errors}}{\text{Number of phase I errors+Number of phase I defects}}$$

35)Write down the characteristics of DRE?

- There are only two phases of defect removal.
- The defect removal effectiveness for the two phases is same.

36)Write down the five steps involved in Fagans Inspection method?

- Overview

- Preparation.
- Inspection.
- Rework.
- Follow-up.

37)Why we have to assess the reliability of a software product?

It is important for two reason

- As an objective statement of the quality of the product.
- For resource planning for the software maintenance phase.

38)How the reliability models are classified?

Reliability models are classified into two types.

- Dynamic models
- Static models

A static models uses other attributes of the project or program modules to estimate number of defects in the software.

A dynamic models usually based on statistical distributions,uses development defect patterns to estimate end product reliability.

39)What are five factors affecting software quality assurance?

Size of the system
Criticality of the system.
The cost of correcting errors.
Type of release.
Relationship with user.

40)Write down the guidelines for effective leadership?

Trust your subordinates.
Develop your vision.
Keep u cool.
Encourage risk
Be an expert.
Invite dissent.
Simplify.

41)Write down the five effective methods to ensure the failure of software quality assurance?

Too many technical niceties.
Too much time spent stopping,rather than preventing defects.
Efforts wasted.
Management has a problem with the mathematical kid.
Always complaining about the government,but no one does anything.

42)What is SRS?

The software requirement specification document describes capabilities,states,functionality of all aspects of the system.This include major components,subcomponentsof the software and internal interfaces of the software and may include databases.It also include items specifically required by the user.

43)What is SDD?

The software Design Description describes major components and sub components of the software,including databases and internal interfaces.This process will be carried

out according to the standard procedure.This procedure may include use of a computerized design tool.

44)What is Software Interfaces documentation?

Software interfaces documentation describes capabilities and functionality of all interfaces between any two or more components of the system.This include major components ,sub components and external systems.

45)Write down the principles behind the review process?

- Establishing what reviews are needed by the project.
- What are contents of various review.
- What should be results o f the review.

46)Write down the specification for reviews?

- Formal reviews occur at menaing ful points of the software schedule.
- Include affected groups within organization and customer or end user representatives as appropriate.
- Review materials that the responsible software managers have reviewed and approved.
- Check the commitments,plans and status of the software activities.
- Document the identification of significant issues.
- Address the software project risks.
- Define any refinements in the software development plan

47)Write down the objectives of Management Review Process?

- Making activities progress according to plan
- Changing project direction.
- Identify the need for alternative palnning.
- Maintaining the global control of the project.

48)What are the inputs given to the management review process?

- Statement of objectives
- List of issues to be addressed.
- Current project schedule.
- Report from other reviews.
- Reports of resources assigned to project
- Data on the software elements completed.

49)What are the procedures involved in the management review?

- Planning
- Overview
- Preparation
- Examination.
- Rework
- Exit criteria.
- Management review output.
- Auditability

50)Write down the objective of Technical review ?

- Evaluation of a specific software elements.
- Identification of any discrepancies from specification and standards.

- Recommendations after the examination of alternatives.

51)What are inputs given to the technical review processs?

- Statement of objectives.
- Software elements being examined.
- Specifications for the software elements.
- Plans,standards or guidelines against which the software elements are to be examined.

52)Write down the procedures involved in auditing?

- Planning
- Overview
- Preparation
- Examination
- Reporting

53)Write down the preparations that has to be made by the audit team?

- Understand the organization
- Understand the products and processes.
- Understand the objective audit criteria.
- Prepare for the audit report.
- Detail the audit plan.

54)Write down the contents included in the Auditing plan?

- Project processes to be examined.
- Software required to be examined.
- Reports shall be identified.
- Reports distribution.
- Required follow up activities.
- Requirements.
- Objective audit criteria.
- Audit procedures and checklists.
- Audit personnel.
- Organization involved in the audit.
- Date,time, place,agenda of session.

55)What are the requirements required for the document audit and verification?

- Acquisition of project documentation.
- Analysis of documents.
- Dissemination of information.

56)When the auditing is said to be complete?

When

- Each element within the scope has been examined.
- Findings have been presented to the auditing organization.
- Response to the draft audit have been received.
- Final findings have been formally presented.
- The audit report has been prepared and submitted.
- All follow-up actions by the auditing organization have been performed.

57)Write down the contents of audit reports?

- Audit Identification
- Scope
- Conclusions.
- Synopsis
- Follow-up.

58)What is Auditing?

An audit provides an objective compliance confiramation of products and processes to certify adherence to standards,guideleines,specifications and procedures.Audits are performed in accordance with documented plans and procedures .The results of the audit are documented and are submitted to the management of the audited organization,to the entity initiating the audit and to any external organiztions identified in the audit plan.

59)What is the purpose of performing Review and auditing?

The purpose of performing review and audits are to ensure that the products meets all client needs and equirementsand to find development anomalies as early and as inexpensively as possible.

60)What are Ishikawa's seven basic tools for quality control?

- Check sheet
- Pareto diagram
- Histogram
- Scatter diagram
- Run chart
- Control chart
- Cause and effect diagram.

61)What is the purpose of using check sheet?

A check sheet is a paper form with printed items to be checked.Its main purpose is to facilitate gathering data and to arrange data while collecting it so the data can be easily used later.

62)What is the use of pareto diagram?

A pareto diagram is a frequency chart of bars in descending order.A pareto daiagram can identify the few causes that account for the majority of defects.It indicates which problem can be solved first in eliminating defects and improving the operation.Pareto analysis can be referred to as 80-20% principle.

63) What is the purpose of using Histogram?

The histogram is a graphic representation of frequency counts of a sample or a population.the purpose of histogram is to show the distribution characteristics of a parameter.

64) What is the use of scatter diagram?

A scatter diagram vividly portrays the relationship of two interval variables.

65)What is the use of cause and effect diagram?

The cause and effect diagram is also known as fish bone diagram.It shows the relationship between the quality characteristics and factors that affect the characteristics.It identifies all casual factors of a quality characteristics in one chart.

66)Define process capability?

$$Cp = \frac{USL - LSL}{}$$

6σ

67)Define process capability index?

$$Cp = \frac{USL-u}{3\sigma}$$

68)Write down the assumptions made in the phases of defect removal activities?

- Those activities handled directly by the development team for large software projects .
- The formal machine tests after code integration.

69)How will u calculate the total defects for the life of the software?

TD=MP+PTR+Q

TD=Total defects for the life of software.

MP=Major problems found during review.

Q =Number of defects in the released software.

70)What are the two types of inspector phase defined by knight and Myers?

- Single Inspector Phase.
- Multi Inspector phase.

71)What is single inspector phase?

It's a rigidly formatted process driven by a list of unambiguous checks,for eg,internal documentation,source code layout,source code readability.

72)What is multi inspector phase?

It's designed to check for those properties of the software that cannot be captured in a precise yes or no statement is called the multi inspector phase.

73)What is the use of software reliability models?

Software reliability models are used to assess a software products reliability or to estimate the number of latent defects when it is available to the customers.

74)What is the need of assessing the software reliability?

An estimate is important for two reasons

- As an objective statement of the quality of the product
- Resource planning for software maintenance phase.

75)Write down the classification of reliability models?

The reliability models can be broadly classified into two categories.They are

- Static models
- Dynamic models

76)What are the assumptions made in the rayleigh model curve to model the software development activity?

- Defect rate observed during development process is positively correlated with the defect rate.
- Same error injection rate

77)Define component?

A component is a group of modules that perform specific functions such as spooling,printing,message handling,file handling,and so on.

78)What is DUD?

DUD is a derivative free algorithm for non linear least squares.It competes favorably with even the best derivative based algorithm when evaluated on number of standard test problems.One of the advantage behind this DUD method is its simplicity and its efficiency.

79)Define Predictive validity?

Predictive validity refers to the accuracy of model estimates.To achieve the predictive validity is to make sure that the input data are accurate and reliable.

80)What are the strengths of Rayleigh model?

Compared to phase defect removal model,the rayleigh model is a formal parametric work that can be used for projecting latent software defects when the development work is complete .another strength of Rayleigh model is it provides an excellent framework for quality management.

81)How the Reliability growth models are classified?

Reliability groth models are classified into two major classes depending on the dependent variable of the model.They are

- Time between failure models.
- Fault count models.

82)Write down the equation for Goel generalized non homogenous poisson process model?

$$M(t) = a(1-e^{-bt^c})$$

83)What are different types of Reliability growth models?

- J-M Model.
- Littlewood Model
- Goel-Okumoto Imperfect Debugging Model.
- Goel-Okumoto Non Homogenous Poisson Process Model.
- The Delayed and Inflection S Model.

84)What are assumptions made in J-M model?

- There are N unknown software faults at the start of testing.
- Failures occur randomly-times between failures are independent.
- All faults contribute equally to cause a failure.
- Fix time is negligible.
- Fix is perfect for each failure.

85)What are the assumptions made in fault count model?

- Testing intervals are independent of each other.
- Testing during intervals is reasonably homogenous.
- Number of defects detected during non overlapping intervals are independent of each other.

86)Write down the criterias involved in reliability models?

- Predictive validity
- Capability
- Quality of assumptions.
- Applicability
- Simplicity

87)Write down the procedures involved in modeling software reliability?

- Examine the data.
- Select a model or several models to fit the data.
- Estimate the parameters of the model.

- Obtain the fitted model by substituting the estimates of parameters into the chosen model
- Perform a goodness –of-fit test and assess the reasonableness of the model.
- Make reliability predictions based on the fitted model.

88)Define test compression factor?

The difference between testing defect density and field defect density is called compression factor.

89)Write down the principles behind the quality management?

- The best scenario is to prevent errors being injected into the development process.
- When errors are introduced,improve the front end of the devlopment process to remove as many of them as early as possible.
- If the project is beyond the design and code phases,unit tests and any additional tests by the developers serve as gate keepers for defects to escape the frobt end process before the code is integrated into the configuration management system.

90)What are the four types of scenarios?

- Best case scenario
- Good scenario.
- Unsure scenario
- Worst case scenario.

91)What are the five activities involved in QIP?

- Blitz testing
- Customer evaluation
- Code inspections.
- Design reviews
- Extension of system tests.

92)Write down the advantages of using reliability growth model?

- Comparisons can be made when the first data points become available.If unfavaorable signs are detected timely action s can be taken.
- To determine end date of testing.

93)Write down the general formula to calculate the cyclomatic complexity?

$$M=V(G)=e-n+2p$$

Where V(G)=cyclomatic number of G
E=number of edges.
N=number of nodes.
P=number of unconnected parts of the graph.

94)Define Fan-in and Fan-out?

- Fan-in :A count of the modules that call a given module.
- Fan-out:A count of modules that are called by a given module.

95)Define Structure complexity?

Henry and Kafura's structure complexity is defined as

$$Cp=(\text{fan-in} * \text{fan-out})^2$$

96)Define Complexity metrics and models?

Complexity metrics and models are by small team metrics.They measure the internal dynamics of design and code of the software,and the unit of analysis is usually at the program module level.

97)Write down the methods to gather data?

- Face to face interviews
- Telephone interviews
- Mailed questionaries

98)Define sampling methods?

When the customer base is large ,its to costly to survey all customers.Estimating the satisfaction level of the entire customer population through a representative sample is more efficient.To obtain representative samples ,scientific probability sampling must be used.

99)Write down the different types of sampling methods?

- Random sampling.
- Systematic sampling.
- Stratified sampling.
- Cluster sampling.

100)Write down the product quality attributes?

- Technical solution.
- Support and service.
- Marketing
- Administration.
- Delivery
- Company image.

16 MARKS

1)Explain Boehm and McCall hierarchical model of Quality?

- Three areas addressed by McCall
- Product operation.
- Product Revision.
- Product transition.
- McCalls criteria
- Qulaity criteria interrelation

2)How will u measure software quality?

- Conditions for quality metric.
- Structuredness
- Types of metrics
- Seven criteria for good metric.
- Metrics cited in the literature

3)Explain the views of Quality?

- The Transcendent view
- The product based view
- The value based view.
- The manufacturing view.
- The user based view.
- Authors view.

4)Explain the classification of metrics?

- Readability as a measure of usability.
- Error prediction as a measure of correctness.
- Error detection as a measure of correctness.
- MTTF as a measure of reliability.
- Complexity as a measure of reliability.
- Complexity as a measure of maintainability.
- Readability of code as a measure of maintainability.
- Modularity as a measure of maintainability.
- Testability as a measure of mainatainability.

5)Explain gilb's approach?

- The work of gilb.
- Gilb's quality attributes
- Resource attributes.

6)Explain GQM model?

7)Explain about CASE tools?

- Advantages of CASE tools.
- Types of CASE tools.
- The Excelerator CASE tools.
- The Information Engineering Facility

8)Explain the stages involved in SSADM?

- Analysis of current system
- Requirements specification.
- Selection of technical options.
- Data design
- Process design
- Physical design.

9)Explain Ishkawa's seven basic tools?

- Process flow charts
- Tally charts
- Histograms
- Pareto analysis.
- Cause and effect diagram
- Scatter diagram
- Control charts

10)Explain CMM and CMMI?

- Five levels
- Five stages
- Process stages
- key actions
- 11 atributes
- roles of CMM

11)Explain about ISO 9000 series?

Clause	ISO 9001	ISO9002	ISO9003
1	Management Responsibility	*	*
2	Quality System	*	*
3	Contract Review	*	
4	Design Control		
5	Document Control	*	*
6	Purchasing	*	
7	Purchaser supplier product	*	
8	Product Identification and Traceability	*	*
9	Process Control	*	
10	Inspection andTesting	*	*
11	Inspection,measuring and Testing Equipment	*	*
12	Inspection and Test status	*	*
13	Control of non conforming product	*	*
14	Corrective action	*	
15	Handling,storage,packaging,and delivery	*	*
16	Quality records	*	*
17	Internal Quality Audits	*	
18	Training	*	*
19	Servicing		
20	Statistical Techniques	*	*

12)Explain about Reviews and Audits?

- ✓ Managerial Review process.
- ✓ Technical Review process
- ✓ Audits

13)Explain about Documentation?

14)Explain about the characteristics of Team?

- ✓ Definition
- ✓ Sponsor
- ✓ Training
- ✓ Feedback
- ✓ Leadership
- ✓ communication

15)Explain about Reliability Models?

- ✓ Rayleigh model
- ✓ Reliability growth model

16)Explain about Rayleigh model?

- ✓ Rayleigh Model
- ✓ Basic assumptions
- ✓ Implementation
- ✓ Reliability and predictivevalidity

17)Explain about Reliability growth model?

- ✓ J-M Model
- ✓ Littlewood Model
- ✓ Goel-Okumoto Imperfect Debugging Model
- ✓ Goel-okumoto Non homogenous poison process model.
- ✓ Musa-okumoto logarithmic poison Execution Time model.
- ✓ The delayed S and inflection S Model.
- ✓ Basic Assumptions

18)Explain about Defect Removal and Prevention?

- ✓ DRE
- ✓ Defect injection process
- ✓ DRE and Planning
- ✓ Characteristics
- ✓ Derivation
- ✓ DRE and process maturity model

19)Explain about Six sigma concepts?

- ✓ Definition
- ✓ Areas under normal curve
- ✓ Specifaication limits
- ✓ Centered six sigma
- ✓ Shifted six sigma

20)Explain about Rayleigh model frame work?

- ✓ Quality management principle.
- ✓ Problems
- ✓ Directions for quality improvement plan
- ✓ Four best scenarios

21)Explain about reliability growth model for QMS?

- ✓ Quality improvement plan
- ✓ QIP activities.
- ✓ Advantages

22)Explain about complexity metrics and Models?

- ✓ Lines of code
- ✓ Halstead software science
- ✓ Cyclomatic complexity
- ✓ Syntactic constructs
- ✓ Structure metrics

23)How will u analyze Customer satisfaction?

- ✓ Customer satisfaction surveys
- ✓ Methods of survey data collection
- ✓ Sampling methods
- ✓ Sample size
- ✓ Analyzing satisfaction data

24)Explain about the elements of QMS?

- ✓ Definition of QMS
- ✓ Organizational structure
- ✓ Responsibilities

- ✓ Procedures
- ✓ Processes
- ✓ Resources
- ✓ Statistical process control
- ✓ Quality control

25)Explain about the methods that are used for measuring software quality?

- ✓ Simple scoring
- ✓ Weighted scoring
- ✓ Phasedweighted scoring
- ✓ The kepner tregoe method.
- ✓ The cologne combination method.