

CS 1632 SOFTWARE QUALITY ASSURANCE

2 Marks

Sample Questions and Answers

1. Define quality.

Quality is the degree of goodness of a product or service or perceived by the customer. Quality concept is the way business organizations perform their business activities that focuses on two things.

2. What is quality cost?

The expenditure incurred by the producer, by the user and by the community associated with the product and service quality.

3. What are the building blocks of total quality management?

Management commitment, customer focus, process focus, continuous improvement, benchmarking, teams, supplier teaming, employee involvement, training of employees, inventory management, communication.

4. What are the 7 QC tools?

1. Check sheet
2. Graphs
3. Histograms
4. Pareto charts
5. Cause and effect diagrams
6. Scatter charts
7. Control charts

5. What is business process reengineering?

BPR is the search for, and the implementation of, radical change in business process to achieve breakthrough results Define Quality Function Deployment.

6. Define Quality Function Deployment.

QFD is a systematic and structured planning tool which is used to convert the voice of the customer into appropriate requirements.

7. Define six sigma.

Six sigma is a highly disciplined process that helps the enterprise to focus on developing and delivering new perfect products and services.

8. What are the uses of arrow diagram?

Arrow diagrams help in scheduling the activities so that any project can be completed in the best possible way. It will provide a time sequential action plan for all the tasks that are to be carried out in a project.

9. What are the different dimensions of quality?

Performance, features, reliability, conformance, durability, serviceability, aesthetics, perceived quality and reputation, response.

10. What is external failure?

Costs of correction methods adopted to meet quality standards after reaching the customers.

11. What are the uses of control charts?.

1. Monitoring the process.
 2. Identifying the state of statistical control
 3. Finding the reasons for out of control.
 4. finding out of mean and variation
 5. identifying the randomly occurring variations
12. Steps involved in the bench marking process.

Decide the function to be benchmarked, look into and understand the current performance, plan, study the other players in the market, learn from the data that you have collected, implement the findings.

13. What is statistical process control?

Statistical process control procedures are designed to divert attention from individual data and focus on the system as a whole. SPC is used to measure and control the degree of variation in material, service, process and product.

14. Define TQM.

Total quality management is customer oriented management philosophy and strategy. It is centered on quality so as to result in customer delight.

15. What is quality planning?

Quality planning refers to the activities that establish the objectives and requirements for quality.

16. What is quality improvement?

QM aims at attaining unprecedented levels of performance which are significantly better than the past level.

17. What is quality management?

Quality management comprises all activities of the overall management function that determine the quality policy, objectives and responsibilities, and implement them by means such as other quality planning, quality control, etc.

18. What are the benefits of QFD?

1. Reduces product development time
2. Reduce engineering costs
3. Reduces the time to market.

4. Improves design quality
5. Improves customer satisfaction.
6. Reduce quality costs. etc.

19. What is internal benchmarking>?

Internal benchmarking compares best practices followed in different departments with in a company instead of looking other companies.

20. What are the four p's focused on effective software project management?

1. People, 2. Product, 3. Process, 4. Project

21. Define software configuration management.

SCM is a set of activities that have been developed to manage change throughout the life cycle of computer software.

23. What are CASE tools?

CASE is the use of computer based support in the S/W development process. Tools used to assist in this way are known as CASE tools.

24. What are function-oriented metrics?

Function oriented software metrics use a measure of the functionality delivered by the application as a normalization value. Since functionality can not be measured directly, it must be derived indirectly using other direct measures.

25. Define white box testing?

White box testing sometimes called as glass box testing is a test case design method that uses the control of the procedural design to drive test cases.

26. What are the steps implied by statistical quality assurance?

1. Information about s/w defects, 2. An attempt is made to trace each defect to its underlying cause, 3. Using the pareto principle, 4. Move to correct the problems that have caused the defects.

27. Define Verification and Validation.

Verification refers to the set of activities that ensure that s/w correctly implements a specific function. Validation refers to a different set of activities that ensure that the s/w that has been built is traceable to customer requirements.

28. What is RMM plan?

The risk mitigation, monitoring, and management plan documents all work performed as part of risk analysis and is used by the project manager as part of the overall project plan. Once the RMMM has been documented and the project has begun risk mitigation and monitoring steps commence.

29. What are the qualities team leaders should possess?

Motivation, organization, ideas and innovation, problem solving, managerial identity, achievement, and influence and team building.

30. What is an agile team?

Agile software development encourages customer satisfaction and early incremental delivery. Agile team is a highly motivated project team which adopts informal methods, and overall development simplicity.

31. What are the categories of activities connected with measurement process?

Formulation, Collection, Analysis, Interpretation and feedback.

31. What are the different measurable characteristics of an OO design?

Size, complexity, coupling, sufficiency, completeness, cohesion, primitiveness, similarity, volatility.

32. What are the measures of software quality?

Correctness, maintainability, integrity usability.

33. What is metrics evaluation?

Metrics evaluation focuses on the underlying reasons for the results obtained and produces a set of indicators that guide the project or process.

34. What is software quality assurance?

Software quality assurance is a planned and systematic pattern of actions that are required to ensure high quality in software.

35. What is SQA group?

SQA group consists of many different constituencies like software engineers, project managers, customers, salespeople and the individuals which are having software quality assurance responsibility.

36. What are the activities associated with SQA group?

Planning, oversight, record keeping, analysis and reporting.

37. What are the different SCM features?

Versioning, dependency tracking and change management, requirements tracing, configuration management, audit trails.

38. What are reactive risk strategies?

Reactive strategy the software team does nothing about risks until something goes wrong.

39. What are the characteristics of software risks?

Uncertainty and loss

40. What is software availability?

Software availability is the probability that a program is operating according to requirements at a given point in time.

41. What are the management responsibilities regarding ISO 9001 requirements?

Management commitment, Customer focus, Quality policy, Planning, Responsibility, Authority, Communication, and Management review.

42. Define SPICE.

SPICE (Software Process Improvement and Capability dEvelopment) standard defines a set of requirements for software process assessment. The intent of the standard is to assist organizations in developing an objective evaluation of the efficacy of any defined software process.

43. What is MALCOLM BALDRIGE award?

MALCOLM BALDRIGE award is the most prestigious quality award in the United States. The award is given annually to recognize U.S companies that exceed in quality management and quality achievement.

44. What are the ISO 9000 series of quality management standards?

ISO 9000, ISO9001, ISO9002, ISO9003, ISO9003, ISO9004

45. Define CMM.

The capability maturity model (CMM) for s/w is a widely accepted set of guidelines for developing high performance s/w organizations.

46. What are the capability levels defined in SPICE?

Level0: Not performed, 1: Performed informally, 2: Planned and tracked, 3: Well defined, 4: Quantitatively controlled, 5: Continuously improving.

47. What are the types of accreditation?

First party, Second party, Third party.

48. What are the components of the ISO 9000 series to which SPICE is related?

ISO 9001, ISO 9000-3, ISO 9004-4., ISO DIS.

49. What is an assessment instrument?

An assessment instrument is a tool, or set of tools, used during the performance of an assessment to assist the assessor in obtaining reliable, consistent and repeatable results.

50. What are the goals of SPICE project?

1. developing a working draft for a standard for software process assessment
2. conducting industry trials of the emerging standards.
3. promoting the technology transfer of software process assessment into the software industry world wide.

51. What are the benefits that an international standard will provide to industry?
1. Software suppliers will submit to just one process assessment scheme.
 2. Software development organizations will have a tool to initiate and sustain a continuous process improvement
 3. Programme managers will have a means to ensure that their software development is aligned with, and supports, the business needs of the organization.
52. What are the benefits of ISO 9000 verification?
1. Provides know-how for establishing a quality management system.
 2. Certification has become the minimum requirement of quality for any tender.
 3. It is a status symbol for the organizations.
 4. Improves products and services.
 5. Improves employee morale.
53. What are the events associated with quality management?
- Establishing, Documenting, Implementing, Maintaining, Continuously improving its effectiveness.
54. What are the documents required to implement quality management system in an organization?
1. Quality policy and quality objectives
 2. Quality manual
 3. Document to ensure the effective planning, operation and control of its processes
 4. Records.
55. What are the pre-requisites for employees?
- Education, training, skill, experience
56. What are the requirement of internal auditing?
1. Set up an internal audit program
 2. Develop an internal audit procedure
 3. Plan internal audit procedure.
 4. Perform regular internal audits
 5. Take corrective action.
57. What are the different organizations to which the Malcolm Balridge award is given?
1. Manufacturing
 2. Service
 3. Small businesses
58. What are the different process maturity levels?
1. Initial
 2. Repeatable
 3. Defined
 4. Managed
 5. Optimizing

59. Who are the steps organizations has to take to improve their software capabilities??
1. Understand the current status
 2. Develop a vision of the desired process
 3. Establish a list of process improvement actions.
 4. Produce a plan to accomplish the required actions.
 5. Commit the resources to execute theplans.
60. What are the requirements of ISO 9001: 2000 standard?
1. Demonstrate ability to consistently provide product that meets customer and applicable regulatory requirements.
 2. Enhance customer satisfaction.
61. What are the different principles of software assessment?
1. Start with a process model
 2. Observe strict confidentiality
 3. Involve senior management
 4. Keep an open mind and a level head
 5. Focus on action
62. Who are the different inspection participants?
1. The moderator
 2. The producers
 3. The reviewers
63. Define software engineering process.
The total set of software engineering activities needed to a user's requirement into software.
64. Define software process architecture.
A framework within which project specific software process are defined
65. Define software process model.
One specific embodiment of a software process architecture.
66. Define software process.
The set of activities, methods, and practices that are used in the production and evolution of software.
67. What are the critical software process issues?
Quality, product technology, Requirement instability and complexity.
68. What are the different process model views?
Organizational view and Control and measurement view.
69. What are the drawbacks of water fall model?
1. It does not adequately address changes.
 2. It assumes a relatively uniform and orderly sequence of development steps.

3. It does not provide for such methods as rapid prototyping or advanced languages.
70. What are the different levels of software process models?
U process models, A process models and U process models
71. What are the different types of software tests?
1. Unit testing
 2. Integration testing
 3. Function testing
 4. Regression testing
 5. System test
72. Define testing.
The process of executing a program with the intention of finding errors.
73. Define debugging.
Diagnosing the precise nature of a known error and then correcting it.
74. What are integration tests.
Integration tests verify the interfaces between system parts such as modules, components and subsystems.
75. What are regression tests?
Regression tests run a subset of previously executed integration and function tests to ensure that program changes have not degraded the system.
76. What are installation tests?
Installation tests validate the instability and operability of the user's system.
77. What are the major test plan elements?
1. Establish objectives for each test phase
 2. Establish schedules and responsibilities for each test activity
 3. Determine the availability of tools, facilities, and test libraries.
 4. Establish the procedure and standards to be used for planning and conducting the tests and reporting the test results.
 5. Set the criteria for test completion as well as for the success of each test.
78. What should be the qualities of assessment team members?
The assessment team members should all be experienced software developers, and one or more should have experience in each phase of the software process.
79. What are the different risks associated with a software process?
Schedule conflict, inadequate support and lack of follow through.
80. What are the basic objectives of inspections?
1. To find errors at the earliest
 2. To ensure that the appropriate parties technically agree on the work.

3. To verify that the work meets predefined criteria.
4. To formally complete a technical task
5. To provide data on the product and the inspection process.

81. Why defect prevention is crucial to the software process?

Finding and fixing errors accounts for much of the cost of software development and maintenance. Also the process of fixing defects is even more error prone than original software creation.

82. What are the principles of software defect prevention?

1. The programmers must evaluate their own errors
2. Feedback is essential part of defect prevention
3. There is no single cure – all that will solve all the problems.
4. Process improvement must be an integral part of the process.
5. Process improvement takes time to learn.

83. What are the different steps of software defect prevention?

Defect reporting, Cause analysis, action plan development, action implementation, performance tracking and starting over.

84. What are the different errors for which defect prevention analysis is required?

Technological, Organizational, Historic, Group dynamic, Individual and others.

85. What are the different ways in which CMMI represents a process meta model?

As a Continuous model and as a staged model

86. What is PSP?

The personal software process emphasizes personal measurement of both the work product that is produced and the resultant quality of the work product.

87. What are the different framework activities defined by PSP model?

Planning, High-level design, High level design-review, development and postmortem.

88. What is postmortem in PSP?

Determining the effectiveness of the process using the measures and metrics is defined as postmortem.

89. What are the objectives of TSP?

1. Build self-directed teams that plan and track their work.
2. Show managers how to coach and motivate their teams.
3. Accelerate software process improvement
4. Provide improvement guidance to high maturity organizations.
5. Facilitate university teaching of industrial – grade team skills.

90. What are the framework activities defined by TSP?

Launch, high – level design, implementation, integration, and test and postmortem.

91. What is cleanroom software engineering?

The clean room process emphasizes rigor in specification and design, and formal verification of each design element using correctness proofs that are mathematical based. It also emphasizes statistical quality control. Cleanroom software engineering is a process model that removes defects before they can precipitate serious hazards.

92. What are the tasks associated with cleanroom strategy?

Increment planning, Requirements gathering, Box structure specification, Formal design, and Correctness verification. Code generation, inspection and verification, statistical test planning, Statistical use testing and certification.

93. What are the different boxes used in cleanroom software engineering?

Black box, State box and Clear box

94. What is state box?

The state box is a simple generalization of a state machine. The state box uses a data abstraction to determine the transition to the next state and the action that will occur as a consequence of the transition.

95. What are the different models required for cleanroom software engineering certification?

1. Sampling model
2. Component model
3. Certification model

96. What is object – oriented systems development methodology?

Object – oriented systems development is a way to develop software by building self contained modules or objects that can be easily replaced, modified and reused. Furthermore, it encourages a view of the world as a system of cooperative and collaborating systems.

97. What are the reasons for the necessity of object – orientation?

1. Higher level abstraction
2. Seamless transition among different phases of software development.
3. Encouragement of good programming technique.
4. Promotion of reusability

98. What is UML?

Unified modeling language (UML) is intended to be a universal language for modeling systems, meaning that it can express models of many different kinds and purposes, just as a programming language or a natural language can be used in many different ways.

99. What are the different diagrams defined in UML?

Class diagram, Use-case diagram, Behavior diagram, interaction diagram, sequence diagram, collaborative diagram, statechart diagram, activity diagram, implementation diagram, component diagram, deployment diagram.

100. What is classification?

Classification is the process of checking to see if an object belongs to a category or a class.

16 – MARKS

1. Explain Quality Function Deployment in detail.

Introduction – what is QFD? – QFD team – Benefits of QFD – customer satisfaction, reduce implementation time, promotes team work, provides documentation– House of quality – effectiveness, advantages, importance to customer, target value, scale up factor, sales point – QFD process – Conclusion.

2. Describe in detail the standardization procedure of benchmarking.

Introduction – Definitions - Reasons for benchmarking – Process – function, understanding performance, planning, internal benchmarking, competitive benchmarking, process benchmarking, learning from data, using the findings,– Advantages of benchmarking – Conclusion.

3. Explain how software quality assurance is ensured in a software firm.

Quality concepts – quality, quality control, quality assurance, cost of quality – Software quality assurance- background issues, SQA activities – Software reviews – Cost impact of software defects, defect amplification and removal – Formal technical reviews – the review meeting, review reporting and record keeping, review guidelines, sample-driven reviews- Formal approaches to SQA – Statistical SQA, Software reliability.

4. Explain the seven basic quality control tools in detail.

Statistical process control- 7QC tools- check sheet – graphs – Histograms – bar charts – cause and effect diagrams – Inter relationship diagrams – control charts – Definition, steps example and applications.

5. Explain software project management in detail.

The management spectrum – Effective project management focuses on 4 P's the people, the product, the process, the project- people- the players, team leaders, the software team, coordination and communication issues – the product – Software scope, problem decomposition – The process- melding the product and the process, problem decomposition – The project – W⁵HH Principle – Critical Practices – risk management, empirical cost and schedule estimation, metric based project management, earned value tracking, defect tracking, People aware program management.

6. Explain how software quality assurance is ensured in a software firm

Quality concepts – quality, quality control, quality assurance, cost of quality – Software quality assurance- background issues, SQA activities – Software reviews – Cost impact of software defects, defect amplification and removal – Formal technical reviews – the review meeting, review reporting and record keeping, review guidelines, sample-driven reviews- Formal approaches to SQA – Statistical SQA, Software reliability.

7. What are the different software testing tactics? Explain.

Testing fundamentals - Basis path testing – flow graph notation, independent program paths, deriving test cases, graph matrices – Control structure testing – Black box testing – Graph based testing method, equivalence partitioning, Boundary value analysis, Orthogonal array testing – Object oriented testing methods – White box testing – Testing methods applicable at the class level – Interclass test case design – Testing for specialized environments, architectures, and applications _ Testing patterns.

8. Write detail notes on risk management.

Reactive and proactive risk strategies – software risks – risk identification – assessing overall project risks – risk components and diagrams – risk projection – developing a risk table – assessing risk impact – risk refinement – risk mitigation – monitoring and management.

9. Write detail notes on ISO9000 series of quality management standards.

The purpose of standards – The ISO9000 series – The contents of the standard – seeking accreditation – An assessment of the ISO9001 standard- ISO9000-3:notes for guidance on the application of ISO9001 to software development – ISO9000-3 – The impact of ISO9000 and TickIT- survey design – Questionnaire format – Impact of organization size upon uptake of third party accreditation – Historical development of third party accreditation – Reasons for not having external accreditation – The effect of business type and size for organizations using QA procedures – Reasons for developers seeking or not seeking an external QA standard

10. Account on CMM in detail.

Introducing Software Process Maturity - The Evolution of the CMM, Immature versus Mature Software Organizations, Fundamental Concepts Underlying Process Maturity, Total Quality Management and the CMM, Customer Satisfaction, Benefits and Risks of Model-Based Improvement - The Software Process Maturity Framework - The Structure of the Capability Maturity Model - Interpreting the CMM - Using the CMM - The Key Areas for Level 2: Repeatable - Process Areas for Level 3: Defined - The Key Process Areas for Level 4: Managed - The Key Process Areas for Level 5:Optimizing..

11. Give a detail note on SPICE in detail.

Principal goals – SPICE document – Capability levels – not performed, performed informally, planned and tracked, well defined, quantitatively controlled, continuously improving – Award categories – leadership, strategic planning, customer and market focus, information and analysis, human source focus, process management, business results – Overview of award process – Relationship to other international standards.

12. Write detailed notes on Malcolm Baldrige award.

Categories of organizations – Quality award – Award criteria

13. Explain how software process assessment helps software organizations to improve themselves.

Assessment overview – Assessment phases – Five assessment principles – Start with a process model, observe strict confidentiality, involve senior management, keep an open mind and level head, focus on action– The assessment process – forming an assessment team, self – assessment considerations, assessment ground rules, assessment team training, the on-site period– Assessment conduct – implementation consideration.

14. Explain the testing phase of software development in detail.

Definitions – testing, verification, validation, debugging – The seven types of software tests – Testing methods – Software testing principles – The axioms of testing – The proper role of testing – Types of software tests – Unit testing – Integration testing – Function testing – Regression testing – System test – Test planning – The test files – The success criteria –Test development –Test coverage techniques – Test execution and reporting – Test tools and methods – Real-time testing – The test organization.

15. Give detailed description about software process assessment.

Assessment overview – assessment phases – Five assessment principles – the assignment process – assessment conduct – implementation considerations.

16. Explain software inspections in detail.

Types of reviews – Inspection objectives – basic inspection principles – the conduct of inspections – inspection training – reports and tracking – other considerations – initiating an inspection program – future directions.

17. Explain OO methodology in detail.

OO system development – Object basics – OO system development life cycle – Rumbaugh, Booch, Jacobson methodologies – Patterns – Frameworks – OO analysis – classification, identifying object relationships, attributes, and methods – OO design – designing classes, access layer, view layer – Quality assurance – system usability and measuring user satisfaction

18. Write detailed notes on the techniques for error cause analysis and defect prevention.

Defect prevention not a new idea – Why defect prevention is crucial to the software process – The principles of software defect prevention – The steps of software defect prevention - defect reporting – error cause categories – cause analysis – The cause analysis meeting – The action team – Tracking action progress – Prevention feedback - Process changes for defect prevention – Defect prevention considerations –The role of tools and technology – The costs and benefits of defect prevention - Management’s role.

19. Account on clean-room software engineering.

The clean-room approach – The clean-room strategy – functional specification – black-box, state-box and clear-box specifications – clean-room design – design refinement and verification – advantages of design verification – clean-room testing – statistical use testing – certification.

20. Write notes on TSP and PSP.

Personal software process – framework activities – planning – high-level design – high-level design view – development –postmortem.

Team software process – framework activities – launch – High-level design – implementation – integration – test – postmortem.