1) **Define Software Engineering.**

Software Engineering is a discipline that produces error free software with in a time and budget.

2) **Define software Testing.**

Testing can be described as a process used for revealing defects in software, and for establishing that the software has attained a specified degree of quality with respect to selected attributes.

3) **List the elements of the engineering disciplines.**

- Basic principles
- Processes
- Standards
- Measurements
- Tools
- Methods
- Best practices
- Code of ethics
- Body of knowledge

4) **Differentiate between verification and validation?(U.Q Nov/Dec 2009)**

Verification	**Validation**
1. Verification is the process of evaluating software system or component to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase. 2. Verification is usually associated with activities such as inspections and reviews of the s/w deliverables.	1.Verification is the process of evaluating software system or component during or at the end of the , the development phase satisfy the conditions imposed at the start of that phase. 2. Verification is usually associated with Traditional execution _based testing, i.e., Exercising the code with testcases.

5) **Define the term Testing.**

Testing is generally described as a group of procedures carried out to evaluate

6) Differentiate between testing and debugging. (U.Q Nov/Dec 2008)

Testing	Debugging
1. Testing as a dual purpose process • Reveal defects • And to evaluate quality attributes	1. Debugging or fault localization is the process of • Locating the fault or defect • Repairing the code, and • Retesting the code.

7) Define process in the context of software quality. (U.Q Nov/Dec 2009) Process, in the software engineering domain, is a set of methods, practices,

Standards, documents, activities, polices, and procedures that software engineers use to develop and maintain a software system and its associated artifacts, such as project and test plans, design documents, code, and manuals.

8) Define the term Debugging or fault localization.

Debugging or fault localization is the process of

- Locating the fault or defect
- Repairing the code, and
- Retesting the code.

9) List the levels of TMM.

The testing maturity model or TMM contains five levels. They are

Level1: Initial
Level2: Phase definition
Level3: Integration
Level4: Management and Measurement
Leval5: Optimization /Defect prevention and Quality Control

10) List the members of the critical groups in a testing process (U.Q Nov/Dec 2008)

- Manager
- Developer/Tester
- User/Client

11) Define Error.

An error is mistake or misconception or misunderstanding on the part of a software developer.

12) Define Faults (Defects).

A fault is introduced into the software as the result of an error. It is an anomaly in the software that may cause nit to behave incorrectly, and not according to its specification.

13) Define failures.

A failure is the inability of a software or component to perform its required functions within specified performance requirements.

14) Distinguish between fault and failure. (U.Q May/June 2009)

Fault	Failure
1. A fault is introduced into the software as the result of an error. It is an anomaly in the software that may cause nit to behave incorrectly, and not according to its specification.	2. A failure is the inability of a software or component to perform its required functions within specified performance requirements.

15) Define Test Cases.

A test case in a practical sense is attest related item which contains the following information.

- A set of test inputs. These are data items received from an external source by the code under test. The external source can be hardware, software, or human.
- Execution conditions. These are conditions required for running the test, for example, a certain state of a database, or a configuration of a hardware device.
- Expected outputs. These are the specified results to be produced by the code under test.

16)Write short notes on Test, Test Set, and Test Suite.

A Test is a group of related test cases, or a group of related test cases and test Procedure A group of related test is sometimes referred to as a test set.

A group of related tests that are associated with a database, and are usually run together, is sometimes referred to as a Test Suite.

17) Define Test Oracle.

Test Oracle is a document, or a piece of software that allows tester to determine whether a test has been passed or failed.

18) Define Test Bed.

A test bed is an environment that contains all the hardware and software needed to test a software component or a software system.

19) Define Software Quality.

Quality relates to the degree to which a system, system component, or process meets specified requirements.

Quality relates to the degree to which a system, system component, or process meets Customer or user needs, or expectations.

20) List the Quality Attributes.

- Correctness
- Reliability
- Usability
- Integrity
- Portability
- Maintainability
- Interoperability

21) Define SQA group.

The software quality assurance (SQA) group is a team of people with the necessary training and skills to ensure that all necessary actions are taken during the development process so that the resulting software confirms to established technical requirements.

22) Explain the work of SQA group.

Testers to develop quality related policies and quality assurance plans for each project. The group is also involved in measurement collection and analysis, record keeping, and Reporting. The SQA team members participate in reviews and audits, record and track Problems, and verify that corrections have been made.

23) Define reviews.

A review is a group meeting whose purpose is to evaluate a software artifact or a set of Software artifacts. Review and audit is usually conducted by a SQA group.

20) List the sources of Defects or Origins of defects. Or list the classification of defect (U.Q May/June 2009)

- Education
- Communication
- Oversight
- Transcription
- Process

25) Programmer A and Programmer B are working on a group of interfacing modules. Programmer A tends to be a poor communicator and does not get along well with Programmer B. Due to this situation, what types of defects are likely to surface in these interfacing modules?

Communication defects.

16 Marks

1. Discuss in detail Testing Maturity Model (TMM)
2. Discuss in detail Software testing principles.
3. Explain in detail the tester's role in a software development organization
4. Explain in detail defect classes, the defect repository and test design
5. Explain in detail about defect analysis in coin problem

IT6004/ Software Testing

Unit-II

Question Bank

2 Marks

1. Define Smart Tester.

Software must be tested before it is delivered to users. It is responsibility of the testers to Design tests that (i) reveal defects

(ii) can be used to evaluate software performance, usability and reliability.

To achieve these goals, tester must select a finite no. of test cases (i/p, o/p, & conditions).

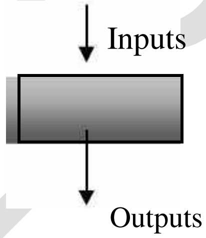
2. Compare black box and white box testing.

Black box testing	White box Testing
Black box testing , the tester is no Knowledge of its inner structure(i.e. how it woks)The tester only has knowledge of what it does(Focus only input & output)	The White box approach focuses on the inner structure of the software to be tested.
Black box approach is usually applied large size piece of software.	White box approach is usually applied small size piece of software.
Black box testing sometimes called functional or specification testing.	White box sometimes called clear or glass box testing.

3. Draw the tester's view of black box and white box testing.

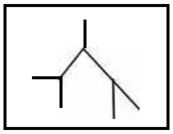
Test Strategy Tester's View

Black box



(No Knowledge about inner structure, Focus only input and output)

White box



(focuses on the inner structure of the software)

4. Write short notes on Random testing and Equivalence class portioning.

Each software module or system has an input domain from which test input data is selected. If a tester randomly selects inputs from the domain, this is called random testing. In equivalence class partitioning the input and output is divided in to equal classes or partitions.

5. List the Knowledge Sources & Methods of black box and white box testing.

Test Strategy	Knowledge Sources	Methods
Black box	1. Requirements document 2. Specifications 3. Domain Knowledge 4. Defect analysis data	1. Equivalence class partitioning (ECP) 2. Boundary value analysis (BVA) 3. State Transition testing.(STT) 4. Cause and Effect Graphing. 5. Error guessing
White box	1. High level design 2. Detailed design 3. Control flow graphs 4. Cyclomatic complexity	1. Statement testing 2. Branch testing 3. Path testing 4. Data flow testing 5. Mutation testing 6. Loop testing

7. Define State.

A state is an internal configuration of a system or component. It is defined in terms of the values assumed at a particular time for the variables that characterize the system or component.

8. Define Finite-State machine.

A finite-state machine is an abstract machine that can be represented by a state graph having a finite number of states and a finite number of transitions between states.

9. Define Error Guessing.

The tester/developer is sometimes able to make an educated "guess' as to which type of defects may be present and design test cases to reveal them. Error Guessing is an ad-hoc approach to test design in most cases.

10. Define COTS Components.

The reusable component may come from a code reuse library within their org or, as is most likely, from an outside vendor who specializes in the development of specific types of software components. Components produced by vendor org are known as commercial off-the shelf, or COTS, components.

11. Define usage profiles and Certification.

Usage profiles are characterizations of the population of intended uses of the software in its intended environment. Certification refers to third party assurance that a product,process, or service meets a specific set of requirements.

12. Write the application scope of adequacy criteria?

- Helping testers to select properties of a program to focus on during test.
- Helping testers to select a test data set for a program based on the selected properties.
- Supporting testers with the development of quantitative objectives for testing
- Indicating to testers whether or not testing can be stopped for that program.

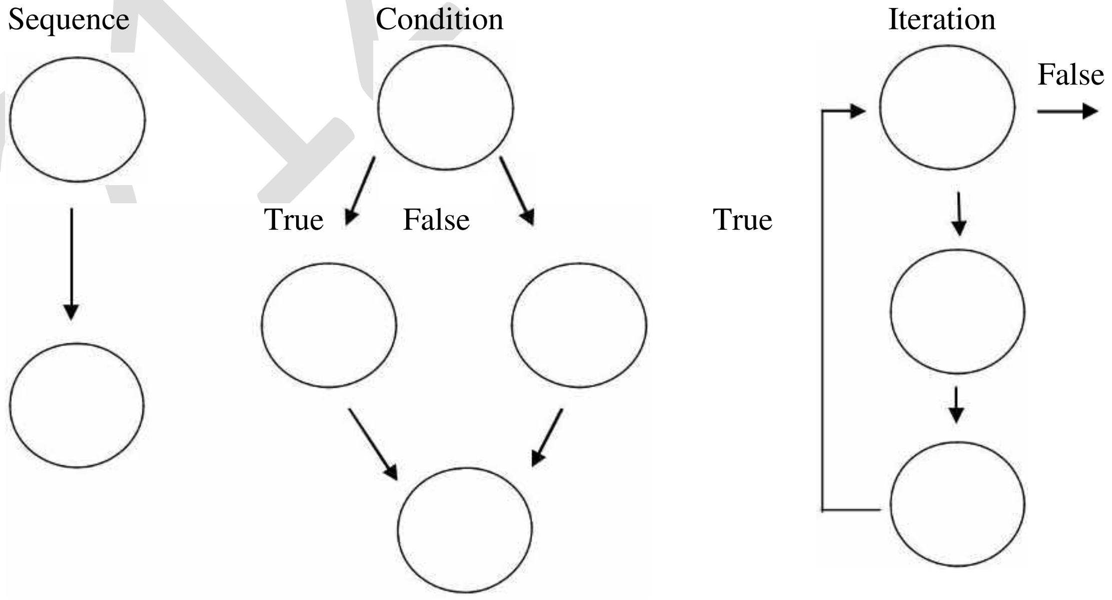
13. What are the factors affecting less than 100% degree of coverage?

- The nature of the unit
  - ➢ Some statements/branches may not be reachable.
  - ➢ The unit may be simple, and not mission, or safety, critical, and so complete coverage is thought to be unnecessary.
- The lack of resources
  - ➢ The time set aside for testing is not adequate to achieve complete coverage for all of the units.
  - ➢ There is a lack of tools to support complete coverage
- Other project related issues such as timing, scheduling. And marketing constraints.

14. What are the basic primes for all structured program.

- Sequential (e.g., Assignment statements)
- Condition (e.g., if/then/else statements)
- Iteration (e.g., while, for loops)

The graphical representation of these three primes are given



15. Define path.

A path is a sequence of control flow nodes usually beginning from the entry node of a graph through to the exit node.

16. Write the formula for cyclomatic complexity?

The complexity value is usually calculated from control flow graph(G) by the formula.

$V(G) = E-N+2$

Where The value E is the number of edges in the control flow graph

The value N is the number of nodes.

17. List the various iterations of Loop testing.

- Zero iteration of the loop
- One iteration of the loop
- Two iterations of the loop
- K iterations of the loop where k<n
- n-1 iterations of the loop
- n+1 iterations of the loop

18. Define test set.

A test set T is said to be mutation adequate for program p provided that for every in equivalent mutant pi of p there is an element t in T such that pi[t] is not equal to p[t].

19. What are the errors uncovered by black box testing?

Incorrect or missing functions

Interface errors

Errors in data structures

Performance errors

Initialization or termination error

16 <u>Marks</u>

1. Explain in detail block box testing approach with example
2. Explain detail white box testing approach with example
3. Briefly explain about Requirement based testing?
4. Explain about Positive and Negative testing?
5. Explain about Boundary value analysis:
6. Briefly explain about Equivalence class partitioning?

IT6004/ Software Testing

Unit-III

Question Bank

2 Marks

1. **List the levels of Testing or Phases of testing.**
   - Unit Test
   - Integration Test
   - System Test
   - Acceptance Test

2. **Define Unit Test and characterized the unit test.**

   At a unit test a single component is tested. A unit is the smallest possible testable software component.

   It can be characterized in several ways
   - A unit in a typical procedure oriented software systems.
   - It performs a single cohensive function.
   - It can be compiled separately.
   - It contains code that can fit on a single page or a screen.

3. **List the phases of unit test planning.**

   Unit test planning having set of development phases.

   Phase1: Describe unit test approach and risks.
   Phase 2: Identify unit features to be tested.
   Phase 3: Add levels of detail to the plan.

4. **List the work of test planner.**
   - Identifies test risks.
   - Describes techniques to be used for designing the test cases for the units.
   - Describe techniques to be used for data validation and recording of test results.
   - Describe the requirement for test harness and other software that interfaces with the unit to be tested, for ex, any special objects needed for testing object oriented.

5. **Define integration Test.**

   At the integration level several components are tested as a group and the tester investigates component interactions.

6. **Define System test.**

   When integration test are completed a software system has been assembled and its major subsystems have been tested. At this point the developers /testers begin to test it as a whole. System test planning should begin at the requirements phase.

8. What are the approaches are used to develop the software?

There are two major approaches to software development

- Bottom-Up
- Top_Down

These approaches are supported by two major types of programming languages. They are

- procedure_oriented
- Object_oriented

9. List the issues of class testing.

Issue1: Adequately Testing classes

Issue2: Observation of object states and state changes.

Issue3: The retesting of classes-I

Issue4: The retesting of classes-II

10. Define test Harness.

The auxiliary code developed into support testing of units and components is called a test harness. The harness consists of drivers that call the target code and stubs that represent modules it calls.

11. Define Test incident report.

The tester must determine from the test whether the unit has passed or failed the test. If the test is failed, the nature of the problem should be recorded in what is sometimes called a test incident report.

12. Define Summary report.

The causes of the failure should be recorded in the test summary report, which is the summary of testing activities for all the units covered by the unit test plan.

13. Goals of Integration test.

- To detects defects that occur on the interface of the units.
- To assemble the individual units into working subsystems and finally a completed system that ready for system test.

14. What are the Integration strategies?

- Top_ Down: In this strategy integration of the module begins with testing the upper level modules.
- Bottom_ Up: In this strategy integration of the module begins with testing the lowest level modules.

15. What is Cluster?

A cluster consists of classes that are related and they may work together to support a required functionality for the complete system.

16. List the different types of system testing.

- Functional testing
- Performance testing
- Stress testing
- Configuration testing
- Security testing
- Recovery testing

The other types of system Testing are,

- Reliability & Usability testing.

17. Define load generator and Load.

An important tool for implementing system tests is a load generator. A load generator is essential for testing quality requirements such as performance and stress

A load is a series of inputs that simulates a group of transactions. A transaction is a unit of work seen from the system user's view. A transaction consist of a set of operation that may be perform by a person , s/w system or device that is outside the system.

18. Define functional Testing.

Functional tests at the system level are used ensure that the behavior of the system adheres to the requirement specifications.

19. What are the two major requirements in the Performance testing.

- Functional Requirement: User describe what functions the software should perform. We test for compliance of the requirement at the system level with the functional based system test.
- Quality Requirement: They are nonfunctional in nature but describe quality levels expected for the software.

20. Define stress Testing.

When a system is tested with a load that causes it to allocate its resources in maximum amounts .It is important because it can reveal defects in real-time and other types of systems. which it will crash. This is sometimes called "breaking the system".

22. What are the steps for top down integration?

- Main control module is used as a test driver and stubs are substituted for all components directly subordinate to the main module.
- Depending on integration approach (Depth or breadth first) subordinate stubs are replaced one at a time with actual components.
- Tests are conducted as each component is integrated.
- The completion of each set of tests another stub is replaced with real component

- Regression testing may be conducted to ensure that new errors have not been introduced.

23. What is meant by regression testing?

Regression testing is used to check for defects propagated to other modules by changes made to existing program. Thus, regression testing is used to reduce the side effects of the changes.

16 marks

1. Explain testing and debugging goals and policies
2. Explain test plan components
3. Explain test plan attachments
4. Explain reporting test result formats
5. Explain how to build a testing group
6. Explain structure of the testing group
7. Explain careers paths for tester with example

IT6004/ Software Testing

Unit-IV

Question Bank

2 Marks

1) **Write the different types of goals?**
   1. Business goal: To increase market share 10% in the next 2 years in the area of financial software
   2. Technical Goal: To reduce defects by 2% per year over the next 3 years.
   3. Business/technical Goal: To reduce hotline calls by 5% over the next 2 years
   4. Political Goal: To increase the number of women and minorities in high management positions by 15% in the next 3 years.

2) Define Goal and Policy

A goal can be described as (i) a statement of intent or (ii) a statement of a accomplishment that an individual or an org wants to achieve.

A Policy can be defined as a high-level statement of principle or course of action that is used to govern a set of activities in an org.

Define Plan.

A plan is a document that provides a framework or approach for achieving a set of goals.

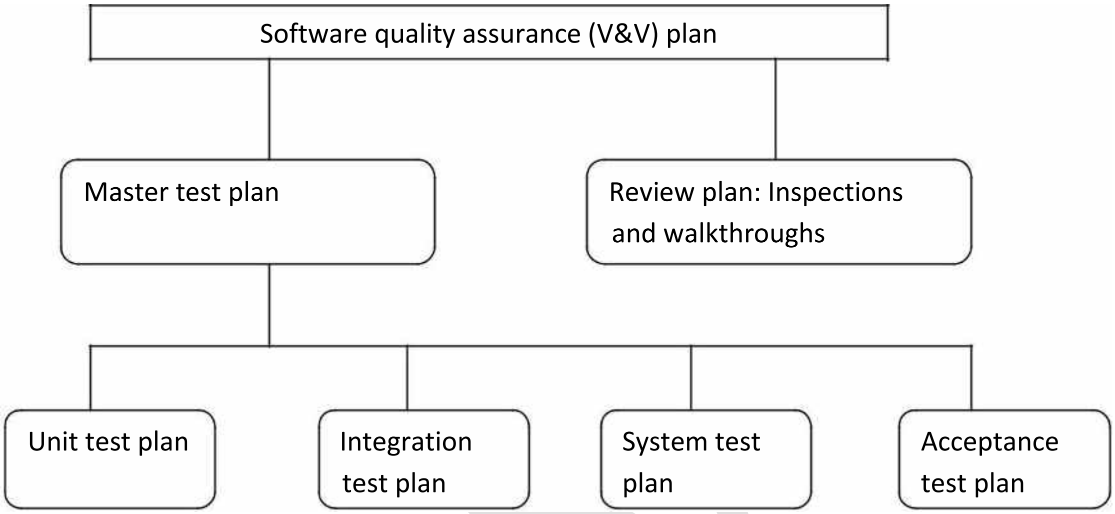
3) **Define Milestones.**

Milestones are tangible events that are expected to occur at a certain time in the Project's lifetime. Managers use them to determine project status.

4) **List the Test plan components.**

- Test plan identifier
- Introduction
- Items to be tested

4) **Draw a hierarchy of test plans.**



6) **Define a Work Breakdown Structure.(WBS)**

A Work Breakdown Structure (WBS) is a hierarchical or treelike representation of all the tasks that are required to complete a project.

7) **Write the approaches to test cost Estimation?**

- The COCOMO model and heuristics
- Use of test cost drivers
- Test tasks
- Tester/developer ratios
- Expert judgment

8) Write short notes on Cost driver.

A Cost driver can be described as a process or product factor that has an impact on overall project costs. Cost drivers for project the include

- Product attributes such as the required level of reliability
- Hardware attributes such as memory constraints.
- Personnel attributes such as experience level.
- Project attributes such as tools and methods.

9) Write the WBS elements for testing.

1. Project startup
2. Management coordination
3. Tool selection
4. Test planning
5. Test design
6. Test development
7. Test execution
8. Test measurement, and monitoring
9. Test analysis and reporting
10. Test process improvement

10) What is the function of Test Item Transmittal Report or Locating Test Items

Suppose a tester is ready to run tests on the data described in the test plan. We needs to be able to locate the item and have knowledge of its current status. This is the function of the Test Item Transmittal Report. Each Test Item Transmittal Report has a unique identifier.

11) What is the information present in the Test Item Transmittal Report or Locating Test Items

1) Version/revision number of the item
2) Location of the item
3) Person responsible for the item (the developer)
4) References tyo item documentation and test plan it is related to.
5) Status of the item

6) Approvals – space for signatures of staff who approve the transmittal.

12) Define Test incident Report

The tester should record in attest incident report (sometimes called a problem report) any event that occurs during the execyution of the tests that is unexpected , unexplainable, and that requires a follow- up investigation.

13) Define Test Log.

The Test log should be prepared by the person executing the tests. It is a diary of the events that take place during the test. It supports the concept of a test as a repeatable experiment.

14) What are the Three critical groups in testing planning and test plan policy ?

- Managers:
  - ➢ Task forces, policies, standards, planning Resource allocation, support for education and training, Interact with users/Clients
- Developers/Testers
  - ➢ Apply Black box and White box methods, test at all levels, Assst with test planning, Participate in task forces.
- Users/Clients
  - ➢ Specify requirement clearly, Support with operational profile, Participate in acceptance test planning

15) Define Procedure.

A procedure in general is a sequence of steps required to carry out a specific task.

16) What are the skills needed by a test specialist?

- Personal and managerial Skills
  - ➢ Organizational, and planning skills, work with others, resolve conflicts, mentor and train others, written /oral communication skills, think creatively.
- Technical Skills
  - ➢ General software engineering principles and practices, understanding of testing principles and practices, ability to plan, design, and execute test cases, knowledge of networks, database, and operating System.

17) Write the test term hierarchy?

- Test Manager
- Test leader
- Test Engineer
- Junior Test Engineer

16 Marks

1. **Testing and Debugging goals and Policy** Debugging goal
   Debugging policy
   Testing Policy: Organization X
   Debugging policy: Organization X
2. **Test planning**
   Planning
   Milestone
   Overall test objectives
   What to test (Scope of the tests)
   Who will test?
   How to test?
   When to test?
   When to stop Testing?

3. **Test Plan Components**
   - Test plan identifier
   - Introduction
   - Items to be tested
   - Features to be tested
   - Approach
   - Pass/fail criteria
   - Suspension and resumption criteria
   - Test deliverables
   - Testing tasks
   - Test environment
   - Responsibilities
   - Staffing and training needs
   - Scheduling
   - Risks and contingencies
   - Testing costs
   - Approvals

4. **Test Plan Attachments**
    - Test design specifications
    - Test case specifications
    - Test procedure specifications
5. **Reporting Test Results**
    - Test log
    - Test log identifier
    - Description
    - Activity and event entities
    - Test incident report
    - Test incident report identifier
    - Summary
    - Impact
    - Test summary report
6. **The role of the 3 critical groups**
    1. **Managers**
        - Task forces, policies, standards
        - Planning
        - Resource allocation
        - Support for education and training
        - Interact with users
    2. **Developers/ testers**
        - Apply black and white box methods
        - Assist with test planning
        - Test at all levels
        - Train and mentor
        - Participate in task forces
        - Interact with users
    3. **Users/clients**
        - Specify requirements clearly
        - Participate in usability test

IT6004/ Software Testing

Unit-V

Question Bank

2 Marks

1. **Define Project monitoring or tracking.**

   Project monitoring refers to the activities and tasks managers engage into periodically check the status of each project .Reports are prepared that compare the actual work done to the work that was planned.

2. **Define Project Controlling.**

   It consists of developing and applying a set of corrective actions to get a project on track when monitoring shows a deviation from what was planned .

3. **Define Milestone**.

   MileStones are tangible events that are expected to occur at a certain time in the projects life time .Mnagers use them to determine project status.

4. **Define SCM (Software Configuration management).**

   Software Configuration Management is a set of activities carried out for identifying, organizing and controlling changes throughout the lifecycle of computer software.

5. **Define Base line.**

   Base lines are formally reviewed and agreed upon versions of software artifacts, from which all changes are measured. They serve as the basis for futher development and can be changed only through formal change procedures.

6. **Differentiate version control and change control.**

   Version Control combines procedures and tools to manage different versions of configuration objects that are created during software process.

   Change control is a set of procedures to evaluate the need of change and apply the changes requested by the user in a controlled manner.

7. **What is Testing?**

   Testing is generally described as a group of procedures carried out to evaluate some aspect of a piece of software.It used for revealing defect in software and to evaluate degree of quality.

8. **Define Review.**

   Review is a group meeting whose purpose is to evaluate a software artifact or a set of software artifacts.

9 .**What are the goals of Reviewers?**

Identify problem components or components in the software artifact that need improvement.

- Identify components of the software artifact that donot need improvement.
- Identify specific errors or defects in the software artifact.
- Ensure that the artifact confirms to organizational standards.

10. What are the benefits of a Review program?

- Higher quality software
- Increased productivity
- Increased awareness of quality issues
- Reduced maintenance costs
- Higher customer satisfaction

11. What are the Various types of Reviews?

- Inspections
- WalkThroughs

12. What is Inspections?

It is a type of review that is formal in nature and requires prereview preparation on the part of the review team.the Inspection leader prepares is the checklist of items that serves as the agenda for the review.

13. What is WalkThroughs?

It is a type of technical review where the producer of the reviewed material serves as the review leader and actually guides the progression of the review .It have traditionally been applied to design and code.

14. List out the members present in the Review Team.

- SQA(Software Quality Assurance) staff
- Testers
- Developers
- Users /Clients.
- Specialists.
-

15. List the components of review plans.

- Review Goals
- Items being reviewed
- Preconditions for the review.
- Rolls,Team size,participants.
- Training requirements.
- Review steps.
- Time requirements

16 Marks

1. **Measurements and milestones for monitoring and controlling**
    - Measurements for monitoring testing status
    - Coverage measures
    - Test case development
    - Test execution
    - Test harness development
    - Measurements to monitor tester productivity
    - Measurements for monitoring testing costs
    - Measurements for monitoring errors, faults, and failures
    - Monitoring test effectiveness

2. **Criteria for test completion**
    - All the planned tests that were developed have been executed and passed
    - All specified coverage goals have been met
    - The detection of a specific number of defects has been accomplished
    - The rates of defect detection for a certain time period have fallen below a specified level
    - Fault seeding ratios are favorable
3. **Software configuration management**
    - Identification of the configuration items
    - Change control
    - Configuration status reporting
    - Configuration audits
4. **Types of reviews**
    - Inspections as a type of technical review
    - Inspection process
    - Initiation
    - Preparation
    - Inspection meeting
    - Reporting results
    - Rework and follow up
    - Walkthroughs as a type of technical review
5. **Components of review plans**
    - Review goals
    - Preconditions and items to be reviewed
    - Roles, participants, team size, and time requirements
    - Review procedures
    - Review training
    - Review checklist