

UNIT 4 – TWO MARKS**1. List out the characteristics of testable software**

Operability, Observability, Controllability, Decomposability, Simplicity, Stability, Understandability

2. Describe the objective of testing.

- a. Testing is a process of executing a program with the intent of finding an error.
- b. A good test case is one that has a high probability of finding an as-yet undiscovered error.
- c. A successful test is one that uncovers an as-yet-undiscovered error

3. List the attributes of a good test

- A good test has a high probability of finding an error.
- A good test is not redundant.
- A good test should be “best of breed”
- A good test should be neither too simple nor too complex.

4. Differentiate verification and validation

Verification refers to the set of activities that ensure that software correctly implements a specific function.

- Verification: "Are we building the product right?"

Validation refers to a different set of activities that ensure that the software that has been built is traceable to customer requirements.

- Validation: "Are we building the right product?"

5. What is white box testing? Or what is internal view of testing?

Knowing the internal workings of a product, tests can be conducted to ensure that “all gears mesh,” that is, internal operations are performed according to specifications and all internal components have been adequately exercised. This approach takes an internal view and is termed white-box testing.

6. What is black box testing? Or what is external view of testing?

Knowing the specified function that a product has been designed to perform, tests can be conducted that demonstrate each function is fully operational while at the same time searching for errors in each function. This approach takes an external view and is called black-box testing.

7. Mention the white box testing methods.

Using white-box testing methods, you can derive test cases that

- (1) Guarantee that all independent paths within a module have been exercised at least once,
- (2) Exercise all logical decisions on their true and false sides,
- (3) Execute all loops at their boundaries and within their operational bounds, and
- (4) Exercise internal data structures to ensure their validity.

8. What is basis path testing and list its methods

Basis path testing is a white-box testing technique. The basis path method enables the test-case designer to derive a logical complexity measure of a procedural design and use this measure as a guide for defining a basis set of execution paths. Test cases derived to exercise the basis set are guaranteed to execute every statement in the program at least one time during testing.

- Flow graph notation
- Independent program paths
- Deriving test cases
- Graph matrix

9. What is cyclomatic complexity?

Cyclomatic complexity is software metric that provides a quantitative measure of the logical complexity of a program. When used in the context of the basis path testing method, the value computed for cyclomatic complexity defines the number of independent paths in the basis set of a program and provides you with an upper bound for the number of tests that must be conducted to ensure that all statements have been executed at least once.

10. How will you compute cyclomatic complexity?

Cyclomatic complexity has a foundation in graph theory and provides you with extremely useful software metric. Complexity is computed in one of three ways:

1. The number of regions of the flow graph corresponds to the cyclomatic complexity.
2. Cyclomatic complexity $V(G)$ for a flow graph G is defined as

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

Where E is the number of flow graph edges and N is the number of flow graph nodes.

3. Cyclomatic complexity $V(G)$ for a flow graph G is also defined as

$$V(G) = P + 1$$

where P is the number of predicate nodes contained in the flow graph G .

11. What is conditional testing?

Condition testing is a test-case design method that exercises the logical conditions contained in a program module. A simple condition is a Boolean variable or a relational expression, possibly preceded with one NOT (\neg) operator. A relational expression takes the form

$$E1 <\text{relational-operator}> E2$$

where $E1$ and $E2$ are arithmetic expressions and $<\text{relational-operator}>$ is one of the following: $<$, $<=$, $=$, $>$, $>=$, not equal .

12. What is a loop testing and list different type of loop?

Loop testing is a white-box testing technique that focuses exclusively on the validity of loop constructs. Four different classes of loops can be defined:

Simple loops, concatenated loops, nested loops, and unstructured loops

13. What types of errors will be found by black box testing?

- a. Incorrect or missing functions,
- b. Interface errors,
- c. Errors in data structures or external data base access.

- d. Behavior or performance errors,
- e. Initialization and termination errors.

14. What is Equivalence partitioning?

Equivalence partitioning is a black-box testing method that divides the input domain of a program into classes of data from which test cases can be derived. Test case design for equivalence partitioning is based on an evaluation of equivalence classes for an input condition. An equivalence class represents a set of valid or invalid states for input conditions. Typically, an input condition is a specific numeric value, a range of values, a set of related values, or a Boolean condition.

15. What is regression testing?

Regression testing is the re-execution of some subset of tests that have already been conducted to ensure that changes have not propagated unintended side effects. Regression testing may be conducted manually, by re-executing a subset of all test cases or using automated capture/playback tools. The Capture/playback tools enable the software engineer to capture test cases and results for subsequent playback and comparison.

16. What is alpha testing?

The *alpha test* is conducted at the developer's site by a customer. The software is used in a natural setting with the developer "looking over the shoulder" of the user and recording errors and usage problems. Alpha tests are conducted in a controlled environment.

17. What is beta testing?

The *beta test* is conducted at one or more customer sites by the end-user of the software. Beta test is a "live" application of the software in an environment that cannot be controlled by the developer. The customer records all problems (real or imagined) that are encountered during beta testing and reports these to the developer at regular intervals. As a result of problems reported during beta tests, software engineers make modifications and then prepare for release of the software product to the entire customer base.

18. List out various types of system testing

Types of system tests are:

- a. Recovery Testing
- b. Security Testing
- c. Stress Testing\
- d. Performance Testing

19. Why debugging is difficult?

- The symptom may disappear (temporarily) when another error is corrected.
- The symptom may actually be caused by non-errors (e.g., round-off inaccuracies).
- The symptom may be caused by human error that is not easily traced (e.g. wrong input, wrongly configure the system)
- The symptom may be a result of timing problems, rather than processing problems.(e.g. taking so much time to display result).

- It may be difficult to accurately reproduce input conditions (e.g., a real-time application in which input ordering is indeterminate).

20. What is debugging and list out its strategies

Debugging is the process that results in the removal of the error. Although debugging can and should be an orderly process, it is still very much an art. Debugging is not testing but always occurs as a consequence of testing.

Three categories for debugging

approaches ○ Brute force

○ Backtracking

- Cause elimination

21. List out the activities of BPR model

- Business definition
- Process identification
- Process evaluation
- Process specification and design
- Prototyping
- Refinement and instantiation

22. What is reverse engineering?

23. What is forward engineering?

15 MARKS**1. Write short notes on white box testing**

- Basis path testing
- Control structure testing

2. Explain in detail about basis path testing

Refer question 8

3. Write short note on black box testing.

- Graph based testing method
- Equivalence partitioning
- Boundary value analysis
- Orthogonal array testing

4. Explain in detail about regression and unit testing**5. Explain in detail about integration testing****6. Explain in detail about debugging strategies****7. Explain in detail about BPR model.**