**Assignment-3**

**Q.1) Define Software Testing. Briefly explain STLC principle.**

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* **Software Testing:** The process or practice of investigating a software / system under test so as to ensure that it is of the highest quality. **OR** Software Testing is evaluation of the software against requirements gathered from users and system specifications. **OR** Software testing is the act of examining the artifacts and techniques, design patterns executing a program or application with the intent of exam the behaviour of the software under test by validation and verification.
* **STLC principle:**
* Testing shows the presence of defects
* Exhaustive testing is not possible
* Early testing
* Defect clustering
* Pesticide paradox
* Testing is context-dependent
* Absence of errors fallacy.

**Q.2) Draw and explain STLC.**

1. **Requirement Analysis Phase:** Tester analyses requirement document of SDLC (Software Development Life Cycle) to examine stated by the client. This phase examines functional and non-functional requirements from the testing perspective to identify the testable needs. The entry criteria for this phase is the BRS (Business Requirement Specification) document. During this phase, the test team studies and analyzes the requirements from a testing perspective.
2. **Test planning:**  is the first step in the testing process.In this phase typically Test Manager/Test Lead involves determining the effort and cost estimates for the entire project. Test plan creation is the crucial phase of STLC where all the testing strategies are defined. Activities like resource planning, determining roles and responsibilities, tool selection (if automation), training requirements, etc., carried out in this phase. Testing strategy and effort estimation documents provided by this phase
3. **Test Case Development:** Develop the test cases based on scope and criteria’s. The test team starts with test case development activity here in this phase. Testers prepares test cases, test scripts (if automation), and test data.Once the test cases are ready then these test cases are reviewed by peer members or team lead.
4. **Test Environment Setup:** Environment setup requires a group of essential software and hardware to create a test environment. This phase can be started in parallel with the Test design phase. The test team is required to do a readiness check (smoke testing) of the given environment. In some cases, the test team may not be involved in this phase. The development team or customer provides the test environment.
5. **Test Execution:** **T**esting of the software build is done based on test plans and test cases prepared. The process consists of test script execution, test script maintenance and bug reporting. Document test results, and log defects for failed cases. If bugs are reported then it is reverted back to development team for correction and retesting will be performed. RTM (Requirement Traceability Matrix) is also prepared in this phase.
6. **Test Case closure:** Test Cycle Closure phase is completion of test execution which involves several activities. The testing team will be called out for a meeting to evaluate cycle completion criteria based on Test coverage, Quality, Time, Cost, Software, Business objectives. The test team analyses the test artifacts to identify strategies that have to be implemented in the future, which will help to remove process bottlenecks in the upcoming projects.

**Q.3) What is Software quality and user satisfaction? State quality attributes.**

* **Software quality:** Quality is meeting the requirement, expectation, and needs of the customer is free from the defects, lacks and substantial variants. There are standards needs to follow to satisfy the customer requirements. Quality of design refers to the characteristics that designers specify for an item. The grade of materials, tolerances, and performance speciﬁcations all contribute to the quality of design. Quality of conformance is the degree to which the design specifications are followed during manufacturing. Again, the greater the degree of conformance, the higher is the level of quality of conformance. Quality of design and quality of conformance
* **User satisfaction = Compliant product + Good quality + Delivery within budget and schedule**
* **Quality attributes :** Portability, Usability, Reusability, Correctness, Maintainability.

**Q.4) What is quality control and quality assurance?**

* **Quality control:** Involves the series of inspections, reviews, and tests used -throughout the software process to ensure each work product meets the requirements of users. Quality control includes a feedback loop to the process that created the work product. Quality control as part of the manufacturing process. A key concept of quality control is that all work products have deﬁned, measurable speciﬁcations to which we may compare the output of each process
* **Quality Assurance:** Is defined as a procedure to ensure the quality of software products or services provided to the customers by an organization. Quality assurance focuses on improving the software development process and making it efficient and effective as per the quality standards defined for software products. Quality assurance consists of the auditing and reporting functions of management. Quality assurance consists of the auditing and reporting functions of management.

**Q.5) Differentiate quality control and quality assurance.**

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|  | **Quality control** | **Quality assurance** |
| **1** | It focuses on providing assurance that the quality requested will be achieved. | It focuses on fulfilling the quality requested |
| **2** | It is the technique of managing quality. | It is the technique to verify quality. |
| **3** | It is involved during the development phase | It is not included during the development phase. |
| **4** | It does not include the execution of the program. | It always includes the execution of the program. |
| **5** | It is a managerial tool. | It is a corrective tool. |
| **6** | Ex: Verification | Ex: Validation |

**Q.6) What is Software Quality Assurance and its activities.**

* **Software Quality Assurance:** (SQA) is simply a way to assure quality in the software. It is the set of activities which ensure processes, procedures as well as standards are suitable for the project and implemented correctly. SQA is kind of Umbrella activity that is applied throughout the software process.
* **Quality Assurance activities:**

1. Prepares an SQA plan for a project
2. Participates in the development of the project's software process description
3. Reviews software engineering activities to verify compliance with the defined software process.
4. Audits designated software work products to verify compliance with those defined as a part of the software process.
5. SQA is kind of Umbrella activity that is applied throughout the software process.
6. Ensures that deviations in software work and work products are documented and handled according to a documented procedure
7. Records any noncompliance and reports to senior management.

**Q.7) Explain Veriﬁcation and validation.**

* **Verification:** It is the process to ensure whether the product that is developed is right or not. It verifies whether the developed product fulfills the requirements that we have. Verification is static testing. Veriﬁcation refers to the set of activities that ensure that software correctly implements a speciﬁc function.Verification means Are we building the product right?
* **Validation:** It is the process of checking the validation of product i.e. it checks what we are developing is the right product. it is validation of actual and expected product. Validation is the dynamic testing. Validation refers to a different set of activities that ensure that the software that has been built is traceable to customer requirements. Validation means Are we building the right product?

**Q.8) What is Black box testing explain its type and strategies.**

* Black box testing is a type of software testing in which the functionality of the software is not known. The testing is done without the internal knowledge of the products and implementation details and internal paths.The primary source of black box testing is a specification of requirements that is stated by the customer. In this method, tester selects a function and gives input value to examine its functionality, and checks whether the function is giving expected output or not.
* **Type of Black box testing :**

1. **Functional testing –**the functional requirements of a system; it is done by software testers.
2. **Non-functional testing –**Related to such as performance, scalability, usability**.**
3. **Regression testing –**is done after code fixes, upgrades or any other system maintenance to check the new code has not affected the existing code.

* **Strategies of Black box testing :**
* **1)Graph-Based Testing Methods:** Each and every application is a build-up of some objects. All such objects are identified and the graph is prepared. From this object graph, each object relationship is identified and test cases are written accordingly to discover the errors.
* **Equivalence Partitioning:** In this technique, input values to the system or application are divided into different classes or groups based on its similarity in the outcome. Hence, instead of using each and every input value, we can now use any one value from the group/class to test the outcome
* **Boundary Value Analysis:** The idea is to partition the input domain of the system into several equivalence classes such that each member of the class works similarly.
* **Orthogonal Testing:** It is statistical testing approach especially useful when system to be tested has huge data inputs. Orthogonal array testing helps to maximize test coverage by pairing and combining the inputs and testing the system with comparatively less number of test cases for time saving.
* **Comparison Testing :** Its testing where the strength and weakness of the currently developed software produced is compared with already existing software products in the market.

**Q.9) What is white box testing explain and its type.**

* **White box testing** : White box testing techniques analyze and test the internal structures. WBT used data structures, internal design, code structure and the working of the software rather than just the functionality. It is also called glass box testing or clear box testing or structural testing. In WBT coding are tested to verify input-output flow and improve design, usability, and security. In white box testing, code is visible to testers, so it is also called Clear box testing, Open box testing, Transparent box testing, Code-based testing, and Glass box testing.
* **Type of White box testing:**

1. Statement Coverage. **2)**Decision Coverage. **3)**Branch Coverage. **4)**Condition Coverage. **5)** Multiple Condition Coverage. **6)** Finite State Machine Coverage. **7)**Path Coverage. **8)**Control flow testing. **9)**Data flow testing

**Q.10) Differentiate Static Testing and dynamic testing.**

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| **Static Testing** | **Dynamic testing.** |
| Static Testing is a type of a Software Testing method which is performed to check the defects in software without actually executing the code of the software application | Dynamic testing is testing performed when code ior software is in running state. To perform dynamic testing the software should be compiled and run. |
| Static testing is done to avoid errors at an early stage of development as it is easier to identify the errors and solve the errors. | Dynamic Testing is a type of Software Testing which is performed to analyze the dynamic behavior of the code. |

**Q.11) What is Static Testing and explain its type.**

* **Static Testing**: Static Testing is a type of a Software Testing method which is performed to check the defects in software without actually executing the code of the software application.Static testing is done to avoid errors at an early stage of development as it is easier to identify the errors and solve the errors.
* **Type of Static Testing:**

1. **Review:** In static testing review is a process or technique that is performed to find the potential defects in the design of the software. It is process to detect and remove errors and defects in the different supporting documents like software requirements specifications. People examine the documents and sort out errors, redundancies and ambiguities.
2. **Informal:** In informal review the creator of the documents put the contents in front of audience and everyone gives their opinion and thus defects are identified in the early stage.
3. **Walkthrough:** It is basically performed by experienced person or expert to check the defects so that there might not be problem further in the development or testing phase.
4. **Peer review:** Peer review means checking documents of one-another to detect and fix the defects. It is basically done in a team of colleagues.
5. **Inspection:** Inspection is basically the verification of document the higher authority like the verification of software requirement specifications (SRS).
6. **Static Analysis:** Static Analysis includes the evaluation of the code quality that is written by developers. Different tools are used to do the analysis of the code and comparison of the same with the standard. It also helps in following identification of following defects:Unused variables, Dead code, Infinite loops, Variable with undefined value, Wrong syntax.
7. **Data Flow:** Data flow is related to the stream processing.
8. **Control Flow:** Control flow is basically how the statements or instructions are executed.
9. **Cyclomatic Complexity:** Cyclomatic complexity is the measurement of the complexity of the program that is basically related to the number of independent paths in the control flow graph of the program.

**Q.12) Explain Structural Testing and its type.**

* **Structural Testing :** Structural testing is to test the internal design of the software or structure of the coding for the particular software. In this testing, the development team members are included in the testing team to execute the software's internal design.
* **Type of Structural Testing:**

1. **Mutation testing: -**It is used to check the quality of the test case that should fail the mutant code. It used to cause an error in the program, which implies that the mutation testing is performed to evaluate the test case's productivity.
2. **Data flow testing:** -It is a group of testing approaches used to observe the control flow of programs to discover the sequence of variables as per the series of events. It implements a control flow graph and analysis the points where the codes can change the data.
3. **Control flow testing**: -It is to check the implementation order of commands or statements of the code over a control structure. In the control flow testing, a specific part of an extensive program is selected by the test engineer to set the testing path.
4. **Slice-based testing:** -The basic idea is to sort the complete code into small chunks and then evaluate each portion carefully.

**Q.13) Explain what are the Challenges In White Box Testing?**

* **Challenges In White Box Testing:**

1. Lack of Understanding Of Programming Language(S) Used For Testing.
2. Lack Of Understanding The Logical Flow/Use Case .
3. Lack Of Patience To Go Thorough The Program.
4. Copying The Existing Functionality.
5. Not Being Honest Enough With The Client.