Exam without additional material: 1.5 hours

Name of the student_____ **Nº**_____

Each correct answer is worth 0.4 or 0.5 points and each wrong answer deducts 0.1 points.

1) [0.4] Regarding quality costs, which of the following statement is **TRUE**?

☐	Usually, the cost of conformance plus the cost of internal failures is higher than cost of external failures
☐	Usually the cost of external failures is higher than the cost of conformance plus cost of internal failures
☐	Usually the cost of nonconformance due to external failures is minimum
☐	Usually the cost of conformance is the same as the cost of nonconformance

2) [0.4] Regarding the goal of software testing, which of the following statement is **TRUE**?

☐	The primary goal of software testing is to show the presence of failures
☐	The primary goal of software testing is to ensure that failures are fixed
☐	The primary goal of software testing is to show the absence of failures
☐	The primary goal of software testing is to assess quality

3) [0.4] Regarding test levels, which of the following statement is **FALSE**?

☐	Usually unit testing comes before integration testing
☐	Usually unit testing is performed by developers
☐	The goal of integration testing is to find defects in the user interface
☐	System testing verifies if the whole system meets specification

4) [0.4] Which of the following statements is **TRUE**?

☐	A test case is checked by one test condition
☐	A test case can be checked by one or more test conditions
☐	A test condition is checked by one test case
☐	A test condition can be checked by one or more test cases

5) [0.4] Which of the following statements is **MORE CORRECT** about a test case?

☐	A good test case is the one that achieves 100% coverage according to a coverage criterion
☐	A good test case is the one that has higher change of finding failures with higher impact and more frequent
☐	A good test case is the one that exercises multiple aspects of the system and is easy to maintain
☐	A good test case is the one that is automated and has tests-to-pass and to tests-to-fail

6) [0.4] Which of the following statements is **TRUE**?

☐	A test harness is the set of drivers
☐	A stub calls the software component under test
☐	A driver is called by the component under test
☐	A driver calls the software component under test

7) [0.4] Which of the following statements is **TRUE**?

☐	A failure is the origin of a defect
☐	A defect is the origin of an error
☐	A failure is the origin of an error
☐	A defect is the origin of a failure

8) [0.4] Which of the following statements is **FALSE** according to the standard ISO/IEC 25010:2011?

☐	Among others, software product quality as to do with functionality, performance and security
☐	Among others, software quality in use as to do with effectiveness, efficiency and satisfaction
☐	Among others, software product quality as to do with security, portability and context coverage
☐	Among others, software quality in use as to do with freedom from risk and satisfaction

9) [0.4] Which of the following statements is **FALSE** according to the standard ISO/IEC 25010:2011?

☐	Maintainability as to do with modularity, reusability and testability
☐	Security as to do with integrity, non-repudiation and authentication
☐	Reliability as to do with recoverability, accessibility and maturity
☐	Portability as to do with adaptability and replaceability

10) [0.4] Which of the following statements is **FALSE**?

☐	Mutation testing is a fault-based testing technique
☐	Mutation score is the ratio between dead mutants over live mutants
☐	Mutation testing is useful to test the quality of your tests
☐	Mutation testing involves small changes in the code

11) [0.4] Which of the following statements is **TRUE**?

☐	By applying mutation operators it is possible to create equivalent mutants
☐	Weak mutation testing considers the state propagated to the output
☐	Strong mutation testing considers different states of the program
☐	Equivalent mutants are the ones that distinguish the original code from the mutant

12) [0.4] Which of the following statements is **TRUE**?

☐	Bottom-up integration testing is useful to discover design problems earlier
☐	A top-down integration testing requires the development of drivers
☐	Top-down integration testing gives poor support for early release of limited functionality
☐	Bottom-up integration testing allows observing the whole functional system from the beginning

13) [0.4] Which of the following statements is **FALSE**?

☐	GUI testing can be performed by heuristic methods or cognitive walkthrough
☐	Capture replay tool do not support automatic generation of test cases
☐	Model based testing allows achieving higher levels of automation
☐	Random testing tools allow exhaustive system testing

14) [0.4] Which of the following statements is **TRUE**?

☐	Regression testing and retesting is the same
☐	Regression testing is a test level
☐	Regression tests check for unexpected side effects
☐	Retesting executes tests that passed

15) [0.4] Which of the following statements is **TRUE**?

☐	Alpha testing is performed at an external site while beta testing is developed at the developer's site
☐	Alpha, Beta, Walkthrough and Operational are examples of acceptance tests
☐	Acceptance criteria can be defined based on data integrity, usability, stress and robustness attributes
☐	Smoke testing is useful to exercise finer details of a system to find bugs

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16) [0.4] Which of the following statements is **FALSE**?

☐	BDD extends TDD by using natural language understandable by non-technical stakeholders
☐	In BDD it is not possible to define the same scenario for different test data
☐	BDD has features, features have scenarios, scenarios have steps
☐	BDD is similar to TDD because tests are written before the code

17) [0.4] Which of the following statements is **TRUE**?

☐	A test policy describes the test levels to perform and the testing within those levels for an organization
☐	Test strategy is defined for an organization as a whole while a test policy is defined for each project
☐	A test policy provides a definition of testing, defines quality targets and specifies test process improvement
☐	Analytical, model-based, consultation and methodical are example of test policies

18) [0.4] Which of the following statements is **TRUE** regarding the test process?

☐	Within test analysis and design, test objectives are transformed into tangible test conditions and test cases
☐	Test closure activities include executing the final test cases and finalizing and archiving testware
☐	Within test implementation and execution, the test environment is set up and test objective are defined
☐	Test planning and control includes writing the summary report for stakeholders

19) [0.4] Which of the following statements is **FALSE**?

☐	Examples of exit criteria are cost, residual risks and time to market
☐	Examples of entry criteria are code and environment availability
☐	Examples of exit criteria are test data availability and estimated of defect density
☐	Example of entry criteria are code coverage and test tool availability

20) [0.4] Which of the following statements is **FALSE**?

☐	Risk analysis helps to define what to test and what to test first
☐	Risk analysis is only valuable in projects without rigid time-to-market constraints
☐	Risk analysis may consider safety and financial impact, and visibility for the user
☐	To perform risk analysis one may need judgment skills, common sense and experience

21) [0.4] Which of the following statements is **FALSE** according to the IEEE829 standard?

☐	IEEE829 includes test document templates for test planning, specification and execution
☐	For the test specification stage, IEEE829 defines templates for test plan and test design specification
☐	For the execution stage, IEEE829 defines templates for test log, test incident report and test summary report
☐	Test case specification and test item transmittal reports' templates are defined for the specification stage

22) [0.4] Which of the following statements is **TRUE** according to IEEE829 standard?

☐	A test plan includes items to be tested, test deliverables, staffing and training
☐	A test design specification includes inputs, outputs expected and environmental needs
☐	A test procedure specification includes steps, inputs and outputs expected
☐	A test case specification includes test techniques and feature pass/fail criteria

23) [0.4] According to requirement R1, scoreA can be between 0 and 5, 6 and 10, and 11 and 15. Which of the following set of values belong to the same class?

☐	1,2,5
☐	6,7,11
☐	12,15,16
☐	10,11,12

24) [0.4] According to R1, scoreA can be between 1-4, 5-10, and 11-14. According to requirement R2, scoreB can be between 2-7, and 8-13. Considering only valid values, what is the minimum number of test cases that you need for unidimensional equivalence partitioning?

☐	5
☐	6
☐	2
☐	3

25) [0.4] According to requirement R1, A can be between 5 and 10. According to requirements R2, B can be between 2-5, and 6-12. How many equivalent classes do you have?

☐	3
☐	5
☐	6
☐	7

26) [0.5] According to requirement R1, A can be between 1-10, and 11-20. According to requirement R2, B can be between 5-15. According to requirement R3, if the sum of A and B is between 1-15 the Result is Small, if the sum is between 16-30 de Result is Medium, if the sum is higher than 30 the Result is Large. Which of the following test cases cover all the equivalent classes of the Result variable?

☐	A=0 and B=0; A=5 and B=20; A=15 and B=15; A=22 and B= 35
☐	A=0 and B=5; A=10 and B=15; A=20 and B=30; A=25 and B=35
☐	A=0 and B=0; A=5 and B=5; A=10 and B=16, A=20 and B=15
☐	A=0 and B=5; A=10 and B=15; A=20 and B=30; A=30 and B=35

27) [0.5] According to requirement R1, A can be between 1-10, 11-20, and 21-30. What is the minimum number of test cases that you need to achieve 100% coverage according to boundary value analysis?

☐	6
☐	8
☐	9
☐	10

28) [0.5] Which of the following statements is **FALSE**?

☐	Cause-effect graph is equivalent to decision table
☐	In pairwise testing the number of test cases is higher than in multidimensional
☐	Error guessing results depend on the intuition and experience of the tester
☐	Cover all pairs of transitions can be a coverage criteria used by state-transition testing

29) [0.5] Which of the following statements is **FALSE**?

☐	100% decision coverage guaranties 100% statement coverage
☐	100% multiple condition coverage guaranties 100% modified condition / decision coverage
☐	100% condition coverage guaranties 100% decision coverage
☐	100% condition and decision coverage guaranties 100% statement coverage

30) [0.5] Which of the following statements is **FALSE**?

☐	White box testing techniques can be split into control flow, data flow based and requirements coverage
☐	Most of the times, 100% path coverage is impossible to achieve
☐	The number of independent paths can be predicted by the cyclomatic complexity
☐	All defs, all p-uses and all-uses are example of coverage criteria in data flow testing

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31) [0.5] Consider the following program:

```
if (A) then
        print "Probably B";
if (B) then
        print "Probably A";
if (A and B) then
        print A
else
        print B;
```

What is the minimum number of test cases that you need to cover 100% condition coverage and 100% decision coverage?

☐	Condition: 2; Decision: 3
☐	Condition: 3; Decision: 3
☐	Condition: 2 Decision: 2
☐	Condition: 2; Decision: 4

32) [0.5] Consider the following program:

```
read(A); read(B);
if (A>5) then
        print "A is higher than 5";
while (B>0 and A>5) do {
        B := B -5;
        A := A-1;
}
print(B);
```

What is the minimum number of test cases that you need to cover 100% condition coverage and 100% decision coverage?

☐	Condition: 2; Decision: 3
☐	Condition: 3; Decision: 3
☐	Condition: 2; Decision: 2
☐	Condition: 2; Decision: 4

33) [0.5] Consider the following Boolean expression:

(A and B) or (A and ~C)

What is the minimum of test cases that you need to cover 100% modified condition / decision coverage?

☐	4
☐	5
☐	6
☐	7

34) [0.5] Consider the following program

```
1: read(A); read(B);
2: if (A>5) then
3:         print A;
4: while (B>0 and A>5) do {
5:         B := B -5;
6:         A := A-1;
7: }
8: print(B);
```

Which of the following are examples of **def-clear** paths for variable A

☐	1-2 and 1-2-4-5-6 and 6-4-5-6
☐	2-3 and 2-3-4 and 6-4
☐	6-4 and 2-3-4-5-6
☐	1-2-3 and 3-4-5-6 and 1-2

35) [0.5] Considering the previous program in question 34, which of following statements is **TRUE**?

☐	The definition of B at line 1 is alive at line 8
☐	The definition of B at line 5 is alive at line 8
☐	The definition of B at line 1 is not alive at line 4
☐	The definition of B at line 5 is alive at line 5

36) [0.5] Consider the program in question 34, and the following mutant

```
4: while (B>0 or A>5) do {
```

Which of the following test case is able to kill the mutant?

☐	A=6, B=1
☐	A=4, B=0
☐	A=5, B=0
☐	A=4, B=1

37) [0.5] Which of the following statements is **TRUE**?

☐	A tester creates test specifications and select tools to support testing
☐	A test leader decides what should be automated and defines metrics for monitoring the progress of the tests
☐	A test leader analyses testware for testability and adapts the plan as needed
☐	A tester writes or reviews the test strategy for a project

38) [0.5] Which of the following statements is **FALSE**?

☐	Test estimation can be split into metrics-based and expert-based
☐	Test estimation can be based on the following metrics: complexity and test point analysis
☐	Test estimation is useful to define which test tool to use
☐	Test estimation may estimate the effort of the tasks based on estimated made by experts

39) [0.5] Which of the following statements is **TRUE**?

☐	Project risks are split into organizational and client
☐	Test progress monitoring may use percentage of work done, defect information and dates of test milestones
☐	Product risks are related to problems due to contractual issues
☐	Test control measures may include stopping the project because it will not be ready on time

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40) [0.5] Which of the following statements is **FALSE**?

☐	Drawbacks of test independence include isolation from development team and lose sense of responsibility
☐	Benefits of test independence include verification of assumptions made by others during specification
☐	Drawbacks of test independence include delays in the release
☐	Independent testers see different defects and are unbiased

41) [0.5] Which of the following statements is **TRUE**?

☐	Configuration management ensures that test artifacts are identified and version controlled for traceability
☐	Incident management ensures that incidents are traceable and the source of the incident identified
☐	Configuration management provides ideas for test process improvement
☐	Incident management gathers information about change requests

42) [0.5] Which of the following statements is **TRUE**?

☐	Model based testing allows to fix problems easier
☐	Model based testing systematizes the testing process and allows to automate test case generation
☐	Model based testing generates a set of test cases of manageable size
☐	Model based testing guaranties that test cases generated are the same even when the model changes

43) [0.5] Which of the following statements is **FALSE** about test data generators?

☐	They start by building the control flow graph, then path selection and then test data generation
☐	One way to derive test input for a path is to find the predicate for that path and then solve it
☐	Random test data generators are simple to develop but do not perform well in terms of coverage
☐	They can be classified as random, pathwise, goal oriented, intelligent and subjective

44) [0.5] Which of the following statements is **FALSE**?

☐	State filters, state grouping, and stopping conditions are examples of techniques to deal with state explosion problem
☐	Pre/Post, state/transition based, property based and behavior based are examples of notations for models used by model based testing techniques
☐	Symbolic execution may be useful for deriving independent paths, then SAT solvers calculate the path conditions and solve them
☐	By using model-checking it is possible to generate courter-examples, from properties that do not hold, and use them as test cases

45) [0.5] Which of the following statements is **TRUE**?

☐	Static analysis may detect unreachable code, security vulnerabilities and wrong interfaces between modules
☐	Static analysis may detect variables never used, variables with wrong values and missing variables
☐	The phases of a formal review are kick-off, group preparation, discussion, and re-planning
☐	System design, code, test policy, test strategy, plans, models, and thoughts can all be reviewed

Good luck!