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Sample Exam Paper

Authored by:

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A4Q TF4D Syllabus 2021 V.1.0 // Glossary



Introduction

This is a sample exam. It helps candidates prepare for the certification exam. Included are questions whose structure, layout and format are like a regular exam.

This version of the sample exam questions for A4Q-TF4D has been compiled from the following sources:

- ISTQB® CTFL CORE 2018; V.3.1; SAMPLE EXAM SET A and SET B,
- CTAL 2019 (V.3.0) SAMPLE EXAM PAPER,
- and other supplemental questions created by a GTB working group.

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General information:

Number of questions: 40

Duration of the exam: 60 minutes

Total score: 40 (one point per question)

Score to pass the exam: 26 (or more)

Percentage of passing the exam: 65% (or more)

Questions on the topic "Fundamentals of Testing"

Question 1	Keywords	K1	Score	1.0
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Which of the following provides the definition of the term test case?

Select exactly ONE option.

a)	Subset of the value domain of a variable within a component or system in which all values are expected to be treated the same based on the specification	<input type="checkbox"/>
b)	A set of preconditions, inputs, actions, expected results and postconditions, developed based on test conditions	<input checked="" type="checkbox"/>
c)	Work products produced during the test process for use in planning, designing, executing, evaluating and reporting on testing	<input type="checkbox"/>
d)	A source to determine an expected result to compare with the actual result of the system under test	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) IS NOT CORRECT – Based on definition of equivalence partition

b) IS CORRECT – Based on definition from Glossary

c) IS NOT CORRECT – on Glossary definition of testware

d) IS NOT CORRECT – Based on definition of test oracle

Question 2	FL-1.1.1	K1	Score 1.0
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Which of the following statements is a valid objective for testing?

Select exactly ONE option.

a)	The test should start as late as possible so that development had enough time to create a good product	<input type="checkbox"/>
b)	To validate whether the test object works as expected by the users and other stakeholders	<input checked="" type="checkbox"/>
c)	To prove that all possible defects are identified	<input type="checkbox"/>
d)	To prove that any remaining defects will not cause any failures	<input type="checkbox"/>

FL-1.1.1 (K1) Identify typical objectives of testing

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – Contradiction to principle 3: “Early testing saves time and money” (Syllabus, Section 1.3)
- b) IS CORRECT – This is one objective of testing (Syllabus, Section 1.1.1)**
- c) IS NOT CORRECT – Principle #2 states that exhaustive testing is impossible, so one can never prove that all defects were identified (Syllabus, Section 1.3)
- d) IS NOT CORRECT – To make an assessment whether a defect will cause a failure or not, one must detect the defect first. Saying that no remaining defect will cause a failure implicitly means that all defects were found. This again contradicts principle #2 (Syllabus, Section 1.3)

Question 3	FL-1.1.2	K2	Score 1.0
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Which of the following statements correctly describes the difference between testing and debugging?

Select exactly ONE option.

a)	Testing identifies the source of defects; debugging analyzes the defects and proposes prevention activities	<input type="checkbox"/>
b)	Dynamic testing shows failures caused by defects; debugging eliminates the defects, which are the source of failures	<input checked="" type="checkbox"/>
c)	Testing does not remove faults; but debugging removes defects that cause the faults	<input type="checkbox"/>
d)	Dynamic testing prevents the causes of failures; debugging removes the failures	<input type="checkbox"/>

FL-1.1.2 (K2) Differentiate testing from debugging

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – Testing does not identify the source of defects, debugging identifies the defects (Syllabus, Section 1.1.2)
- b) IS CORRECT – Dynamic testing can show failures that are caused by defects in the software. Debugging eliminates the defects, which are the source of failures, not the root cause of the defects (Syllabus, Section 1.1.2)
- c) IS NOT CORRECT – Testing does not remove faults, but debugging remove defects that cause the faults (Syllabus, Section 1.1.2)
- d) IS NOT CORRECT – Dynamic testing does not directly prevent the causes of failures (defects) but detects the presence of defects (Syllabus, Section 1.1.2 and 1.3)

Question 4	FL-1.2.1	K2	Score 1.0
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Which is an important reason for testing in the software development process?

Select exactly ONE option.

a)	Through its results, testing can be used as a tool to evaluate the performance of developers.	<input type="checkbox"/>
b)	Testing can help prevent possible failures of the software during operation.	<input checked="" type="checkbox"/>
c)	Testing is always required by law.	<input type="checkbox"/>
d)	Testing always ensures that all requirements are fully and correctly met.	<input type="checkbox"/>

FL-1.2.1 (K2) Give examples of why testing is necessary

Justification

a) IS NOT CORRECT – This is not one of the reasons mentioned in syllabus CTFL chapter 1.2, contrary to the syllabus this is not supposed to take place (see A4Q TF4D Syllabus 2021, Section 1.2).

b) IS CORRECT – A4Q TF4D Syllabus 2021, Section 1.2 "Rigorous testing of components and systems, and their associated documentation, can help reduce the risk of failures occurring during operation."

c) IS NOT CORRECT – A4Q TF4D Syllabus 2021, Section 1.2 Why is testing necessary? "In addition, software testing may also be required to meet contractual or legal requirements or industry-specific standards." --> it can be, but it is not always.

d) IS NOT CORRECT – A4Q TF4D Syllabus 2021, Section 1.2.1 Testing's Contributions to Success

"Throughout the history of computing, it is quite common for software and systems to be delivered into operation and, due to the presence of defects, to subsequently cause failures or otherwise not meet the stakeholders' needs. However, using appropriate test techniques can reduce the frequency of such problematic deliveries, when those techniques are applied with the appropriate level of test expertise, in the appropriate test levels, and at the appropriate points in the software development lifecycle."

Testing reduces the frequency, but it is not possible to cover all problems and risks completely. (See also 1.3 Seven Principles of Testing: Exhaustive testing is impossible).

Question 5	FL-1.2.2	K2	Score 1.0
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Which of the following statements describes the relationship between testing and quality assurance?

Select exactly ONE option.

a)	Testing is part of quality assurance.	<input checked="" type="checkbox"/>
b)	Testing always leads to better product requirements.	<input type="checkbox"/>
c)	Testing early in the development process contributes little to quality assurance.	<input type="checkbox"/>
d)	The more test cases are executed, the higher the quality of the software.	<input type="checkbox"/>

FL-1.2.2 (K2) Describe why testing is part of quality assurance and give examples of how testing contributes to higher quality

Justification:

- a) **IS CORRECT** – Since quality assurance is concerned with the proper execution of the entire process, quality assurance supports proper testing. (cf. A4Q TF4D Syllabus 2021, section 1.2.2)
- b) **IS NOT CORRECT** – For example, thoroughly testing all specified requirements and fixing all defects found could still produce a system that is difficult to use, that does not fulfill the users' needs and expectations, or that is inferior compared to other competing systems. (cf. A4Q TF4D Syllabus 2021, section 1.3)
- c) **IS NOT CORRECT** – (cf. A4Q TF4D Syllabus 2021, Section 1.3 Seven Principles of Testing) To find defects early, both static and dynamic test activities should be started as early as possible in the software development lifecycle. Early testing is sometimes referred to as shift left. Testing early in the software development lifecycle helps reduce or eliminate costly changes (see section 3.1).
- d) **IS NOT CORRECT** – (cf. A4Q TF4D Syllabus 2021, Section 1.3 Seven Principles of Testing). Some organizations expect that testers can run all possible tests and find all possible defects, but principles 2 and 1, respectively, tell us that this is impossible. Further, it is a fallacy (i.e., a mistaken belief) to expect that just finding and fixing a large number of defects will ensure the success of a system. For example, thoroughly testing all specified requirements and fixing all defects found could still produce a system that is difficult to use, that does not fulfil the users' needs and expectations, or that is inferior compared to other competing systems.

Question 6	FL-1.2.3	K2	Score 1.0
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Which of the following is an example of a failure in a car cruise control system?

Select exactly ONE option.

a)	The developer of the system forgot to rename variables after a cut-and-paste operation	<input type="checkbox"/>
b)	Unnecessary code that sounds an alarm when reversing was included in the system	<input type="checkbox"/>
c)	The system stops maintaining a set speed when the radio volume is increased or decreased	<input checked="" type="checkbox"/>
d)	The design specification for the system wrongly states speeds	<input type="checkbox"/>

FL-1.2.3 (K2) Distinguish between error, defect and failure

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – This is an example of a mistake made by the developer
- b) IS NOT CORRECT – This is an example of a defect (something wrong in the code that may cause a failure)
- c) IS CORRECT – This is a deviation from the expected functionality - a cruise control system should not be affected by the radio
- d) IS NOT CORRECT – This is an example of a defect (something wrong in a specification that may cause a failure if subsequently implemented)

Question 7	FL-1.2.4	K2	Score 1.0
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Which of the following is a defect rather than a root cause in a fitness tracker?

Select exactly ONE option.

a)	Because the author of the requirements was unfamiliar with the domain of fitness training, he therefore wrongly assumed that users wanted heartbeat in beats per hour	<input type="checkbox"/>
b)	The tester of the smartphone interface had not been trained in state transition testing, so missed a major defect	<input type="checkbox"/>
c)	An incorrect configuration variable implemented for the GPS function could cause location problems during daylight saving times	<input checked="" type="checkbox"/>
d)	Because the designer had never worked on wearable devices before, she as designer of the user interface therefore misunderstood the effects of reflected sunlight	<input type="checkbox"/>

FL-1.2.4 (K2) Distinguish between the root cause of a defect and its effects

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – The lack of familiarity of the requirements author with the fitness domain is a root cause
- b) IS NOT CORRECT – The lack of training of the tester in state transition testing was one of the root causes of the defect (the developer presumably created the defect, as well)
- c) IS CORRECT – The incorrect configuration data represents faulty software in the fitness tracker (a defect), that may cause failures**
- d) IS NOT CORRECT – The lack of experience in designing user interfaces for wearable devices is a typical example of a root cause of a defect

Question 8	FL-1.3.1	K2	Score 1.0
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Mr. Test has been testing software applications on mobile devices for a period of 5 years. He has a wealth of experience in testing mobile applications and achieves better results in a shorter time than others. Over several months, Mr. Test did not modify the existing automated test cases and did not create any new test cases. This leads to fewer and fewer defects being found by executing the tests. What principle of testing did Mr. Test not observe?

Select exactly ONE option.

a)	Testing depends on the environment	<input type="checkbox"/>
b)	Exhaustive testing is not possible	<input type="checkbox"/>
c)	Repeating of same tests will not find new defects	<input checked="" type="checkbox"/>
d)	Defects cluster together	<input type="checkbox"/>

FL-1.3.1 (K2) Explain the seven testing principles.

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – Testing is context dependent, regardless of it being manual or automated (principle #6), but does not result in detecting a decreasing number of faults as described above
- b) IS NOT CORRECT – Exhaustive testing is impossible, regardless of the amount of effort put into testing (principle #2)
- c) IS CORRECT – Principle #5 says “If the same tests are repeated over and over again, eventually these tests no longer find any new defects. To detect new defects, existing tests and test data may need changing, and new tests may need to be written.” Automated regression testing of the same test cases will not bring new findings
- d) IS NOT CORRECT – “Defect cluster together” (principle #4). A small number of modules usually contain most of the defects, but this does not mean that fewer and fewer defects will be found

Questions on the topic “Testing Throughout the Software Development Lifecycle”

Question 9	Keywords Chapter 2	K1	Score 1.0
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Which of the following statements is a correct definition for regression testing?

Select exactly ONE option.

a)	Testing to see if defects have been introduced into unchanged areas of the software.	<input checked="" type="checkbox"/>
b)	Testing the impact of a changed environment to an operational system.	<input type="checkbox"/>
c)	Testing the changes to an operational system.	<input type="checkbox"/>
d)	Testing after fixing a defect to confirm that a failure caused by that defect no longer occurs.	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) **IS CORRECT** – Based on the definition of regression testing in the Glossary.
- b) IS NOT CORRECT – This is the definition of maintenance testing according to the Glossary.
- c) IS NOT CORRECT – This is the definition of maintenance testing according to the Glossary.
- d) IS NOT CORRECT – This is the definition of confirmation testing according to the Glossary.

Question 10	FL-2.3.1	K2	Score	1.0
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Which of the following terms is a white-box test technique?

Select exactly ONE option.

a)	Decision testing	<input checked="" type="checkbox"/>
b)	Performance efficiency testing	<input type="checkbox"/>
c)	Code review	<input type="checkbox"/>
d)	Equivalence partitioning	<input type="checkbox"/>

FL-2.3.1 (K2) Compare functional, non-functional and white-box testing

Justification:

- a) **IS CORRECT** – Decision testing is a white-box test technique. (see A4Q TF4D Syllabus 2021, Section 4.3 White-box Test Techniques).
- b) **IS NOT CORRECT** – Performance testing aims to determine the performance efficiency of a test object (see in the Glossary), hence it is a test type rather than a test technique. (see A4Q TF4D Syllabus 2021 section 2.2.2, second bullet point)
- c) **IS NOT CORRECT** – Code review is a static test type, and thus does not belong to white-box testing. (see A4Q TF4D Syllabus 2021)
- d) **IS NOT CORRECT** – Equivalence partitioning is a black-box test technique (see A4Q TF4D Syllabus 2021, Section 4.2 Black-box test techniques).

Question 11	FL-2.3.3	K2	Score 1.0
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Which of the following statements BEST compares the purposes of confirmation testing and regression testing?

Select exactly ONE option.

a)	The purpose of regression testing is to ensure that all previously run tests still work correctly, while the purpose of confirmation testing is to ensure that any fixes made to one part of the system have not adversely affected other parts	<input type="checkbox"/>
b)	The purpose of confirmation testing is to check that a previously found defect has been fixed, while the purpose of regression testing is to ensure that no other parts of the system have been adversely affected by the fix	<input checked="" type="checkbox"/>
c)	The purpose of regression testing is to ensure that any changes to one part of the system have not caused another part to fail, while the purpose of confirmation testing is to check that all previously run tests still provide the same results as before	<input type="checkbox"/>
d)	The purpose of confirmation testing is to confirm that changes to the system were made successfully, while the purpose of regression testing is to run tests that previously failed to ensure that they now work correctly	<input type="checkbox"/>

FL-2.3.3 (K2) Compare the purposes of confirmation testing and regression testing

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – Although the description of regression testing is largely correct, the description of confirmation testing (which should be testing a defect has been fixed) is not correct
- b) IS CORRECT – The descriptions of both confirmation and regression testing match the intent of those in the syllabus, Section 2.2.4**
- c) IS NOT CORRECT – Although the description of regression testing is largely correct, the description of confirmation testing (re-running all previously run tests to get the same results) is not correct, as the purpose of confirmation testing is to check that tests that previously failed now pass (the fix worked)
- d) IS NOT CORRECT – Although the description of confirmation testing is largely correct, the description of regression testing (re-running tests that previously failed) is not correct (this is a more detailed description of confirmation testing)

Question 12	FL-2.4.1	K2	Score	1.0
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Which of the following should NOT be a trigger for maintenance testing?

Select exactly ONE option.

a)	Decision to test the maintainability of the software	<input checked="" type="checkbox"/>
b)	Decision to test the system after migration to a new operating platform	<input type="checkbox"/>
c)	Decision to test if archived data is possible to be retrieved	<input type="checkbox"/>
d)	Decision to test after “hot fixes”	<input type="checkbox"/>

FL-2.4.1 (K2) Summarize triggers for maintenance testing

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) IS CORRECT – This is maintainability testing, not maintenance testing. (Syllabus A4Q TF4D 2021, Section 3.1.3, last paragraph)

b) IS NOT CORRECT – This is a trigger for maintenance testing: Operational tests of the new environment as well as of the changed software, see Syllabus A4Q TF4D 2021, Section 2.3.1

c) IS NOT CORRECT – This is the trigger for maintenance testing: testing restore/retrieve procedures after archiving for long retention periods, see Syllabus A4Q TF4D 2021, Section 2.3.1

d) IS NOT CORRECT – This is the trigger for maintenance testing: Reactive modification of a delivered software product to correct emergency defects that have caused actual failures, see Syllabus A4Q TF4D 2021, Section 2.3.1

Question 13	FL-2.4.2	K2	Score 1.0
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Which of the following statements CORRECTLY describes a role of impact analysis in Maintenance?

Select exactly ONE option.

a)	Impact analysis is used when deciding if a fix to a maintained system is worthwhile	<input checked="" type="checkbox"/>
b)	Impact analysis is used to identify how data should be migrated into the maintained system	<input type="checkbox"/>
c)	Impact analysis is used to decide which hot fixes are of most value to the user	<input type="checkbox"/>
d)	Impact analysis is used to determine the effectiveness of new maintenance test cases	<input type="checkbox"/>

FL-2.4.2 (K2) Describe the role of impact analysis in maintenance testing

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) **IS CORRECT** – Impact analysis may be used to identify those areas of the system that will be affected by the fix, and so the extent of the impact (e.g. necessary regression testing) can be used when deciding if the change is worthwhile, see Syllabus A4Q TF4D 2021, Section 2.3.2

b) **IS NOT CORRECT** – Although testing migrated data is part of maintenance testing (see conversion testing), impact analysis does not identify how this is done

c) **IS NOT CORRECT** – Impact analysis shows which parts of a system are affected by a change, so it can show the difference between different hot fixes in terms of the impact on the system, however it does not give any indication of the value of the changes to the user

d) **IS NOT CORRECT** – Impact analysis shows which parts of a system are affected by a change; it cannot provide an indication of the effectiveness of test cases

Questions on the topic “Static Testing”

Question 14	Keywords	K1	Score	1.0
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Which of the following statements is a correct definition for the checklist-based review?

Select exactly ONE option.

a)	A review technique guided by a list of questions or required attributes.	<input checked="" type="checkbox"/>
b)	A type of review that follows a defined process and has a formally documented output.	<input type="checkbox"/>
c)	A type of static testing in which a work product or process is evaluated by one or more individuals to identify defects or to propose improvements.	<input type="checkbox"/>
d)	A review technique in which a work product is evaluated from the perspective of different stakeholders.	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) IS CORRECT – Based on the definition of a checklist-based review in the Glossary.

b) IS NOT CORRECT – This is the definition of a formal review according to the Glossary.

c) IS NOT CORRECT – This is the definition of a Review in general according to the Glossary.

d) IS NOT CORRECT – This is the definition of a role-based review according to the Glossary.

Question 15	Keywords	K1	Score	1.0
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Which of the following is a correct definition of cyclomatic complexity?

Select exactly ONE option.

a)	The maximum number of linear, independent paths through a program.	<input checked="" type="checkbox"/>
b)	The degree to which a component or system has a design and/or internal structure that is difficult to understand, maintain and verify.	<input type="checkbox"/>
c)	The coverage of sequences of N+1 transitions.	<input type="checkbox"/>
d)	The coverage of all outcomes of the atomic conditions that independently affect the overall decision outcome.	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) IS CORRECT – Based on the definition of cyclomatic complexity in the Glossary.

b) IS NOT CORRECT – This is the definition of complexity in the Glossary.

c) IS NOT CORRECT – This is the definition of N-Switch Coverage in the Glossary.

d) IS NOT CORRECT – This is the definition of modified condition/decision coverage (MC/DC) in the Glossary.

Question 16	Keywords	K1	Score	1.0
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Which of the following is a correct definition for the pairwise integration testing?

Select exactly ONE option.

a)	A type of integration testing that targets pairs of components that interact as shown in a call graph.	<input checked="" type="checkbox"/>
b)	A test level that focuses on interactions between components or systems.	<input type="checkbox"/>
c)	A type of integration testing in which all of the nodes that connect to a given node are the basis for the integration testing.	<input type="checkbox"/>
d)	Testing in which the test items are interfaces and interactions between integrated components.	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) IS CORRECT – Based on the definition of pairwise integration testing in the Glossary.

b) IS NOT CORRECT – This is the definition of integration testing in the Glossary.

c) IS NOT CORRECT – This is the definition of neighborhood integration testing in the Glossary.

d) IS NOT CORRECT – This is the definition of component integration testing in the Glossary.

Question 17	FL-3.2.4	K3	Score	1.0
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You have been asked to take part in a checklist-based review of the following excerpt from the requirements specification for a library system:

Librarians can:

1. Register new borrowers
2. Return books from borrowers
3. Accept fines from borrowers
4. Add new books to the system with their ISBN, author and title
5. Remove books from the system
6. Get system responses within 5 seconds

Borrowers can:

7. Borrow a maximum of 3 books at one time
8. View the history of books they have borrowed/reserved
9. Be fined for failing to return a book within 3 weeks
10. Get system responses within 3 seconds
11. Borrow a book at no cost for a maximum of 4 weeks
12. Reserve books (if they are on-loan)

All users (librarians and borrowers):

13. Can search for books by ISBN, author, or title
14. Can browse the system catalogue
15. The system shall respond to user requests within 3 seconds
16. The user interface shall be easy-to-use

You have been assigned the checklist entry that requires you to review the specification for inconsistencies between individual requirements (i.e. conflicts between requirements).

(Continued on the next page)

Which of the following CORRECTLY identifies inconsistencies between pairs of requirements?

Select exactly ONE option.

a)	6-10, 6-15, 7-12	<input type="checkbox"/>
b)	6-15, 9-11	<input checked="" type="checkbox"/>
c)	6-10, 6-15, 9-11	<input type="checkbox"/>
d)	6-15, 7-12	<input type="checkbox"/>

FL-3.2.4 (K3) Apply a review technique to a work product to find defects

Justification: (A4Q TF4D Syllabus 2021; Glossary)

Considering the potential inconsistencies:

- 6-10 – If librarians should get system responses within 5 seconds, it is NOT inconsistent for borrowers to get system responses within 3 seconds.
- 6-15 - If librarians should get system responses within 5 seconds, it is inconsistent for all users to get system responses within 3 seconds.
- 7-12 – If borrowers can borrow a maximum of 3 books at one time it is NOT inconsistent for them to also reserve books (if they are on-loan).
- 9-11 – If a borrower can be fined for failing to return a book within 3 weeks it is inconsistent for them to also be allowed to borrow a book at no cost for a maximum of 4 weeks – as the length of valid loans are different.

Thus, of the potential inconsistencies, 6-15 and 9-11 are valid inconsistencies, and so option b) IS CORRECT.

Question 18	TTA-3.2.1	K3	Score 1.0
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Below is the pseudo-code for an EASY program:

```
00  program EASY
01  var1, var2, var3 : integer
02  easy: boolean
02  begin
03      read ( var2 )
04      read ( var1 )
05      read (easy)
06      If (easy = true) then
07          var3 = var2 + var1
08          print ( var3 )
09          if var1 = 5 then
10              print ( var1 )
11          else
12              print ( var1+1 )
13          endif
14          var2 = var2 + 1
15      else
16          var2 = 0
17          write ( "Wow - that was tricky!" )
18      endif
19  write ( var2 )
20  end program EASY
```

What is the cyclomatic complexity for the program?

Select exactly ONE option.

a)	2	<input type="checkbox"/>
b)	4	<input type="checkbox"/>
c)	1	<input type="checkbox"/>
d)	3	<input checked="" type="checkbox"/>

Justification:

- a) IS NOT CORRECT
- b) IS NOT CORRECT
- c) IS NOT CORRECT
- d) IS CORRECT – Cyclomatic complexity refers to the number of independent paths through a program. In the Easy program there are three independent paths:
 - Path 1: (easy = false)
 - Path 2: (easy = true, var1 = 5)
 - Path 3: (easy = true, var1 not = 5)

Question 19	TTA-3.2.2	K2	Score 1.0
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Below is the pseudo-code for a program that calculates and prints sales commissions:

```

00 program Calculate Commission
01 total, number : integer
02 commission_hi, commission_lo : real
03 begin
04     read ( number )
05     while number ≠ -1 loop
06         total = total + number
07         read ( number )
08     endloop
09     if total > 1000 then
10         commission_hi = 100 + 0.2 * ( total - 1000 )
11     else
12         commission_lo = 0.15 * total
13     endif
14     write ( "This salesman's commission is:")
15     write ( commission_hi )
16 end program Calculate Commission

```

The code contains data flow anomalies on lines 6 and 12 (highlighted text).

Which examples of data flow anomalies are to be found on these lines?

Select exactly ONE option.

a)	line 6: variable "total" is not assigned a value before using it line 12: variable "commission_lo" is defined but subsequently not used	<input checked="" type="checkbox"/>
b)	line 6: an invalid value is assigned to variable "total" line 12: variable "commission_lo" is redefined before it is used	<input type="checkbox"/>
c)	line 6: variable "total" is out of scope line 12: the "hard-coded" value "0.15" should not be used	<input type="checkbox"/>
d)	line 6: the variable "number" is undefined line 12: the variable "total" is redefined before it is used	<input type="checkbox"/>



Justification:

a) IS CORRECT – Anomalies:

total: used at line 6 before it is defined.

commission_lo: defined at line 12 & no subsequent use

b) IS NOT CORRECT

c) IS NOT CORRECT

d) IS NOT CORRECT

Question 20	TTA-3.2.2	K2	Score 1.0
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Which of the following statements about data flow analysis is true?

Select exactly ONE option!

a)	Data flow analysis is a type of static analysis based on a representation of unique execution paths of a component or system.	<input type="checkbox"/>
b)	If a variable is referenced before it is used a dr anomaly has occurred.	<input type="checkbox"/>
c)	Data flow analysis can be used to identify error-prone areas of code that could lead to potential efficiency problems.	<input checked="" type="checkbox"/>
d)	Data flow analysis should be used after a code review to rule out undetected control and data flow anomalies.	<input type="checkbox"/>

TTA-3.2.2 (K2) Explain how data flow analysis is used to determine if the program code has data flow anomalies

Justification:

- a) IS NOT CORRECT - The statement is the definition of control flow analysis (see Glossary).
- b) IS NOT CORRECT - The statement is the definition of a dd anomaly and not a dr anomaly. See A4Q TF4D Syllabus 2021, Section 3.2.2, 6th list item.
- c) CORRECT - In data flow analysis, such uses are often referred to as suspect or "error-prone". Even if this use of variable allocation (e.g. declaration of variables without usage) is permissible, it may later lead to problems with the efficiency of the program.**
- d) IS NOT CORRECT - The data flow analysis should be accomplished PRIOR to a code review, in order to find error-prone places in the source code; which are evaluated then situation-dependently in the code review.

Question 21	TTA-3.2.3	K3	Score 1.0
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Below you can see the pseudo-code for a program called TRICKY.

```
00  programme TRICKY
01  var1, var2, var3: integer
02  begin
03      read(var2)
04      read( var1 )
05      while var2 < 10 loop
06          var3 = var2 + var1
07          var2 = 4
08          var1 = var2 + 1
09          print ( var3 )
10          if var1 = 5 then
11              print ( var1 )
12          else
13              print ( var1+1 )
14          endif
15          var2 = var2 + 1
16      endloop
17      write ( "Wow - that was tricky!" )
18      write ( "But the answer is..." )
19      write ( var2+var1 )
20  end program TRICKY
```

How could the use of static analysis best improve the maintainability of the program?

Select exactly ONE option.

a)	Restructuring the code	<input type="checkbox"/>
b)	Reducing coupling between programs	<input type="checkbox"/>
c)	Increasing the number of comments	<input checked="" type="checkbox"/>
d)	Improving the indentation of the code	<input type="checkbox"/>

TTA-3.2.3 (K3) Propose ways to improve the maintainability of code by applying static analysis

Justification:

- a) IS NOT CORRECT – The code is well structured with controls (e.g. loop, if-then-else). It is unlikely that static analysis can identify improvements to the control structure.
- b) IS NOT CORRECT – No global variables are defined and no other programs are called. Coupling is not an area of improvement.
- c) IS CORRECT – Static analysis is used with tool support to improve code maintainability by verifying compliance to coding standards and guidelines. This includes commenting (see A4Q TF4D Syllabus 2021, Section 3.3.3). Since the program has no comments at all, this would be highlighted as an area to improve the maintainability of the code.
- d) IS NOT CORRECT – Static analysis can apply indentation rules, but in the case of the TRICKY program, sufficient indentation is present.

Question 22	TTA-3.2.4	K2	Score	1.0
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Which of the following is a way to use call graphs to determine integration testing requirements?

Select exactly ONE option.

a)	Establishing the number of locations within the software from where a method or function is called.	<input type="checkbox"/>
b)	Establishing the number of locations within the software from where a module or system is called.	<input checked="" type="checkbox"/>
c)	Determining conditional and unconditional calls for performance analysis.	<input type="checkbox"/>
d)	Detecting areas to be targeted for possible memory leaks.	<input type="checkbox"/>

Justification:

- a) IS NOT CORRECT – this is a use of call graphs, but is used for unit testing, not integration testing per the syllabus.
- b) IS CORRECT – see A4Q TF4D Syllabus 2021, Section 3.3.4**
- c) IS NOT CORRECT – determining conditional and unconditional calls can be used for integration but using them for performance analysis has nothing to do with integration.
- d) IS NOT CORRECT – call graphs don't detect memory leaks or possible areas for memory leaks.

Question 23	TTA-3.2.4	K2	Score 1.0
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Which of the following statements regarding call graphs is true?

Select exactly one option! (1 from 4)

a)	Call graphs allow the nesting depth of the individual components to be determined.	<input type="checkbox"/>
b)	Call graphs can be used to design tests that call a specific module or system.	<input checked="" type="checkbox"/>
c)	Call graphs can be used in component test planning to identify components to be integrated concurrently in an effective manner.	<input type="checkbox"/>
d)	Call graphs allow identification of unexecuted data flows of the component in an integration.	<input type="checkbox"/>

TTA-3.2.4 (K2) Explain the use of call graphs to determine test strategies for integration testing.

Justification:

- a) IS NOT CORRECT- The single components are nodes in the call graph (see A4Q TF4D Syllabus 2021 3.3.4 first paragraph). Therefore, their nesting depth cannot be determined from the graph.
- b) CORRECT - Call graphs can be used to design tests that call a specific module or system. (See Syllabus 3.3.4; third paragraph; first bullet point).**
- c) IS NOT CORRECT- The single components are nodes in the call graph (see Syllabus 3.3.4 first paragraph). Call graphs are more appropriately used in integration test planning rather than in component test planning.
- d) IS NOT CORRECT- The internal structure of a component can be made visible by a call graph, but data flows of a component are not executed.

Questions on the topic "Test Techniques"

Question 24	Keywords	K1	Score	1.0
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What is checklist-based testing?

Select exactly ONE option.

a)	A test technique in which tests are derived based on the tester's knowledge of past faults, or general knowledge of failures	<input type="checkbox"/>
b)	A test technique based on an analysis of the specification of a component or system	<input type="checkbox"/>
c)	An experience-based test technique whereby the experienced tester uses a list of items to be noted, checked, or remembered, or a set of rules or criteria against which a product must be verified	<input checked="" type="checkbox"/>
d)	An approach to testing where the testers dynamically design and execute tests based on their knowledge, exploration of the test item and the results of previous tests	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – This is error guessing
- b) IS NOT CORRECT – This is black-box test technique
- c) IS CORRECT – See reasons from incorrect answers**
- d) IS NOT CORRECT – This is exploratory testing

Question 25	Keywords	K1	Score	1.0
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Which of the following provides the BEST description of exploratory testing?

Select exactly ONE option.

a)	A testing practice in which an in-depth investigation of the background of the test object is used to identify potential weaknesses that are examined by test cases	<input type="checkbox"/>
b)	An approach to testing whereby the testers dynamically designs and execute tests based on their knowledge, exploration of the test item and the results of previous tests	<input checked="" type="checkbox"/>
c)	An approach to test design in which test activities are planned as uninterrupted sessions of test analysis and design, often used in conjunction with checklist-based testing	<input type="checkbox"/>
d)	Testing based on the tester's experience, knowledge and intuition	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) IS NOT CORRECT – Exploratory testing is often carried out when timescales are short, so making in-depth investigations of the background of the test object is unlikely

b) IS CORRECT – Glossary definition

c) IS NOT CORRECT – Based on the Glossary definition of session-based testing, but with test execution replaced by test analysis

d) IS NOT CORRECT – Glossary definition of experience-based testing

Question 26	Keywords	K1	Score	1.0
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Which of the following statements is a correct definition for modified condition/decision testing?

Select exactly ONE option.

a)	A white-box test technique in which test cases are designed to exercise outcomes of atomic conditions that independently affect a decision outcome.	<input checked="" type="checkbox"/>
b)	A white-box test technique in which test cases are designed to exercise outcome combinations of atomic conditions.	<input type="checkbox"/>
c)	A white-box test technique in which test cases are designed to execute condition outcomes and decision outcomes.	<input type="checkbox"/>
d)	A white-box test technique in which test cases are designed to execute decision outcomes.	<input type="checkbox"/>

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) **IS CORRECT** – Based on the definition of modified condition/decision testing in the Glossary.

b) IS NOT CORRECT – This is the definition of multiple condition testing in the Glossary.

c) IS NOT CORRECT – This is the definition of condition testing in the Glossary.

d) IS NOT CORRECT – This is the definition of decision testing in the Glossary.

Question 27	FL-4.1.1	K2	Score 1.0
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Which of the following **BEST** matches the descriptions with the different categories of test techniques?

1. Coverage is measured based on a selected structure of the test object
2. The processing within the test object is checked
3. Tests are based on defects' likelihood and their distribution
4. Deviations from the requirements are checked
5. User stories are used as the test basis

Using notation for the following 4 options:

- Black** – Black-box test techniques
White – White-box test techniques
Experience – Experience-based test techniques

Select exactly **ONE** option.

a)	Black – 4, 5; White – 1, 2; Experience – 3	<input checked="" type="checkbox"/>
b)	Black – 3; White – 1, 2; Experience – 4, 5	<input type="checkbox"/>
c)	Black – 4; White – 1, 2; Experience – 3, 5	<input type="checkbox"/>
d)	Black – 1, 3, 5; White – 2; Experience – 4	<input type="checkbox"/>

FL-4.1.1 (K2) Explain the characteristics, commonalities, and differences between black-box test techniques, white-box test techniques and experience-based test techniques

Justification: (A4Q TF4D Syllabus 2021; Glossary)

The correct pairing of descriptions with the different categories of test techniques is:

- Black-box test techniques
- Deviations from the requirements are checked (4) User stories are used as the test basis (5)
- White-box test techniques
- Coverage is measured based on a selected structure of the test object (1) The processing within the test object is checked (2)
- Experience-based test techniques

Tests are based on defects' likelihood and their distribution (3)

Thus, option a) IS CORRECT.

Question 28	FL-4.2.1	K3	Score 1.0
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A daily radiation recorder for plants produces a sunshine score based on a combination of the number of hours a plant is exposed to the sun (below 3 hours, 3 to 6 hours or above 6 hours) and the average intensity of the sunshine (very low, low, medium, high).

Given the following test cases:

	Hours	Intensity	Score
T1	1.5	v. low	10
T2	7.0	medium	60
T3	0.5	v. low	10

What is the minimum number of additional test cases that are needed to ensure full coverage of ALL VALID INPUT equivalence partitions?

Select exactly ONE option.

a)	1	<input type="checkbox"/>
b)	2	<input checked="" type="checkbox"/>
c)	3	<input type="checkbox"/>
d)	4	<input type="checkbox"/>

FL-4.2.1 (K3) Apply equivalence partitioning to derive test cases from given requirements

Justification: (A4Q TF4D Syllabus 2021; Glossary)

The following valid input equivalence partitions can be identified:

- Hours
 1. below 3 hours
 2. 3 to 6 hours
 3. above 6 hours
- Intensity
 4. very low
 5. low
 6. medium
 7. high

The given test cases cover the following valid input equivalence partitions:

T1	1.5 (1)	Very low (4)
T2	7.0 (3)	Medium (6)
T3	0.5 (1)	Very low (4)

Thus, the missing valid input equivalence partitions are: (2), (5) and (7). These can be covered by two test cases, as (2) can be combined with either (5) or (7).

Thus, option b) IS CORRECT.

Question 29	FL-4.2.2	K3	Score 1.0
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A smart home app measures the average temperature in the house over the previous week and provides feedback to the occupants on their environmental friendliness based on this temperature.

The feedback for different average temperature ranges (to the nearest °C) should be:

- Up to 10°C – Icy Cool!**
- 11°C to 15°C – Chilled Out!**
- 16°C to 19°C – Cool Man!**
- 20°C to 22°C – Too Warm!**
- Above 22°C – Hot & Sweaty!**

Using BVA (only Min- and Max values), which of the following sets of test inputs provides the highest level of boundary coverage?

Select exactly ONE option.

a)	0°C,	11°C,	20°C,	22°C,	23°C	<input type="checkbox"/>
b)	9°C,	15°C,	19°C,	23°C,	100°C	<input type="checkbox"/>
c)	10°C,	16°C,	19°C,	22°C,	23°C	<input checked="" type="checkbox"/>
d)	14°C,	15°C,	18°C,	19°C,	21°C 22°C	<input type="checkbox"/>

FL-4.2.2 (K3) Apply boundary value analysis to derive test cases from given requirements

Justification: (A4Q TF4D Syllabus 2021; Glossary)

For the input equivalence partitions given, the above used boundary value technique yields the following 8 coverage items:

10°C, 11°C, 15°C, 16°C, 19°C, 20°C, 22°C, 23°C.

Hence, the options have the following boundary value coverage:

- a) 4 out of 8 (11, 20, 22 and 23).
- b) 3 out of 8 (15, 19 and 23).
- c) 5 out of 8 (10, 16, 19, 22 and 23).
- d) 3 out of 8 (15, 19 and 22)

Thus, option c) IS CORRECT.

Question 30	FL-4.2.3	K3	Score 1.0
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A company's employees are paid bonuses if they work more than a year in the company and achieve a target which is individually agreed before.

These facts can be shown in a decision table:

Test-ID		T1	T2	T3	T4
Condition1	Employment for more than 1 year?	YES	NO	NO	YES
Condition2	Agreed target?	NO	NO	YES	YES
Condition3	Achieved target?	NO	NO	YES	YES
Action	Bonus payment	NO	NO	NO	YES

Which of the following test cases represents a situation that can happen in real life, and is missing in the above decision table?

Select exactly ONE option.

a)	Condition1 = YES, Condition2 = NO, Condition3 = YES, Action= NO	<input type="checkbox"/>
b)	Condition1 = YES, Condition2 = YES, Condition3 = NO, Action= YES	<input type="checkbox"/>
c)	Condition1 = NO, Condition2 = NO, Condition3 = YES, Action= NO	<input type="checkbox"/>
d)	Condition1 = NO, Condition2 = YES, Condition3 = NO, Action= NO	<input checked="" type="checkbox"/>

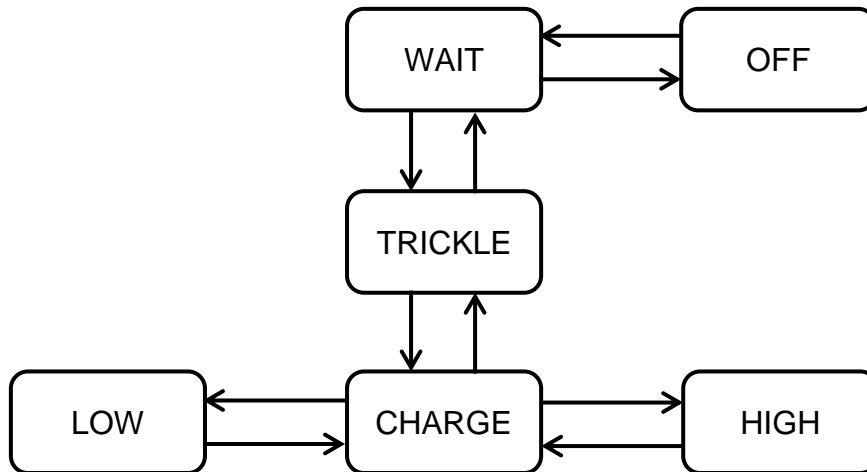
FL-4.2.3(K3) Apply decision table testing to derive test cases from given requirements

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – If there was no agreement on targets, it is impossible to reach the targets. Since this situation can't occur, this is not a scenario happening in reality
- b) IS NOT CORRECT – The test case is objectively wrong, since under these conditions no bonus is paid because the agreed target was not reached
- c) IS NOT CORRECT – There was no agreement on targets, it is impossible to reach the targets. Since this situation can't occur, this is not a scenario happening in reality
- d) IS CORRECT – The test case describes the situation that the too short period of employment and the non-fulfilment of the agreed target leads to non-payment of the bonus. This situation can occur in practice but is missing in the decision table

Question 31	FL-4.2.4	K3	Score 1.0
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Given the following state model of a battery charger software:



Which of the following sequences of transitions provides the highest level of transition coverage for the model?

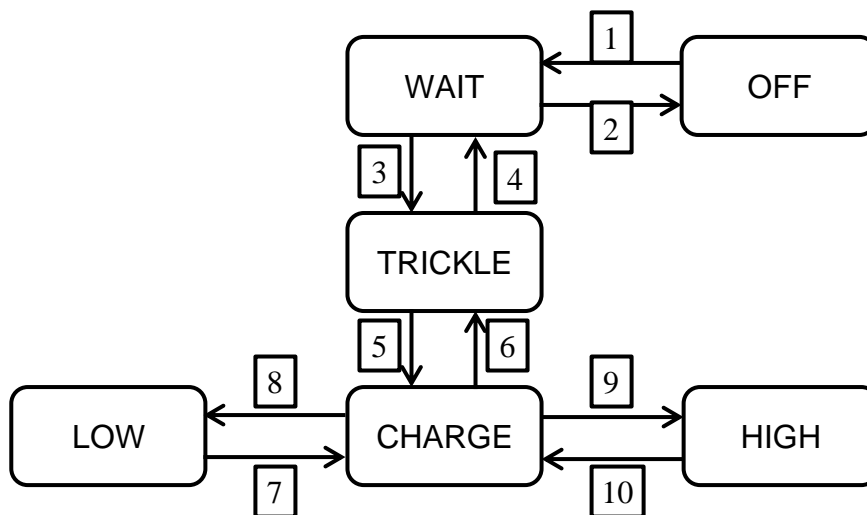
Select exactly ONE option.

a)	OFF → WAIT → OFF → WAIT → TRICKLE → CHARGE → HIGH → CHARGE → LOW	<input type="checkbox"/>
b)	WAIT → TRICKLE → WAIT → OFF → WAIT → TRICKLE → CHARGE → LOW → CHARGE	<input type="checkbox"/>
c)	HIGH → CHARGE → LOW → CHARGE → TRICKLE → WAIT → TRICKLE → WAIT → TRICKLE	<input type="checkbox"/>
d)	WAIT → TRICKLE → CHARGE → HIGH → CHARGE → TRICKLE → WAIT → OFF → WAIT	<input checked="" type="checkbox"/>

FL-4.2.4 (K3) Apply state transition testing to derive test cases from given requirements

Justification: (A4Q TF4D Syllabus 2021; Glossary)

Given the annotated state model below:



The options achieve the following transition coverage:

- a) OFF (2) WAIT (1) OFF (2) WAIT (3) TRICKLE (5) CHARGE (9) HIGH (10) CHARGE (7) LOW = 7 transitions (out of 10)
- b) WAIT (3) TRICKLE (4) WAIT (1) OFF (2) WAIT (3) TRICKLE (5) CHARGE (7) LOW (8) CHARGE = 7 transitions (out of 10)
- c) HIGH (10) CHARGE (7) LOW (8) CHARGE (6) TRICKLE (4) WAIT (3) TRICKLE (4) WAIT (3) TRICKLE (5) = 7 transitions (out of 10)

d) WAIT (3) TRICKLE (5) CHARGE (9) HIGH (10) CHARGE (6) TRICKLE (4) WAIT (1) OFF (2) WAIT = 8 transitions (out of 10)

Thus, option d) IS CORRECT.

Question 32	FL-4.2.5	K2	Score 1.0
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Which of the following statements BEST describes how test cases are derived from a use case?

Select exactly ONE option.

a)	Test cases are created to exercise defined basic, exceptional and error behaviors performed by the system under test in collaboration with actors	<input checked="" type="checkbox"/>
b)	Test cases are derived by identifying the components included in the use case and creating integration tests that exercise the interactions of these components	<input type="checkbox"/>
c)	Test cases are generated by analyzing the interactions of the actors with the system to ensure the user interfaces are easy to use	<input type="checkbox"/>
d)	Test cases are derived to exercise each of the decision points in the business process flows of the use case, to achieve 100% decision coverage of these flows	<input type="checkbox"/>

FL-4.2.5 (K2) Explain how to derive tests from a use case

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) **IS CORRECT** – Syllabus Section 4.2.5 explains that each use case specifies some behavior that a subject can perform in collaboration with one or more actors. It also (later) explains that tests are designed to exercise the defined behaviors (basic, exceptional and errors)
- b) **IS NOT CORRECT** – Use cases normally specify requirements, and so do not ‘include’ the components that will implement them
- c) **IS NOT CORRECT** – Tests based on use cases do exercise interactions between the actor and the system, but they are focused on the functionality and do not consider the ease of use of user interfaces
- d) **IS NOT CORRECT** – Tests do cover the use case paths through the use case, but there is no concept of decision coverage of these paths, and certainly not of business process flows

Question 33	FL-4.3.1	K2	Score 1.0
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Which of the following descriptions of statement coverage is CORRECT?

Select exactly ONE option.

a)	Statement coverage is a measure of the number of lines of source code exercised by tests	<input type="checkbox"/>
b)	Statement coverage is a measure of the proportion of executable statements in the source code exercised by tests	<input checked="" type="checkbox"/>
c)	Statement coverage is a measure of the percentage of lines of source code (without comments) exercised by tests	<input type="checkbox"/>
d)	Statement coverage is a measure of the number of executable statements in the source code exercised by tests	<input type="checkbox"/>

FL-4.3.1 (K2) Explain statement coverage

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – Statement coverage is a measure of the proportion of executable statements exercised by tests. The number of executable statements is often close to the number of lines of code minus the comments, but this option only talks about the number of lines of code exercised and not the proportion exercised
- b) IS CORRECT – Statement coverage is a measure of the proportion of executable statements exercised by tests (normally presented as a percentage)**
- c) IS NOT CORRECT – Statement coverage is a measure of the percentage of executable statements exercised by tests, however many of the lines of source code are not executable (e.g. comments)
- d) IS NOT CORRECT – Statement coverage is a measure of the proportion of executable statements exercised by tests. This option only talks about the number of executable statements exercised and not the proportion (or percentage) exercised

Question 34	FL-4.3.1	K2	Score 1.0
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Which one of the following is the description of statement coverage?

Select exactly ONE option.

a)	It is a metric, which is the percentage of test cases that have been executed	<input type="checkbox"/>
b)	It is a metric, which is the percentage of statements in the source code that have been executed	<input checked="" type="checkbox"/>
c)	It is a metric, which is the number of statements in the source code that have been executed by test cases that are passed	<input type="checkbox"/>
d)	It is a metric, that gives a true/false confirmation if all statements are covered or not	<input type="checkbox"/>

FL-4.3.1 (K2) Explain statement coverage

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – Statement coverage measures the percentage of statements exercised by test cases
- b) IS CORRECT – Statement testing exercises the executable statements in the code. Statement coverage is measured as the number of statements executed by the tests divided by the total number of executable statements in the test object, normally expressed as a percentage**
- c) IS NOT CORRECT – The coverage does not measure pass/fail
- d) IS NOT CORRECT – It is a metric and does not provide true/false statements

Question 35	FL-4.3.2	K2	Score	1.0
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The following statement refers to decision coverage:

“When the code contains only a single ‘if’ statement and no loops or CASE statements, and its execution is not nested within the test, any single test case we run will result in 50% decision coverage.”

Which of the following statement is correct?

Select exactly ONE option.

a)	The statement is true. Any single test case provides 100% statement coverage and therefore 50% decision coverage	<input type="checkbox"/>
b)	The statement is true. Any single test case would cause the outcome of the “if” statement to be either true or false	<input checked="" type="checkbox"/>
c)	The statement is false. A single test case can only guarantee 25% decision coverage in this case	<input type="checkbox"/>
d)	The statement is false. The statement is too broad. It may be correct or not, depending on the tested software	<input type="checkbox"/>

FL-4.3.2 (K2) Explain decision coverage

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – While the given statement is true, the explanation is not. The relationship between statement and decision coverage is misrepresented
- b) IS CORRECT – Since any test case will cause the outcome of the “if” statement to be either TRUE or FALSE, by definition we achieved 50% decision coverage
- c) IS NOT CORRECT – A single test case can give more than 25% decision coverage, this means according to the statement above always 50 % decision coverage
- d) IS NOT CORRECT – The statement is specific and always true, because each test case achieves 50 % decision coverage

Question 36	FL-4.3.2	K2	Score 1.0
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Which of the following descriptions of decision coverage is CORRECT?

Select exactly ONE option.

a)	Decision coverage is a measure of the percentage of possible paths through the source code exercised by tests	<input type="checkbox"/>
b)	Decision coverage is a measure of the percentage of business flows through the component exercised by tests	<input type="checkbox"/>
c)	Decision coverage is a measure of the 'if' statements in the code that are exercised with both the true and false outcomes	<input type="checkbox"/>
d)	Decision coverage is a measure of the proportion of decision outcomes in the source code exercised by tests	<input checked="" type="checkbox"/>

FL-4.3.2 (K2) Explain decision coverage

Justification: (A4Q TF4D Syllabus 2021; Glossary)

- a) IS NOT CORRECT – A path through source code is one potential route through the code from the entry point to the exit point that could exercise a range of decision outcomes. Two different paths may exercise all but one of the same decision outcomes, and by just changing a single decision outcome a new path is followed. Test cases that would achieve decision coverage are typically a tiny subset of the test cases that would achieve path coverage. In practice, most nontrivial programs (and all programs with unconstrained loops, such as 'while' loops) have a potentially infinite number of possible paths through them and so measuring the percentage covered is practically infeasible
- b) IS NOT CORRECT – Coverage of business flows can be a focus of use case testing, but use cases rarely cover a single component. It may be possible to cover the decisions within business flows, but only if they were specified in enough detail, however this option only suggests coverage of "business flows" as a whole. Even if business flows would cover some decisions, the measure "Decision Coverage" don't measure the percentage of business flows, but the percentage of decision outcomes exercised by the business flows
- c) IS NOT CORRECT – Achieving full decision coverage does require all 'if' statements to be exercised with both true and false outcomes, however, there are typically several other decision points in the code (e.g. 'case' statements and the code controlling loops) that also need to be taken into consideration when measuring decision coverage
- d) **IS CORRECT – Decision coverage is a measure of the proportion of decision outcomes exercised (normally presented as a percentage)**

Question 37	FL-4.3.3	K2	Score 1.0
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Which statement about the relationship between statement coverage and decision coverage is true?

Select exactly ONE option.

a)	100% decision coverage also guarantees 100% statement coverage	<input checked="" type="checkbox"/>
b)	100% statement coverage also guarantees 100% decision coverage	<input type="checkbox"/>
c)	50% decision coverage also guarantees 50% statement coverage	<input type="checkbox"/>
d)	Decision coverage can never reach 100%	<input type="checkbox"/>

FL-4.3.3 (K2) Explain the value of statement and decision coverage

Justification: (A4Q TF4D Syllabus 2021; Glossary)

a) IS CORRECT – The statement is true. Achieving 100% decision coverage guarantees 100% statement coverage

b) IS NOT CORRECT – The statement is false because achieving 100 % statement coverage does not in any case mean that the decision coverage is 100%

c) IS NOT CORRECT – The statement is false, because we can only do statements about 100% values

d) IS NOT CORRECT – The statement is false

Question 38	TTA-2.2.1	K3	Score 1.0
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Consider the simplified logic of a tea-making machine:

```
Switch on machine
IF sufficient water THEN
    Boil water
    Add tea
    Show message "milk?"
    IF milk = yes THEN
        Show message "low fat?"
        IF low fat = yes THEN
            Add low fat milk
        ELSE
            Add normal milk
        ENDIF
    ENDIF
    Show message "sugar?"
    IF sugar = yes THEN
        Add sugar
    ENDIF
    Stir
    Wait 3 minutes
    Show message "please take your tea"
ELSE
    Show message "please fill up water"
ENDIF
```

How many test cases would you design to achieve 100% statement coverage for the tea-making machine?

Select exactly ONE option.

a)	3	<input checked="" type="checkbox"/>
b)	2	<input type="checkbox"/>
c)	5	<input type="checkbox"/>
d)	6	<input type="checkbox"/>

TTA-2.2.1 (K3) Write test cases from a given specification item by applying the Statement testing test technique to achieve a defined level of coverage.

Justification:

a) IS CORRECT – The three test cases are defined by the following inputs:

- Sufficient water, milk, low fat, sugar
- Sufficient water, milk, not low fat, sugar or not sugar
- Insufficient water

b) IS NOT CORRECT

c) IS NOT CORRECT

d) IS NOT CORRECT

Question 39	TTA-2.3.1	K3	Score 1.0
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The simplified logic of a program has been specified as follows:

```
Statement P
IF A THEN
    IF B THEN
        Statement Q
    ELSE
        Statement R
    ENDIF
ELSE
    Statement S
    IF C THEN
        Statement T
    ELSE
        Statement U
    ENDIF
ENDIF
Statement V
```

How many test cases would you design to achieve 100% decision coverage?

Select exactly ONE option.

a)	2	<input type="checkbox"/>
b)	3	<input type="checkbox"/>
c)	4	<input checked="" type="checkbox"/>
d)	5	<input type="checkbox"/>

TTA-2.3.1 (K3) Write test cases from a given specification item by applying the Decision testing test technique to achieve a defined level of coverage.

Justification:

a) IS NOT CORRECT

b) IS NOT CORRECT

c) IS CORRECT – the following conditions ensure that all decision outcomes are tested:

1) A, B 2) A, not B 3) not A, C 4) not A, not C.

d) IS NOT CORRECT

Question 40	TTA-2.4.1	K3	Score	1.0
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You are testing a photo-enforcement system for traffic control in an intersection. It has been determined that a photo should be taken if the signal light is red (RED) or the car is speeding (SPEED) and if the front wheels of the car are over the line marking the beginning of the intersection (WHEELS).

Consider these sets of test values:

1. RED + SPEED + WHEELS
2. RED + SPEED + not WHEELS
3. RED + not SPEED + WHEELS
4. RED + not SPEED + not WHEELS
5. not RED + SPEED + WHEELS
6. not RED + SPEED + not WHEELS
7. not RED + not SPEED + WHEELS
8. not RED + not SPEED + not WHEELS

Assume the logic in the code is as follows:

```
IF ((RED OR SPEED) AND WHEELS) THEN  
    TAKE THE PHOTO  
ELSE  
    DO NOT TAKE THE PHOTO
```

Given this information, which sets of values provides the minimum tests to achieve 100% modified condition/decision coverage?

Select exactly ONE option.

a)	1, 3 and 8.	<input type="checkbox"/>
b)	2 and 8.	<input type="checkbox"/>
c)	3, 4, 5 and 7.	<input checked="" type="checkbox"/>
d)	1, 5, 7 and 8.	<input type="checkbox"/>

TTA-2.4.1 (K3) Write test cases from a given specification item by applying the Modified Condition/Decision Coverage (MC/DC) test technique to achieve coverage

Justification:

- a) IS NOT CORRECT – covers the outcomes but not the atomic conditions that affect the decision outcome.
- b) IS NOT CORRECT – does not sufficiently cover the atomic conditions affecting the decision outcome.

c) IS CORRECT – this answer provides the following:

(T or F) + T

(T or F) + F

(F or T) + T

(F or F) + T

This tests all values for the atomic conditions as well as all outcomes with the minimum number of tests.

- d) IS NOT CORRECT – does not sufficiently cover the atomic conditions affecting the decision outcome.



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