

7 THE EXAMINATION

THE EXAMINATION

The examination structure

The Certified Tester Foundation Level (CTFL) examination is a one-hour examination made up of 40 multiple choice questions. There are five main aspects to the examination's structure:

- The questions are all equally weighted.
- Questions are set from learning objectives stated in each section.
- The number of questions associated with each section of the syllabus is in proportion to the amount of time allocated to that section of the syllabus, which roughly translates into:
 - Section 1, seven questions.
 - Section 2, six questions.
 - Section 3, three questions.
 - Section 4, twelve questions.
 - Section 5, eight questions.
 - Section 6, four questions.

These proportions are approximate and the precise breakdown is not mandatory, but examinations will be structured along these lines and as close to these relative proportions as possible.

- The number of questions at each level of understanding will be as follows:
 - K1 50 per cent, that is 20 questions.
 - K2 30 per cent, that is 12 questions.
 - K3 and K4 20 per cent, that is 8 questions.

The breakdown of K3 and K4 questions is not defined in the exam structure, but there is only a single K4 learning objective (LO-4.4.4) and this deals with statement and decision coverage. There will therefore be no more than two K4 questions and more likely only

one, and the topic will be assessing statement and/or decision coverage for completeness with respect to defined exit criteria.

This is a mandatory requirement and examinations will adhere more strictly to these proportions than to those related to the syllabus section.

Since the majority of K3 questions will be likely to be based on section 4 of the syllabus, it is likely that all or most K3 questions will be about applying test design techniques. All K4 questions will be related to statement and decision coverage.

- The pass mark is 26 correct answers and there are no penalties for incorrect answers.

The question types

All questions will contain a 'stem', which states the question, and four optional answers. One and only one of the optional answers will be correct. The remainder can be expected to be plausibly incorrect, which means that anyone knowing the correct answer will be unlikely to be drawn to any of the incorrect answers, but anyone unsure of the correct answer will be likely to find one or more alternatives equally plausible.

Questions will be stated as clearly as possible, even emphasising keywords by emboldening or underlining where this will add clarity. There should be very few negative questions (e.g. which of the following is **not** true?) and any negative questions included will be worded so that there is no ambiguity. Questions will be set to test your knowledge of the content of the topics covered in the syllabus and not your knowledge of the syllabus itself.

There are no absolute rules for question types as long as they are appropriate to the level of understanding they are testing, but there are some common types of questions that are likely to arise.

As a general rule, K1 questions will be of the straightforward variety shown in the next box.

EXAMPLE OF A K1 QUESTION

(This one is taken from **Chapter 3**.)

What do static analysis tools analyse?

- Design.
- Test cases.
- Requirements.
- Program code.

(The correct answer is d.)

K2 questions may be of the same type as the K1 example but with a more searching stem. The more common form of K2 question, however, is known as the Roman type. This is particularly well suited to questions involving comparisons or testing the candidate's ability to identify correct combinations of information. The example in the next box is a K2 question of the Roman type.

EXAMPLE OF A K2 QUESTION

(This one is taken from **Chapter 3**.)

Which of the following statements are correct for walkthroughs?

- i. Often led by the author.
 - ii. Documented and defined results.
 - iii. All participants have defined roles.
 - iv. Used to aid learning.
 - v. Main purpose is to find defects.
- a. i and v are correct.
 - b. ii and iii are correct.
 - c. i and iv are correct.
 - d. iii and iv are correct.

(The correct answer is c.)

K3 questions test the candidate's ability to apply a topic, so the most common form of these is related to test design techniques (though this is not the only topic that can be examined at the K3 level). The next box gives a typical example of a techniques question.

EXAMPLE OF A K3 QUESTION

A system is designed to accept values of examination marks as follows:

Fail	0–39 inclusive
Pass	40–59 inclusive
Merit	60–79 inclusive
Distinction	80–100 inclusive

Which of the following sets of values are all in different equivalence partitions?

- a. 25, 40, 60, 75
- b. 0, 45, 79, 87
- c. 35, 40, 59, 69
- d. 25, 39, 60, 81

(The correct answer is b.)

K4 questions test a candidate's ability to analyse information and decide on a course of action. In this examination, K4 questions will be used to test ability to decide whether defined exit criteria have been met.

EXAMPLE OF A K4 QUESTION

A software component has the code shown below:

```
Program Biggest
A, Biggest: Integer
Begin
Read A
Biggest = 10
While A > 0
Do
    If A > Biggest
        Then Biggest = A
        Endif
    Read A
Enddo
End
```

The component has exit criteria for component testing that include 100 per cent statement coverage. Which of the following test cases will satisfy this criterion?

- a. 0
- b. 10, 0
- c. 10, 5, 0
- d. 10, 11, 0

(The correct answer is d.)

Remember that K1, K2, K3 and K4 do not equate to easy, moderate or hard. The K level identifies the level of understanding being tested, not the difficulty of the question. It is perfectly possible to find K2 questions that are more difficult (in the sense of being more challenging to answer) than a K3 question. It is, however, true that K1 questions will always be the most straightforward and anyone who knows the material in the syllabus should have no difficulty in answering any K1 question. Every question has the same value; any 26 correct answers will guarantee a pass.

Remember, too, that topics can be examined at any level up to the maximum identified in the syllabus for that topic, so a K3 topic can be examined at the K1 or the K2 level.

Questions in the examination are not labelled by the K level they are testing, but the example questions at the end of each chapter of this book include examples of K1, K2, K3 and K4 questions, and these are labelled by level for your guidance.

The sample examination

A sample examination paper is available from the **ISTQB website**. It is designed to provide guidance on the structure of the paper and the 'rubric' (the rules printed on the front of the paper) of the real examination. The questions in the sample paper are not necessarily typical, though there will be examples of the various types of questions so that candidates are aware of the kinds of questions that can arise. Any topic or type of question in the sample paper can be expected to arise in a real examination at some time. For example, the sample paper may contain an example of a question testing the application of decision testing to a program with a looping structure in it; the existence of this question can be taken to imply that questions involving programs with looping structures may appear in the real examination. Bear in mind that the sample paper may change from time to time to reflect any changes in the syllabus or to reflect any changes in the way questions are set.

Examination technique

In a relatively short examination there is little time to devote to studying the paper in depth. However, it is wise to pause before beginning to answer questions while you assimilate the contents of the question paper. This brief time of inactivity is also a good opportunity to consciously slow down your heart rate and regulate your breathing; nervousness is natural, but it can harm your performance by making you rush. A few minutes spent consciously calming down will be well repaid. There will still be time enough to answer the questions; a strong candidate can answer 40 questions in less than 45 minutes.

When you do start, go through the whole paper answering those questions that are straightforward and for which you know the answer. When you have done this you will have a smaller task to complete and you will probably have taken less than a minute for each question that you have already answered, giving you more time to concentrate on those that you will need more time to answer.

Next, turn to those you feel you understand but that will take you a little time to work out the correct answer, and complete as many of those as you can. The questions you are left with now should be those that you are uncertain about. You now know how long you have to answer each of these and you can take a little more time over each of them.

REVISION TECHNIQUES

There are some golden rules for exam revision:

- Do as many example questions as you can so that you become familiar with the types of questions, the way questions are worded and the levels (K1, K2, K3, K4) of questions that are set in the examination.
- Be active in your reading. This usually means taking notes, but this book has been structured to include regular checks of understanding that will provide you with prompts to ensure you have remembered the key ideas from the section you have just revised. In many cases information you need to remember is already in note form for easy learning.

- One important way to engage with the book is to work through all the examples and exercises. If you convince yourself you can do an exercise, but you do not actually attempt it, you will only discover the weakness in that approach when you are sitting in the examination centre.
- Learning and revision need to be reinforced. There are two related ways to do this:
 - By making structured notes to connect together related ideas. This can be done via lists, but a particularly effective way to make the connections is by using a technique known as mind mapping.
 - By returning to a topic that you have revised to check that you have retained the information. This is best done the day after you first revised the topic and again a week after, if possible. If you begin each revision section by returning to the 'Check of understanding' boxes in some or all of the chapters you worked with in previous revision sessions it will help to ensure that you retain what you are revising.
- Read the syllabus and become familiar with it. Questions are raised directly from the syllabus and often contain wording similar to that used in the syllabus. Familiarity with the syllabus document will more than repay the time you will spend gaining that familiarity.

REVIEW

The layout, structure and style of this book are designed to maximise your learning: by presenting information in a form that is easy to assimilate; by listing things you need to remember; by highlighting key ideas; by providing worked examples; and by providing exercises with solutions. All you need for an intense and effective revision session is in these pages.

The best preparation for any examination is to practise answering as many realistic questions as possible under conditions as close to the real examination as possible. This is one way to use the ISTQB sample paper, or you can construct a sample paper of your own from the questions included in this book. However, the best check of your readiness of tackling the real examination would be to attempt the mock exam that is contained in **Appendix A1**. All the answers are provided in **Appendix A2** so that you can see how well you did, and a full commentary is provided in **Appendix A3** so that you can identify where you went wrong in any questions.

Good luck with your Foundation Certificate examination.

A1 MOCK CTFL EXAMINATION

Question 1

Which of the following is a valid objective of testing?

- a. Locating defects in the code.
- b. Preventing defects.
- c. Ensuring no defects are present.
- d. Correcting defects.

Question 2

Which of the following are *most* important in determining the quality of test cases?

- i. Referencing the current version of the requirements.
 - ii. Traceability to requirements via test conditions.
 - iii. Incorporating well-defined expected results.
 - iv. Referencing the test procedure and test execution schedule.
 - v. Identifying the author of the test case.
- a. i and ii.
 - b. ii and iii.
 - c. iii and iv.
 - d. ii and v.

Question 3

Which of the following is true of both linear and cyclical development models for software development?

- a. They both require system requirements to be defined fully upfront.
- b. They both require that working versions of the system are produced early.
- c. They both require that each development activity is matched by a testing activity.
- d. They both require four levels of testing.

Question 4

Candidates for a software developer role must be at least 18 years of age, achieve a pass (at least 60 per cent) in the relevant certification examination and demonstrate at least two years of experience as a developer. Candidates may be declined, accepted as a trainee (if their experience is not yet adequate) or accepted. How many valid input equivalence partitions would be needed to test the acceptance of candidates?

- a. 3
- b. 4
- c. 5
- d. 6

Question 5

What is the main benefit of use case testing?

- a. Use case tests correspond to business rules and check the outputs for multiple input conditions.
- b. Use test cases always contain alternative scenarios to test what happens when a component fails.
- c. Use cases are good for defining user acceptance tests with user participation.
- d. Use case tests can be used to achieve input and output coverage goals.

Question 6

You have been asked to generate a defect report for a test failure in a ticket booking system that maintains a small database containing details of bookings made. You have collected together what you believe is the necessary information, as follows:

- Reference of the test script that failed.
- Expected and actual results.
- Description of the incident.
- Date of the report.
- Your name.
- System under test.
- Identification of the item under test.

Which of the following fields would be most important to add to the incident report to provide adequate detail for the developer tasked with investigating the incident report?

- i. Test level at which the incident was raised.
- ii. Log of the session during which the test failure occurred.
- iii. Database dump.
- iv. Test tools used.
- v. Proposed priority.

- a. i, ii and iii.
- b. ii, iii and v.
- c. i, iii and iv.
- d. ii, iv and v.

Question 7

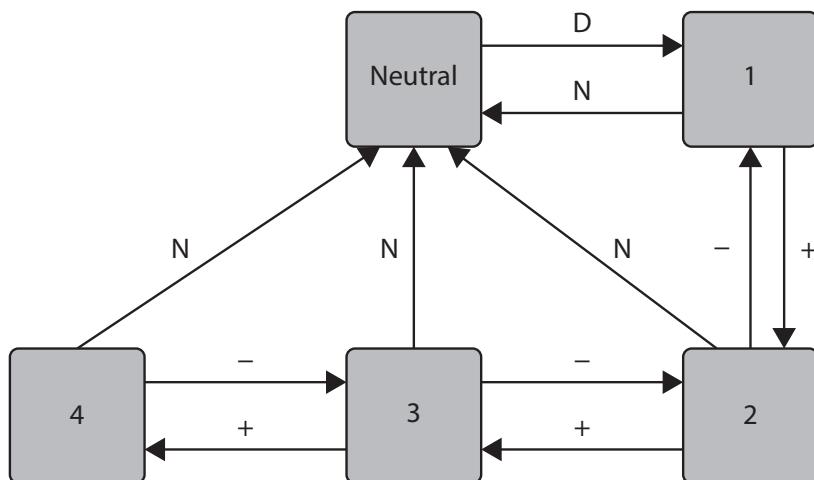
Which two of the following statements best describe the difference between testing and debugging?

- i. Testing aims to identify defects.
 - ii. Testing aims to identify failures caused by defects.
 - iii. Testing aims to assess the quality of the software.
 - iv. Debugging aims to find and remove defects.
 - v. Debugging aims to find, analyse and remove the causes of failures.
- a. i and iv.
 - b. ii and iv.
 - c. iii and v.
 - d. i and v.

Question 8

In the following state transition diagram, if the system is initially in the neutral state, what would be the expected value for a test case with the following sequence of inputs: D, +, +, N, – ?

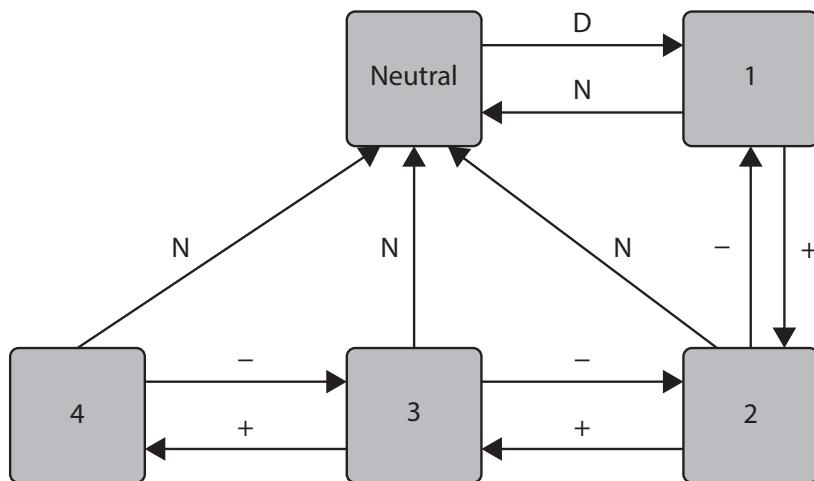
Figure A1.1 State transition diagram for question 8



- a. 3
- b. neutral
- c. 1
- d. 4

Question 9

In the following state transition diagram and table how many non-valid transitions are there?

Figure A1.2 State transition diagram for question 9**Table A1.1 State transition table for question 9**

State/Event	Neutral	1	2	3	4
D	1	X	X	X	X
N	X	Neutral	Neutral	Neutral	Neutral
+	X	2	3	4	X
-	X	X	1	2	3

- a. 7
- b. 8
- c. 9
- d. 10

Question 10

Why are both specification-based and structure-based test design techniques needed?

- a. Because specification-based techniques do not provide coverage measures.
- b. Because structure-based techniques can only test code.
- c. Because both are needed to improve the chances of finding defects.
- d. Because neither can take advantage of users' and testers' experience of the type of system being tested.

Question 11

Which of the following would be the most suitable test basis for system testing when following the V-model?

- a. A program specification.
- b. A detailed design document.
- c. A copy of the coding standards.
- d. A functional specification.

Question 12

An airline frequent flyer scheme provides rewards based on the mileage flown. Every route or leg of a route attracts loyalty points based on the mileage associated with that route, which is calculated to the nearest 10 miles. Mileage is added to a frequent flyer's account within 10 days of a completed flight. Frequent flyers can hold accounts at the 'blue', 'silver' or 'gold' level. Rewards include ticket upgrades, free tickets and promotion from one colour of card to a higher one. A ticket upgrade requires a minimum of 1000 miles, a free ticket requires 10,000 miles and card upgrades are automatically triggered when the holder has completed 100,000 miles since the previous upgrade.

Which of the following would be suitable for boundary value tests on this system?

- a. 990, 1000, 9990, 10,000, 99,990, 100,000
- b. 999, 1000, 9999, 10,000, 99,999, 100,000
- c. 999, 1001, 9999, 10,001, 99,999, 100,001
- d. 900, 1000, 9900, 10,000, 99,900, 100,000

Question 13

How does software testing contribute to the quality of delivered software?

- a. By detecting and removing all the defects in the delivered code and ensuring that all tests adhere to the quality standards set for the project.
- b. By measuring reliability of the software and ensuring that it is always above 99.99 per cent.
- c. By detecting all deviations from coding good practice and ensuring that these are corrected.
- d. By identifying root causes of defects from past projects and using lessons learnt to improve processes and thus help to reduce the defect count.

Question 14

Which of the listed roles matches the listed activities?

1. Moderator.
 2. Scribe.
 3. Reviewer.
 4. Manager.
- A. Sets timescales for individual preparation.
 - B. Allows time for reviews in project schedule.
 - C. Ensures that actions are noted.
 - D. Notes defects as part of individual preparation.
- a. 1–A; 2–B; 3–C; 4–D
 - b. 1–A; 2–C; 3–D; 4–B
 - c. 1–B; 2–C; 3–D; 4–A
 - d. 1–B; 2–C; 3–A; 4–D

Question 15

Which of the following are benefits provided by configuration management to testing?

- i. The integrity of work-products can be maintained.
 - ii. All testware items are uniquely identified.
 - iii. Defect reports are raised.
 - iv. Defect fixes are matched to code versions.
 - v. The test plan is signed off.
- a. i, iii and v.
 - b. i, ii and iv.
 - c. iii, iv and v.
 - d. i, ii and iii.

Question 16

Which of the following test case design techniques is structure-based?

- a. State transition testing.
- b. Decision table testing.
- c. Boundary value analysis.
- d. Decision testing.

Question 17

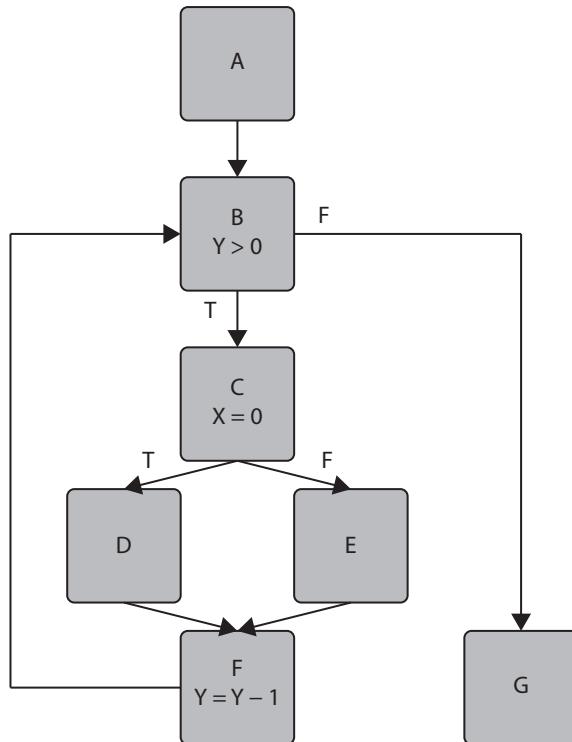
Which of the following is a type a defect easier to find in a review than in a dynamic test?

- a. The price of a product incorrectly displayed.
- b. A system which is running too slowly.
- c. A hacker gaining access to customer details.
- d. Code which does not meet the required coding standards.

Question 18

Consider the control flow below.

Figure A1.3 Control flow diagram for question 18



Which of the following sets of test cases would achieve 100 per cent decision coverage?

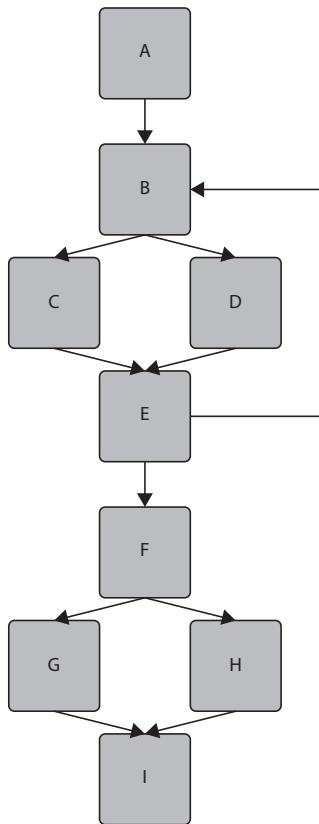
- a. $X = 0, Y = 1; X = 1, Y = 1$
- b. $X = 1, Y = 0; X = 2, Y = 1$
- c. $X = 1, Y = 1; X = 2, Y = 1$
- d. $X = 0, Y = 0; X = 1, Y = 1$

Question 19

Consider the following flow graph.

One of the goals for the project is to achieve 100 per cent statement coverage and 100 per cent decision coverage. The following three tests have been executed:

- Test A covers path ABCEFGI.
- Test B covers path ABCEBDEFGI.
- Test C covers path ABDEFHI.

Figure A1.4 Flow graph for question 19

Which of the following statements related to the coverage goal is correct?

- a. The statement testing coverage goal has been achieved, but not the decision coverage goal
- b. Neither the statement testing coverage goal nor the decision coverage goal has been achieved.
- c. Both the statement testing coverage goal and the decision coverage goal have been achieved.
- d. The statement testing coverage goal has not been achieved, but the decision coverage goal has been achieved.

Question 20

Which of the following statements correctly describes the defect clustering testing principle?

- a. Testing should be targeted at the most junior developer's code. This is where most defects will occur.
- b. If no defects are found in the first 25 per cent of the time available, the code can be deemed safe to deliver to production.
- c. Testing effort is to be targeted at what is thought to be the riskiest areas, and later those areas where there are more defects found.
- d. Finding and fixing defects does not help if the system built is unstable and does not match user needs/expectations.

Question 21

Which of the following statements are true?

- i. Functional testing includes specification-based testing.
 - ii. The purpose of structural testing is to test non-functional requirements.
 - iii. Both functional and structural testing can be carried out at all test levels.
 - iv. Functional testing is the same as regression testing.
- a. i and ii.
 - b. ii and iii.
 - c. i and iv.
 - d. i and iii.

Question 22

Which of the following provides the best match of activity to resulting document?

- 1. To prepare test cases.
 - 2. To determine the order in which test cases should be run.
 - 3. To determine the time required to execute tests.
 - 4. To highlight outstanding high priority defects.
- A. Test plan.
 - B. Test design specification.
 - C. Test procedure specification.
 - D. Test summary report.
- a. 1–A, 2–B, 3–C, 4–D
 - b. 1–B, 2–C, 3–A, 4–D
 - c. 1–C, 2–B, 3–D, 4–A
 - d. 1–B, 2–A, 3–C, 4–D

Question 23

Which of the following are benefits of static analysis?

- i. Improved maintainability of code.
 - ii. Identification of highly complex code.
 - iii. Finding defects by executing code.
 - iv. Finding defects before test execution.
 - v. Better system design documentation.
- a. i, iii and iv.
 - b. ii, iii and v.
 - c. i, ii and v.
 - d. i, ii and iv.

Question 24

Why is it important to have test case design techniques based on the tester's experience?

- a. Because experience-based techniques are more effective than specification-based techniques at finding functional defects.
- b. Because experience-based techniques are more effective than structure-based techniques at finding defects in code.
- c. Because experience-based techniques can be used when no specifications are available or when specifications are not detailed enough.
- d. Because users with knowledge of the system under tests are always better at finding defects than testers with no experience of the system under test.

Question 25

Which of the following matches the activity to its most suitable type of tool?

- 1. Managing test assets.
 - 2. Analysis of code structure.
 - 3. Simulating the interface of a component.
 - 4. Generation of test cases.
- A. Test design tool.
 - B. Test harness.
 - C. Configuration management.
 - D. Static analysis tool.
- a. 1-D, 2-B, 3-C, 4-A
 - b. 1-C, 2-A, 3-D, 4-B
 - c. 1-C, 2-D, 3-B, 4-A
 - d. 1-A, 2-C, 3-D, 4-B

Question 26**Which of the following test tools are mainly used by developers?**

- a. Monitoring tools.
- b. Dynamic analysis tools.
- c. Review tools.
- d. Incident management tools.

Question 27**Which of the following is a scripting technique used with test execution tools?**

- a. Using a unit test framework.
- b. Use of data-driven tests.
- c. Validation of object modules.
- d. Use of a test oracle.

Question 28**Which of the following gives the *most* independence in testing?**

- a. Test designed by a fellow member of the design team.
- b. Tests designed by a different organisation.
- c. Tests designed by a different group within the organisation.
- d. Tests designed by the code author.

Question 29

Consider the following:

- A test project is underway.
- There are five high priority test cases (TC1–TC5) and two test environments (TE1 and TE2).
 - TC1, TC3 and TC5 require use of TE1.
 - TC2 and TC4 require use of TE2.
 - TC1 requires TC2 to be run first.
 - TC2 must be run after TC4.
 - TC3 must be run after TC5.
- Testing will take place over two days.
 - TE2 will be ready on day 1 and TE1 on day 2.

Which of the following accurately reflects the order in which tests should be run over the two days?

- a. TC4, TC2, TC1, TC5, TC3
- b. TC2, TC4, TC1, TC5, TC3
- c. TC4, TC2, TC1, TC3, TC5
- d. TC1, TC3, TC5, TC2, TC4

Question 30

Which of the following is the best description of maintenance testing?

- a. It is a form of non-functional testing and focuses on maintainability of the code.
- b. It is carried out on an operational system after changes have been made.
- c. It is a form of regression testing and checks the impact of code changes.
- d. It uses impact analysis to decide how much regression to do at acceptance testing after a fix has been implemented.

Question 31

Which of the following correctly identifies a reason for writing test cases based on knowledge about common defects?

- a. Testers can use their knowledge of how the system is specified to construct systematic test cases.
- b. Users can make use of their experience of using other software to help them decide how the software should work.
- c. Testers can anticipate where defects are most likely to be found and direct tests at those areas.
- d. Users can create specification-based tests from their knowledge of how the software performs.

Question 32

Which of the following is a product risk?

- a. The product may not be ready on time.
- b. A calculation may not be performed correctly.
- c. The team may not be properly trained.
- d. The agreed contract may increase our costs.

Question 33

Which of the following statements best describes the role of testing?

- a. Testing ensures that the right version of code is delivered.
- b. Testing can be used to assess quality.
- c. Testing improves quality in itself.
- d. Testing shows that the software is error free.

Question 34

Which of the following would improve how a tool is deployed within an organisation?

- i. Ensure the test process is not changed as a result of the tool's implementation.
 - ii. Define best practice guidelines for users.
 - iii. Roll out the tool across the organisation as quickly as possible to all users.
 - iv. Introduce a system to monitor tool usage and user feedback.
 - v. Provide technical support to the test team for each type of tool.
- a. i, ii and iv.
 - b. i, iii and v.
 - c. ii, iv and v.
 - d. iii, iv and v.

Question 35

Which of the following are potential drawbacks of independent testing?

- i. Testers can offer an unbiased view.
 - ii. Testers may become isolated from development.
 - iii. Testing processes may be seen as bottlenecks.
 - iv. Developers may assume less responsibility for software quality.
 - v. Testers may be able to verify assumptions made.
- a. ii, iii and iv.
 - b. i, ii and v.
 - c. ii, iv and v.
 - d. i, iii and iv.

Question 36

Which of the following would be best carried out as part of operational acceptance testing?

- a. Testing that the business considers the system fit for purpose.
- b. Testing that the system meets the required regulatory standards.
- c. Testing that potential customers would buy the system.
- d. Testing that system can be recovered after a disaster.

Question 37

Which of the following best describes metrics-based and expert-based approaches to test estimation?

- a. Metrics-based estimation requires test points to be counted; expert-based uses the judgement of the tester.
- b. Metrics-based estimation requires use of data from previous similar projects; expert-based uses the judgement of the senior developer.
- c. Metrics-based estimation requires use of a work-breakdown structure; expert-based uses the judgement of the tester.
- d. Metrics-based estimation requires use of data from previous similar projects; expert-based uses the judgement of the tester.

Question 38

Which of the following statement pairs correctly describes testing and debugging?

- a. Testing is the process of fixing defects; debugging is undertaken by developers.
- b. Debugging identifies and fixes the cause of failures; testing identifies failures.
- c. Formal testing is usually undertaken by the development team; debugging is performed before any testing has taken place.
- d. Testing aims to assess the quality of the software; debugging assesses whether fixes have been correctly applied.

Question 39

Which of the following is a characteristic of good testing in any life cycle model?

- a. Testers should be involved in reviewing relevant documents early.
- b. Testing should begin when the requirements have been captured fully.
- c. When buying a commercial-off-the-shelf product, all levels of testing must always be carried out by the buyer.
- d. Test analysis and design should be carried out once the system has been built.

Question 40

Which of the following would be a suitable metric for monitoring test execution?

- a. Percentage of planned test cases prepared.
- b. Percentage of work done in test environment preparation.
- c. Percentage of tests cases passed.
- d. Test coverage of requirements.

A2 MOCK CTFL EXAMINATION ANSWERS

Q1	b	Q11	d	Q21	d	Q31	c
Q2	b	Q12	a	Q22	b	Q32	b
Q3	c	Q13	d	Q23	d	Q33	b
Q4	a	Q14	b	Q24	c	Q34	c
Q5	c	Q15	b	Q25	c	Q35	a
Q6	b	Q16	d	Q26	b	Q36	d
Q7	d	Q17	d	Q27	b	Q37	d
Q8	b	Q18	a	Q28	b	Q38	b
Q9	c	Q19	c	Q29	a	Q39	a
Q10	c	Q20	c	Q30	b	Q40	c

A3 MOCK CTFL EXAMINATION COMMENTARY

Question 1

This is a K1 question relating to Learning Objective CTFL-1.2.1 – Recall the common objectives of testing.

Testing identifies defects, but it neither locates them in the code (which rules out option a) nor debugs or corrects them (which rules out option d). Both of these activities are the responsibility of developers, once any defects have been identified. Testing cannot ensure that no defects are present (which rules out option c) – in fact this is one of the seven testing principles identified in the syllabus. This leaves option b as the correct response. As a quick cross-check, preventing defects is given as a testing objective in section 1.2 of the syllabus.

Question 2

This is a K2 question relating to Learning Objective CTFL-4.1.3 – Evaluate the quality of test cases in terms of clear traceability to the requirements and expected results.

A good test case must incorporate the expected results (iii) and should be traceable back to the requirements (i) (which is option b). Referencing the current version of the requirements is important but does not, in itself, provide traceability (i). Test cases are generated before test procedures and test execution schedules, so (iv) is incorrect. Identifying the author of a test case does not, in itself, affect quality (v).

Question 3

This is a K2 question relating to Learning Objective CTFL-2.1.1 – Explain the relationship between development, test activities and work-products in the development life cycle by giving examples using project and product types.

Option a is a requirement of a linear model such as the V-model only, not iterative models, which allow for requirements to be changed throughout development.

Option b is a requirement of iterative models to allow the user representatives to try the system out early. Linear models expect the system to be delivered at the end of the process.

Option c is the correct answer.

Option d is incorrect because neither model stipulates the required levels of testing. The V-model representations often show four design activities on the left matched by four testing activities on the right, but this is not mandatory.

Question 4

This is a K3 question relating to Learning Objective CTFL-4.3.1 – Write test cases from given software models using equivalence partitioning, boundary value analysis, decision tables and state transition diagrams/tables.

The valid input partitions would be ≥ 18 years of age, score ≥ 60 in the certification exam, ≥ 2 years of experience as a developer. These three valid input partitions can generate all valid outputs and any other input partitions would be invalid partitions, so option a is the correct answer.

Question 5

This is a K2 question relating to Learning Objective CTFL-4.3.2 – Explain the main purpose of each of the four testing techniques, what level and type of testing could use the technique, and how coverage may be measured.

Option a is incorrect because use cases model process flow, but do not model the detail of business rules, which would be decision table testing.

Option b is incorrect because alternative scenarios are not always included and they test alternative paths through the process flow not what happens when a component fails.

Option d is incorrect because use cases do not model all inputs and outputs, which would be equivalence partitioning.

This leaves option c, which correctly states that 'Use cases are good for defining user acceptance tests with user participation'. This is a common way of tackling user acceptance testing.

Question 6

This is a K3 question relating to Learning Objective CTFL-5.6.2 – Write an incident report covering the observation of a failure during testing.

The information provided covers most of the key areas of an incident report, but more detail would help the initial investigation. All of the five additional items suggested would add some value, with the possible exception of item (i), which will be valuable for later analysis, but is not really needed for initial investigation. Item (iv), test tools used, is also not essential for an initial investigation. The other three items are important because they provide more detail about the failure and provide a guide to the urgency of the investigation. Option b is the only one that lists all these three key pieces of information.

Question 7

This is a K2 question relating to Learning Objective CTFL-1.2.3 – Differentiate testing from debugging.

Of the statements about testing, (i) is better than (ii) because it relates to removing defects before failures are detected. Of the statements about debugging, (v) is better than (iv) because it relates to removing causes of failure rather than simply removing defects as they are found. Item (iii) relates to another aspect of testing, so is not directly relevant to the question. The **best** combination is therefore (i) and (v) – option d – because it combines the best descriptions of testing and debugging in the list.

Question 8

This is a K3 question relating to Learning Objective CTFL-4.3.1 – Write test cases from given software models using equivalence partitioning, boundary value analysis, decision tables and state transition diagrams/tables.

The sequence of inputs would take the system through the following sequence of states. From Neutral, 'D' would transition to state 1, then '+' would transition to state 2, another '+' would transition to state 3, the 'N' would return the system to the Neutral state and the final '-' would have no effect. This sequence is provided by option b.

The main distracter is option c, which assumes, incorrectly, that a '-' from state 'Neutral' would transition to state 1.

Question 9

This is a K3 question relating to Learning Objective CTFL-4.3.1 – Write test cases from given software models using equivalence partitioning, boundary value analysis, decision tables and state transition diagrams/tables.

From the state transition table the nine entries with a X indicate non-valid transitions and the answer is therefore 9 (option c). The same information can be gleaned from the diagram by applying every possible event to every possible state and counting those that do not achieve a state transition.

Question 10

This is a K1 question relating to Learning Objective CTFL-4.2.1 – Recall reasons that both specification-based (black-box) and structure-based (white-box) test design techniques are useful and list the common techniques for each.

Option a is incorrect because specification-based techniques do have associated coverage measures, as do structure-based techniques.

Option b is incorrect because structure-based techniques can be used to test any programmatic aspects of software, such as menus.

Option d is incorrect because, while it is true that neither provides opportunities for using experience in deriving tests, this is a reason for a third class of test design techniques based on experience rather than a reason to use both specification-based and structure-based techniques.

Option c is correct because each technique is effective for certain classes of defect so that they complement each other.

Question 11

This is a K2 question relating to Learning Objective CTFL-2.2.1 – Compare the different levels of testing: major objectives typical objects of testing, typical targets of testing (e.g. functional or structural), and related work-products, people who test, types of defects and failures to be identified.

Option a would be a test basis for unit testing.

Option b would also be a test basis for unit testing.

Option c is incorrect because coding standards are used by the developers when programming and would not form a test basis for any testing.

Option d is the correct answer because it defines the system functionality.

Question 12

This is a K3 question relating to Learning Objective CTFL-4.3.1 – Write test cases from given software models using equivalence partitioning, boundary value analysis, decision tables and state transition diagrams/tables.

The system has a precision of ± 10 miles, so boundary values need to be 10 miles above or below the boundary.

Option a takes the lower boundary value to be 10 miles below the actual boundary in each case, which is correct.

Option b takes the lower boundary values to be 1 mile below the boundary, but this is a higher precision value than the system can generate.

Option c also adds 1 to the boundary values, so is still incorrect.

Option d takes the precision to be ± 100 instead of 10.

Question 13

This is a K2 question relating to Learning Objective CTFL-1.1.4 – Describe why testing is part of quality assurance and give examples of how testing contributes to higher quality.

All of the options have some element of truth about them, but correct statements are combined with falsehood except in the correct response.

Option a states that testing is about 'detecting and removing all the defects', but testing cannot necessarily find all defects, and is not about correcting defects that are found. In any event, the risk may be considered so small that correction is considered unnecessary in some cases.

Option b suggests that testing can contribute to quality by measuring reliability, which is correct, but it also asserts that reliability should be always over 99.99 per cent, which is not correct and is not mentioned in the syllabus.

Coding standards (option c) are also not mentioned in syllabus section 1.1.4 but, even if they were, some deviations from coding standards may not be deemed necessary to correct and testing is about discovery, not correction.

This leaves option d. Testing enables root causes of defects to be found, which makes it possible to reduce defect counts by applying lessons learned. So option d is the only response that makes a correct assertion and does not also contain a false statement about testing.

Question 14

This is a K2 question relating to Learning Objective CTFL-3.2.2 – Explain the differences between different types of review: informal review, technical review, walkthrough and inspection.

The roles of moderator and manager are similar in that they are both coordinating roles. A moderator manages the review activity, including the setting of timescales for individual preparation – so role 1 relates to activity A. Role 2 is the note taker, which relates to activity C. Role 3 carries out the review of the document and will note defects found, so it relates to activity D. Role 4 is the role which decides that formal reviews will be conducted, so it relates to activity B. Option b is therefore the correct answer.

Question 15

This is a K2 question relating to Learning Objective CTFL-5.4.1 – Summarise how configuration management supports testing.

Item (iii) is part of incident management and item (v) is part of test planning, so options a, c and d are incorrect because they contain either item (iii) or item (v) or both.

Option b contains items (i), (ii) and (iv), all of which are correct, so it is the correct answer.

Question 16

This is a K1 question related to Learning Objective CTFL-4.2.1 – Recall reasons that both specification-based (black-box) and structure-based (white-box) test design techniques are useful and list the common techniques for each.

Options a, b and c are all specification-based test case design techniques.

Options a and c can both distract a candidate who is not certain which techniques are structure-based because they sound 'technical'.

Option b can distract because its name is similar to decision testing even though the technique is very different.

Question 17

This is a K2 question relating to Learning Objective CTFL-3.1.3 – Explain the difference between static and dynamic techniques.

Option a will be detected during functional testing.

Option b will be detected during non-functional testing.

Option c is related to security testing.

Option d can be found during a review because the code can be checked against the coding standards.

Question 18

This is a K3 question relating to Learning Objective CTFL-4.4.3 – Write test cases from given control flows using statement and decision test design techniques.

Option a would take path ABCEFBG and then ABCDFBG to achieve 100 per cent decision coverage, and is the correct answer.

Option b would take ABG and then ABCDFBG to achieve 75 per cent decision coverage.

Option c would take ABCDFBG and then ABCDFBG again to achieve 75 per cent decision coverage.

Option d would take ABG and then ABCDFBG to achieve 75 per cent decision coverage.

Question 19

This is a K3 question relating to Learning Objective CTFL-4.4.3 – Write test cases from given control flows using statement and decision test design techniques.

Test A covers one exit from B, one exit from E and one exit from F.

Test B covers both exits from B and E, but only one exit from F (the same as covered by Test A).

Test C covers one exit from B, one exit from E and the second exit from F.

So the three tests cover both exits from each of the three decisions in the control flow graph and therefore 100 per cent decision coverage is achieved. One hundred per cent decision coverage guarantees 100 per cent statement coverage, so option c is correct.

Question 20

This is a K2 question relating to Learning Objective CTFL-1.3.1 – Explain the seven principles in testing.

Option c is the best statement of the defect clustering principle – defects are often found in the same places, so testing should focus first on areas where defects are expected or where defect density is high.

Option a appears to reflect the defect clustering principle, but there no reason to assume that defect clustering will be associated with the work of the most junior developer.

Option b is an example of the 'absence of errors' fallacy – the fact that no errors have been found does not mean that code can be released into production.

Option d is a direct statement of the 'absence of errors' fallacy.

Question 21

This is a K1 question relating to Learning Objective CTFL-2.3.2 – Recognise that functional and structural tests occur at any test level.

Item (i) is correct – specification-based testing is one technique appropriate to functional testing.

Item (ii) is incorrect – the purpose of structural testing is not to test non-functional requirements but to test structural aspects of software, such as program code and menu structures.

Item (iii) is correct as stated in the syllabus.

Item (iv) is incorrect – regression testing may be functional in nature, but its purpose is to test that changes to software have not introduced new defects, so the terms functional testing and regression testing do not have the same meaning.

Items (i) and (iii) are correct, which leads to option d being the correct answer.

Question 22

This is a K2 question relating to Learning Objective CTFL-5.2.2 – Summarise the purpose and content of the test plan, test design specification, test procedure and test report documents according to IEEE Std. 829 – 1998.

Item 1 is an activity leading to a test design specification (B).

Item 2 is an activity leading to a test procedure specification (C).

Item 3 is an activity leading to a test plan (A).

Item 4 is an activity leading to a test summary report (D).

Option b is the required combination.

Question 23

This is a K2 question relating to Learning Objective CTFL-3.3.2 – Describe, using examples, the typical benefits of static analysis.

The purpose of static analysis is to analyse code prior to execution. This applies to items (i), (ii) and (iv). Option d is therefore the correct answer.

Item (iii) is a benefit of test execution, while item (v) is a benefit of reviews rather than static analysis (note that reviews are also a static technique, but distinct from static analysis).

Note also that items (ii) and (iv) apply to reviews as well as to static analysis.

Question 24

This is a K1 question relating to Learning Objective CTFL-4.5.1 – Recall reasons for writing test cases based on intuition, experience and knowledge about common defects.

Option a suggests that experience-based techniques are more effective than specification-based techniques at finding functional defects, which is not true; experience-based techniques are good at complementing the systematic tests derived from specifications.

Option b suggests that experience-based techniques are more effective than structure-based techniques at finding defects in code. This is not true, though experience can usefully supplement structure-based tests.

Option d suggests that users are better at finding defects than testers with no experience of the system under test. This is not always true, though it may sometimes be true.

This leaves option c, which correctly states that experience-based tests are needed ‘Because experience-based techniques can be used when no specifications are available or when specifications are not detailed enough’.

Question 25

This is a K2 question relating to Learning Objective CTFL-6.1.1 – Classify different types of test tools according to the activities of the fundamental test process and the software life cycle.

A configuration management tool (C) enables assets to be managed (whether code, documents or test plans) (1).

A test design tool (A) enables tests to be created, from the information provided (4).

Static analysis tools (D) look at software code, and examine ('test') it without executing it; the purpose is to identify any aspect of the code that will cause the program to malfunction when executed (2).

A test harness (B) provides an interface that is identical to that of a software program (which might not have been written yet) to allow programs that will interface with that program to be tested (3).

The only option that contains this set of relationships is option c.

Question 26

This is a K1 question relating to Learning Objective CTFL-6.1.1 – Classify different types of test tools according to the activities of the fundamental test process and the software life cycle.

Tools mainly used by developers are marked by a 'D' in the syllabus, and the only one so indicated is option b. This type of tool is used to search for memory lost, for example, and is used by staff during the development stages.

Option a, monitoring tools used to monitor system resources and network traffic, are mainly used when the whole system comes together and basic functionality is present, so they are used widely by testers.

Option d, incident management tools, are used to record and monitor defects and incidents and are used extensively by testers.

Option c, review tools are used during the review process by anyone undertaking a review and are not limited to software developers.

Question 27

This is a K1 question relating to Learning Objective CTFL-6.2.2 – Remember special considerations for test execution tools, static analysis and test management tools.

A unit test framework (option a) may or may not be used to facilitate unit testing, but this is not a scripting technique.

Option c is useful to ensure that the correct modules and the correct versions of modules are available for testing. This is not a scripting technique.

A test oracle (option d) would be used to identify expected results, but this is not a scripting technique.

Option b is the only scripting technique.

Question 28

This is a K1 question relating to Learning Objective CTFL-1.5.1 – Recall the psychological factors that influence the success of testing.

The options are taken directly from the syllabus, section 1.5, where the answers are listed in ascending order of independence. The order is, from low to high:

- Code author (option d).
- A fellow member of the design team (option a).
- A different group in the **same** company (option c).
- Someone from a different organisation (option b).

Question 29

This is a K3 question relating to Learning Objective CTFL-5.2.5 – Write a test execution schedule for a given set of test cases, considering prioritisation, technical and logical dependencies.

- TE2 will be available on day 1.
- Test cases requiring TE2 are TC2 and TC4.
- TC2 must be run after TC4.

Thus our first two test cases in order are TC4 and TC2.

- On day 2 TC1, 3 and 5 can be executed.
- TC3 must be run after TC5.

The question does not make clear when TC1 should be run. However, the only option with an order of TC4, TC2, TC5 and TC3 is option a, so this is the correct answer.

Question 30

This is a K1 question relating to Learning Objective CTFL-2.4.2 – Recognise indicators for maintenance testing (modification, migration and retirement).

Option a is incorrect because non-functional testing can include tests for maintainability of the code, but this is not the focus of maintenance testing.

Option b is the correct answer as defined in the syllabus.

Option c is incorrect because regression testing forms a key part of maintenance testing to check for unintended changes after modifications have been performed, but maintenance testing is not just a form of regression testing.

Option d is incorrect because maintenance testing does indeed use impact analysis to decide how much regression to do, but after the system has gone live, not during user acceptance testing (i.e. before the system has gone live).

Question 31

This is a K1 question relating to Learning Objective CTFL-4.5.1 – Recall reasons for writing test cases based on intuition, experience and knowledge about common defects.

Option a is a definition of specification-based testing, which is a formal approach.

Option b is not true in that knowledge of how other software works does not translate into a new system.

Option d is invalid in that knowledge of how software performs does not enable users (or anyone else) to create specification-based tests; this would need access to a specification.

This leaves option c, which correctly states that 'Testers can anticipate where defects are most likely to be found and direct tests at those areas'. The tests are prioritised using the testers' intuition, knowledge and experience.

Question 32

This is a K1 question relating to Learning Objective CTFL-5.5.3 – Distinguish between the project and product risks.

Options a, c and d are project risks: option a is a risk to project schedule; option c is a risk to project completion; option d is a risk to project cost.

Option b is the correct answer; an incorrect calculation would cause the product to fail.

Question 33

This is a K2 question relating to Learning Objective CTFL-1.1.3 – Give reasons why testing is necessary by giving examples.

The testing process can state that using a particular version of software, there are no residual risks, but that is not ensuring the correct version is actually implemented. Testing is not responsible for the right version of software being delivered – that is configuration management – so option a is incorrect.

Testing can be used to assess quality, for example by measuring defect density or reliability, so option b is correct.

Testing in itself does not improve quality (option c). Testing can identify defects, but it is in the fixing of defects that quality actually improves.

Testing cannot show that software is error free – it can only shows the presence of defects (this is one of the seven testing principles), which rules out option d.

Question 34

This is a K1 question relating to Learning Objective CTFL-6.3.3 – Recognise that factors other than simply acquiring a tool are required for good tool support. In fact this question is arguably at K2 because it requires selection of multiple correct options, but each of these is based on recall rather than comparison or any other K2 level behaviour. The syllabus content does not support the Learning Objective very effectively.

Two of the five stated answers are explicitly excluded from the list of success factors listed in the syllabus. The syllabus specifically states that process should be adapted to fit with the use of the tool (against answer (i)) and that the tool is rolled out incrementally (against answer (iii)), so any option containing either of these items must be incorrect. As a check, the remaining three items ((ii), (iv) and (v)) are included in the same list in section 6.3 of the syllabus. Option c has the three required answers, and excludes the other two, and is therefore the correct option.

Question 35

This is a K1 question relating to Learning Objective CTFL-5.1.2 – Explain the benefits and drawbacks of independent testing within an organisation.

Items (i) and (v) are benefits of independent testing.

Items (ii), (iii) and (iv) are identified in the syllabus as potential drawbacks of independent testing, so option a is the correct answer.

Question 36

This is a K2 question relating to Learning Objective CTFL-2.2.1 – Compare the different levels of testing: related work-products.

Option a is incorrect because it describes user acceptance testing.

Option b is incorrect because it describes regulatory acceptance testing.

Option c is incorrect because it describes beta testing.

Option d is the correct answer – recovery testing is part of operational acceptance testing.

Question 37

This is a K2 question relating to Learning Objective CTFL-5.2.3 – Differentiate between two conceptually different estimation approaches: the metrics-based approach and the expert-based approach.

In option a, the first statement on metrics-based is incorrect; metrics-based estimation is not based on counting test points, so option a is incorrect.

In option b, the second statement is incorrect because test estimation is not reliant on the opinion of the developer, so option b is incorrect.

In option c, the first statement on metrics-based is incorrect because metrics-based estimation is not based on work-breakdown structures, so option c is incorrect.

Option d is correct because both statements are correct.

Question 38

This is a K2 question relating to Learning Objective CTFL-1.2.3 – Differentiate testing from debugging.

Each option has two parts, and the correct answer will be the option in which both parts are true.

In option a, the first part states that 'Testing is the process of fixing defects', which is false; testing is about identifying defects, but not fixing them. Option a is therefore incorrect.

The first part of option b first part states that 'Debugging identifies and fixes the cause of failures', which is correct. The second part states that 'testing identifies failures', which is also correct. So option b appears to be the correct answer.

As a cross check, we look at options c and d to ensure these are incorrect.

Option c states that 'Formal testing is usually undertaken by the development team; debugging is performed before any testing has taken place.' Both of these statements are incorrect, so option c is incorrect.

Option d states that 'Testing aims to assess the quality of the software; debugging assesses whether fixes have been correctly applied.' The first part of this is correct, but the second part is incorrect, so option d is incorrect.

This confirms that option b is the correct answer.

Question 39

This is a K1 question relating to Learning Objective CTFL-2.1.3 – Recall characteristics of good testing that are applicable in any life cycle model.

Option a is the correct answer.

Option b is incorrect because testing in an iterative model does not require requirements to be captured fully before development or testing begin.

Option c is incorrect because, when buying commercial-off-the-shelf products, the buyer may only need to conduct integration and acceptance testing. The vendor would usually be responsible for the other levels of testing.

Option d is incorrect because test analysis and design should begin during the corresponding development activity.

Question 40

This is a K1 question relating to Learning Objective CTFL-5.3.1 – Recall common metrics used for monitoring test preparation and execution.

Option a is a suitable metric for test case preparation.

Option b is a suitable metric for preparation for test execution.

Option d is a suitable metric for test design.

Option c is the most appropriate metric for test execution.