

# **ISTQB<sup>®</sup> Foundation Level Model-Based Tester**

**Sample Exam  
(Including Answer and Justification)**

Version 2015

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International Software Testing Qualifications Board

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Foundation Level Working Party: 2008 - 2015

Exam Working Party: 2010 - 2015

## Revision History

Version	Date	Remarks
Version beta 1.0	2015/05/08	First beta release
Final release	2015/10/23	Final release

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## 0. Introduction

### 0.1 Purpose of this document

This document contains a full sample exam following the rules described in the ISTQB Foundation Level Exam Structure and Rules document.

The sample questions, answer sets and associated justifications in this document have been created by a team of subject matter experts and experienced question writers with the aim of assisting ISTQB® Member Boards and Exam Boards in their question writing activities as well as people planning to take the ISTQB Foundation Level Model-Based Tester examination.

These questions cannot be used as-is in any official examination, but they should serve as guidance for question writers. Given the wide variety of formats and subjects, these sample questions should offer many ideas for the individual Member Boards on how to create good questions and appropriate answer sets for their examinations. Furthermore training providers can use these questions as part of their training to prepare participants for the examination.

### 0.2 Instructions

The question and answer sets are organized in the following way:

- Learning Objective and K-level
- Question - including when appropriate any scenario followed by the question stem
- Answer Set
- Correct answer – including justification of the answers

## 1. Model-Based Tester Sample Questions

### Question 1 K1

Which one of the following statements is the best definition of model-based testing?

**Answer Set:**

- A. A testing technique using models to generate automated scripts.
- B. A test design technique that uses state transition diagrams to design test cases.
- C. Acceptance testing using business process models.
- D. Testing based on or involving models.

->

Chapter 1 - Term (K1) – Recall the definition of model-based testing according to the ISTQB glossary

**Justification:**

- A. Incorrect. Model-based testing is used to generate manual or automated tests.
- B. Incorrect. Model-based testing supports and automates a large variety of test design techniques, not only state transition testing.
- C. Incorrect. Model-based testing may use a large variety of modeling languages, not only business process modeling.
- D. Correct (see ISTQB glossary).

**Point Value:** 1

### Question 2 K2

A test team has decided to apply an MBT approach for a large banking system project at the system testing level.

Which one of the following statements describes a benefit of MBT you may expect for any kind of project?

**Answer Set:**

- A. MBT implies the generation of test scripts for automated test execution, which will reduce execution time and decrease the number of tester errors during test execution.
- B. The test team creates graphical MBT models and reviews them with business analysts to contribute to a common understanding of the requirements.
- C. The maintenance of the automated test scripts is now fully automated when changes to the MBT models have been done by the test team.
- D. MBT reduces the costs of test design, because the test team applies test selection criteria on existing system design models to generate various test suites covering the project test objectives.

->

FM-1.1.1 (K2) - Describe expected benefits of MBT

**Justification:**

- A. Incorrect. MBT is not equivalent to test automation. It is also possible (and beneficial) to generate test cases for manual test execution.
- B. Correct. A benefit of MBT is to facilitate a shared understanding of requirements between testers and other stakeholders using MBT models.
- C. Incorrect. Maintenance of the generated automated test scripts would also require the maintenance of the test adaptation layer.
- D. Incorrect. Reuse of system design models is possible, but of limited use. In particular, it is not possible to cover all project test objectives without writing a targeted MBT model.

**Point Value:** 1

### Question 3 K2

Which one of the following statements best reflects realistic expectations from introducing MBT into the software development lifecycle?

**Answer Set:**

- A. MBT users do not need to understand test design techniques because test generation with MBT is fully automated.
- B. Carefully introducing changes to the whole test process when introducing MBT, including test team training, helps to obtain measurable progress.
- C. Adding an MBT tool without change in the existing organization and/or test process is an effective approach.
- D. Since reuse of a system design model is possible in MBT, after small investment, the usage of MBT in a development process is almost for free.

->

FM-1.1.2 (K2) - Describe misleading expectations and pitfalls of MBT

**Justification:**

- A. Incorrect. To fulfill project test objectives, testers need to drive MBT test generation and to master test design techniques.
- B. Correct. MBT needs to adapt to the existing test process and organization.
- C. Incorrect. MBT is not just a matter of tooling but impacts the test organization and process.
- D. Incorrect. The reuse of system design models has its limits.

**Point Value:** 1

### Question 4 K2

An MBT approach is used in a project. Which statement below regarding MBT activities is most correct?

**Answer Set:**

- A. MBT modeling activities should start as soon as possible, but not before having finished the detailed system design.
- B. MBT models reflect the system requirements, but do not consider the project test objectives.
- C. MBT activities in a test process should follow a strictly sequential order.
- D. Test selection criteria are used to drive test generation from the MBT model.

->

FM-1.2.1 (K2) - Summarize the activities specific to MBT when deployed in a test process

**Justification:**

- A. Incorrect. Early testing is an important aspect of MBT. In a top-down approach, it is not necessary to know the detailed design of the system under test to start the modeling activities.
- B. Incorrect. MBT models should be developed on the basis of requirements AND project test objectives.
- C. Incorrect. Iterative and incremental development of MBT models is part of good practices in MBT.
- D. Correct. The use of test selection criteria to drive test generation is part of MBT activities.

**Point Value:** 1

## Question 5 K1

Which one of the following items are artifacts that can be generated from an MBT model?

**Answer Set:**

- A. Test basis, test cases and defect reports.
- B. Test cases, test suites and traceability matrix between generated tests and requirements.
- C. Test cases, test suites and test strategy.
- D. Test cases, defect reports and process guidelines.

->

FM-1.2.2 (K1) - Recall the essential MBT artifacts (inputs and outputs)

**Justification:**

- A. Incorrect. Test basis are input to the MBT activities and defect reports cannot be generated from the MBT model.
- B. Correct.
- C. Incorrect. The test strategy is part of the input for MBT.
- D. Incorrect. Defect reports cannot be generated from the MBT model and process guidelines are part of the input for MBT activities.

**Point Value:** 1

## Question 6 K2

Which one of the following statements best reflects the impact of MBT on software development lifecycles?

**Answer Set:**

- A. MBT keeps existing testing roles but it amends their tasks with specific MBT activities.
- B. MBT has no impact on the software development lifecycle.
- C. MBT requires a new role to manage the MBT-specific activities.
- D. MBT requires a separate process independent of the software development lifecycle.

->

FM-1.3.1 (K2) - Explain how MBT integrates into software lifecycle development processes



**Justification:**

- A. Correct. MBT requires new activities for testers but not new roles.
- B. Incorrect. MBT impacts the software development life cycle. It amends the lifecycle with modeling activities.
- C. Incorrect. No new roles are required. Modeling activities require testers to learn new skills and enrich current roles.
- D. Incorrect. MBT integrates well with common variants of sequential and agile lifecycles.

**Point Value:** 1

**Question 7 K2**

Suppose a project team is using use case diagrams for business analysis. Now the project manager proposes model-based testing to improve testing.

Which one of the following statements is the best analysis made by the project manager related to the impact of MBT on requirements engineering (RE) activities?

**Answer Set:**

- A. RE activities will not change. The major impact on RE is the fact that MBT models will support validation of requirements by modeling the system from a testing perspective.
- B. RE activities will not change. The major impact is that requirements analysis is now performed by the skilled MBT analyst replacing the business analyst.
- C. RE activities will not change. The major impact is that MBT models are replacing system development models.
- D. RE activities will change. The requirements analysis activity is not required anymore, because MBT analysis and design is sufficient to analyze the requirements.

->

FM-1.3.2 (K2) - Explain how MBT supports requirements engineering

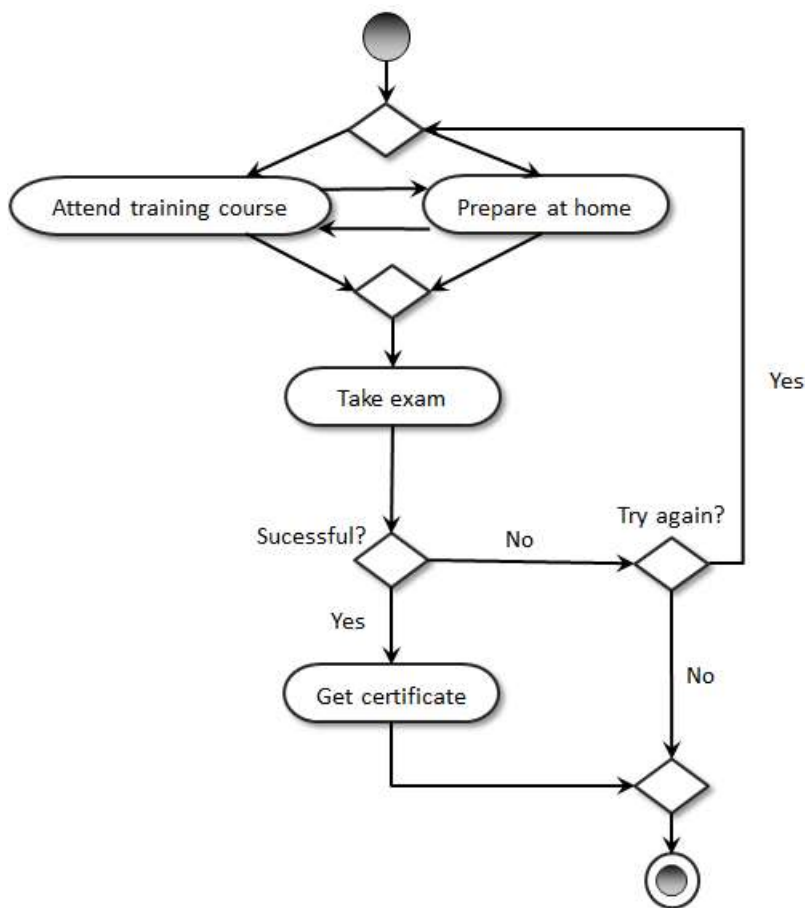
**Justification:**

- A. Correct. RE does not change. In fact RE gets earlier feedback. MBT supports requirements validation early by MBT models made.
- B. Incorrect. RE does not change. MBT analysts do not replace business analysts and do not perform requirements analysis for development, but for testing.
- C. Incorrect. RE does not change. MBT models do not replace system development models, because MBT models cover the project test objectives (which is generally not the case for system development models)..
- D. Incorrect. RE does not change. Requirements Analysis is still required.

**Point Value:** 1

**Question 8 K3**

The given workflow diagram describes an ISTQB certification. It shows the behavior of the exam taker, who attends the training course and/or prepares for the exam at home, then takes the exam and gets the certificate.



Which one of the following statements corresponds to the workflow described in the model?

**Answer Set:**

- A. The exam taker has to attend the training and to prepare individually at home to be able to pass the exam.
- B. After failing the exam, the exam taker willing to repeat the exam has to attend the training course again.
- C. Irrespective of the result, the exam taker may repeat the exam an unlimited number of times.
- D. It is possible to get the certificate without attending the training course.

->

FM-2.1.1 (K3) - Develop a simple MBT model for a test object and predefined test objectives using a workflow-based modeling language

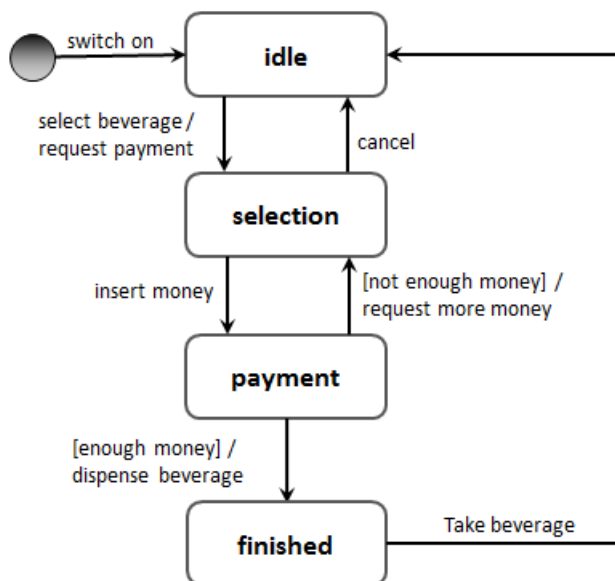
**Justification:**

- A. Incorrect. It is possible to pass the exam without attending a training course or without individual preparation at home.
- B. Incorrect. When repeating the exam, it is also possible to pass the exam without attending a training course or without individual preparation at home.
- C. Incorrect. If the exam taker succeeds the exam, he or she may no longer repeat it.
- D. Correct. It is not necessary to attend the training course prior to the exam.

Point Value: 1

### Question 9 K3

The given state machine shows the behavior of a beverage dispenser, e.g., for soft drinks or coffee. It shows the functional interaction between a user of the dispenser, who can switch the dispenser on and select a beverage, and the dispenser that can request more money if an insufficient amount of money has been inserted. The model should be used for model-based testing of the beverage dispenser.



A reviewer of the model created four comments against the model. Which one of the following comments is correct?

**Answer Set:**

- A. After selecting a beverage and inserting an insufficient amount of money, the model does not require that money is returned.
- B. After selecting the beverage, the user always has to insert an infinite amount of money without getting the selected beverage.
- C. After selecting the beverage and paying for it, the user cannot take the beverage from the dispenser.
- D. After selecting the beverage and canceling the choice, the user has to switch the beverage dispenser on and off again.

->

FM-2.1.2 (K3) - Develop a simple MBT model for a test object and predefined test objectives using a state transition-based modeling language

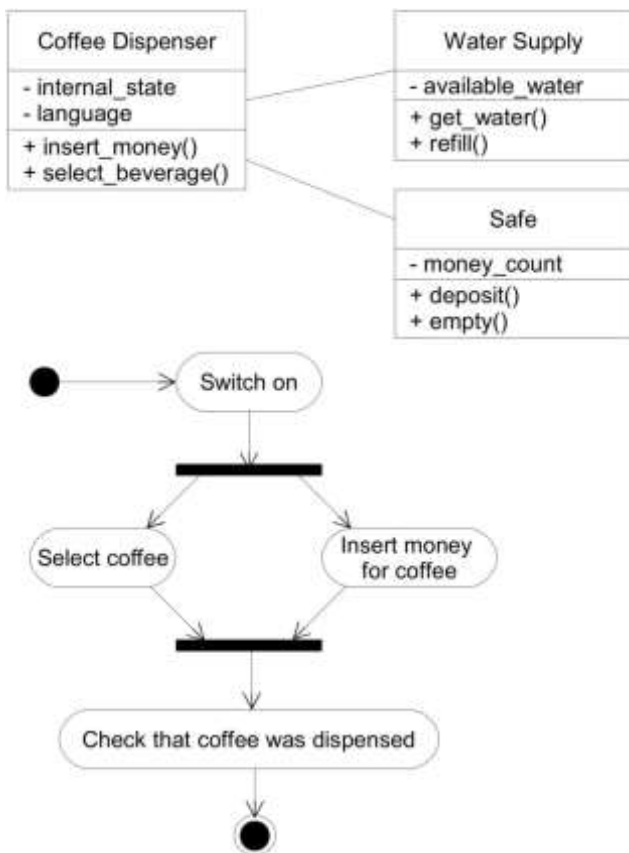
**Justification:**

- A. Correct. An action “/ return money” (or equivalent) missing after “cancel”.
- B. Incorrect. As soon as “[enough money]” is true, the automaton dispenses the beverage.
- C. Incorrect. There is an outgoing transition with the trigger “take beverage” from state “finished”.
- D. Incorrect. The user may select a beverage.

Point Value: 1

Question 10 K2

The following models show two different viewpoints of a coffee dispenser. Please classify the models and select the one correct option below.



Answer Set:

- A. At least one of the models is a structural description of test cases.
- B. At least one of the models is a behavioral description of the system.
- C. At least one of the models is a behavioral description of test cases.
- D. At least one of the models is a structural description of the environment.

->

FM-2.1.3 (K2) - Classify an MBT model with respect to the subject and to the focus

Justification:

The two models are respectively a structural description of the system (class diagram above) and a behavioral description of test cases. The latter one can be recognized by the “check” action. For this reason, only option C is correct.

**Point Value:** 1

## Question 11 K2

Suppose the following test objectives are specified in a project:

TO-1) validate the business workflows.

TO-2) verify whether all system interfaces exist as specified.

TO-3) validate that the system corresponds to the needs of different user profiles.

TO-4) verify the correct implementation of input data ranges.

Which one of the following combinations between test objectives and MBT model subject and focus is correct?

**Answer Set:**

- A. TO-1 requires a structural system model.
- B. TO-2 requires a behavioral test model.
- C. TO-3 requires a behavioral environment model.
- D. TO-4 requires a structural environment model.

->

FM-2.1.4 (K2) - Give examples of how an MBT model depends on the test objectives

**Justification:**

- A. Incorrect. TO-1 requires a behavioral model
- B. Incorrect. TO-2 requires a structural model
- C. Correct. Subject and focus are correct
- D. Incorrect. TO-4 requires a structural system or test model

**Point Value:** 1

## Question 12 K1

In MBT, behavioral models are often used for test generation. Which one of the following diagrams is a behavioral model?

**Answer Set:**

- A. A state transition diagram.
- B. A class diagram.
- C. A deployment diagram.
- D. A package diagram.

->

FM-2.2.1 (K1) - Recall examples of modeling language categories commonly used for MBT

**Justification:**

- A. Correct. This is a UML behavior diagram.
- B. Incorrect. This is a UML structure diagram.

- C. Incorrect. This is a UML structure diagram.
- D. Incorrect. This is a UML structure diagram.

**Point Value:** 1

**Question 13 K1**

You have to test the performance of an IT system and you are asked to recommend a model to derive tests from. Which one would you first recommend?

**Answer Set:**

- A. A usage model, as that model allows representing the prospective usages of the system.
- B. A decision table, as that table allows representing the rule sets of the IT system.
- C. A state diagram, as that model allows representing normal, maximum and overload states of the system.
- D. A feature model, as that model allows representing non-functional requirements.

->

FM-2.2.2 (K1) - Recall typical representatives of modeling language categories relevant for different systems and project objectives.

**Justification:**

- A. Correct. Usage models are well suited as a basis to derive performance tests as they represent typical usages for that system.
- B. Incorrect. Decision tables model logical rules of an IT system, which relate to the functionality of that system, but not to its performance.
- C. Incorrect. State diagrams may be helpful, but they are not the first choice.
- D. Incorrect. Feature models are well suited to represent the variants in the context of a software product line (for example), but they have nothing to do with performance testing.

**Point Value:** 1

**Question 14 K1**

As a reviewer, you have to check whether an MBT model is adequate for the given test objective. How is the corresponding quality criterion defined?

**Answer Set:**

- A. Syntactic quality,
- B. Semantic quality,
- C. Pragmatic quality,
- D. Portability quality.

->

FM-2.3.1 (K1) - Recall quality characteristics for MBT models

**Justification:**

- A. Incorrect. An MBT model may be syntactically correct but inadequate for the given test objective.
- B. Incorrect. An MBT model may be semantically correct but inadequate for the given test objective.

- C. Correct. Pragmatic quality means that the MBT model fits the target.
- D. Incorrect. Portability has nothing to do with adequacy of the MBT model to the test objective.

**Point Value:** 1

**Question 15 K2**

Which one of the following scenarios corresponds to a common mistake MBT newcomers tend to commit?

**Answer Set:**

- A. MBT is used in combination with manual test execution.
- B. The MBT model for system testing tries to describe the system under test in complete detail.
- C. The MBT model is developed on the basis of the test objectives.
- D. Different test suites are generated from the same MBT model with various test selection criteria.

->

FM-2.3.2 (K2) - Describe classic mistakes and pitfalls during modeling activities for MBT

**Justification:**

- A. Incorrect. MBT can be used in combination with either manual or automated test execution.
- B. Correct. The pragmatic aspect of models has been disregarded. The MBT model should focus on the test objective and not aim to be as complete as possible.
- C. Incorrect. Developing the MBT model on the basis of project test objectives is a best practice in model-based testing.
- D. Incorrect. An MBT model can be used to generate several test suites with different test selection criteria.

**Point Value:** 1

**Question 16 K2**

Which one of the following statements about linking requirements to MBT models is most correct?

**Answer Set:**

- A. Linking requirements to models makes it easier to layout the MBT model.
- B. Linking requirements to models makes it possible to generate test cases for selected requirements.
- C. The link between requirements and model elements facilitates root cause analysis in case of errors in the model.
- D. Linking requirements to MBT models facilitates debugging activities at the code level.

->

FM-2.3.3 (K2) - Explain the advantages of linking requirements and process related information to the MBT model

**Justification:**

- A. Incorrect. With increasing number of model elements, it becomes more difficult to keep the model layout readable.

- B. Correct. This linking information is mandatory to be able to generate test cases on the basis of the coverage of selected requirements.
- C. Incorrect. When requirements are linked with model elements, it becomes easier to analyze the impact of requirements changes, but does not support root cause analysis in case of errors in the model.
- D. Incorrect. In principle, code debugging is not specifically facilitated by MBT.

**Point Value:** 1

**Question 17 K2**

In a project regarding the development of a new banking system, a model-based testing approach based on business process modeling with BPMN is used. MBT modeling guidelines are defined for the project.

Which one of the following topics is most probably found in modeling guidelines for such MBT project?

**Answer Set:**

- A. A full description of UML diagrams and model elements.
- B. Proposed modeling patterns for typical business flows.
- C. Naming rules based on the naming conventions defined in coding guidelines.
- D. Sample drafts of test cases relevant for testing the application.

->

FM-2.3.4 (K2) - Explain the necessity of guidelines for MBT

**Justification:**

- A. Incorrect. MBT tools usually take only a subset of an existing modeling language as input. Defining this subset is part of possible MBT modeling guidelines.
- B. Correct. Modeling patterns help to share common structure of MBT models within a team.
- C. Incorrect. MBT modeling guidelines are different from coding guidelines. Syntactical naming rules help foster a similar syntax and semantics of MBT models from various authors, but they should be easy to understand by non-technical stakeholders.
- D. Incorrect. Providing test cases as part of MBT modeling guidelines is not relevant.

**Point Value:** 1

**Question 18 K2**

The reuse of existing design models is usually appreciated by industry as it lowers costs. Consider the following examples where an existing design model shall be used as input to MBT instead of developing completely new MBT models.

Which one of the following examples shows a best-practice reuse of an existing model?

**Answer Set:**

- A. Model-driven engineering was used in the project to automatically derive the implementation of the system from a model. A separate MBT model is not necessary and this model will be reused to generate all test cases to test the system.
- B. A requirements model of the business processes has been developed during the business analysis phase. The test team decided to reuse and adapt it for model-based testing.



- C. A model of the architecture of the system, describing component interaction at a low level, is available from the development team. The test team decided to reuse it in the context of model-based testing for user acceptance testing.
- D. A detailed implementation model was used to derive the implementation of a system. The model is accessible to the MBT tool and can be used to check that the implementation correctly implements the requirements.

->

FM-2.3.5 (K2) - Provide examples where reuse of existing models (from requirements phase or development phase) is or is not appropriate

**Justification:**

- A. Incorrect. If a model is used to automatically generate the code, using it to generate the tests will only test the code generator (which is not the test objective of the project in general).
- B. Correct. If adequate with the test objectives and the MBT tooling, requirements models may be reused and adapted.
- C. Incorrect. A low-level architecture model is a structural model than cannot be reused for user acceptance testing.
- D. Incorrect. A detailed implementation model is, in general, not reusable for MBT because it focuses on implementation information and not on the requirements for test purposes.

**Point Value:** 1

**Question 19 K1**

Consider the following tools supporting the MBT modeling process. Which tool provides support for writing syntactically correct MBT models?

**Answer Set:**

- A. UML modeling tool.
- B. State/transition diagram editor.
- C. Domain-specific language editor.
- D. All of the above.

->

FM-2.3.6 (K1) - Recall tool types supporting specific MBT modeling activities

**Justification:**

A, B and C are specialized model editors that know about the syntax of the modeling language used. Thus, D is the correct answer.

**Point Value:** 1

**Question 20 K2**

Which one of the following statements regarding iterative model development, review and validation is true?

**Answer Set:**

- A. At least some parts of the MBT model must be specified to its final degree of detail, before the stakeholders can perform their first review.
- B. Regular reviews of the MBT model are sufficient to assure that tests generated from the MBT model will fulfill the expectations.
- C. Iterative model development allows the MBT tester to start specifying tests early in the development process.
- D. Validation of the MBT model replaces requirements validation.

->

FM-2.3.7 (K2) - Summarize iterative MBT model development, review and validation

**Justification:**

- A. Incorrect. Especially in a top-down modeling approach, the level of detail is rather low during the first reviews.
- B. Incorrect. MBT models may also become quite complex and pure inspections, especially across different diagrams, are no longer sufficient. Validation of the generated test cases is necessary to ensure that the tests fulfill the expectations.
- C. Correct. Iterative model development allows the MBT tester to start specifying tests early in the development process because that can be done first on a higher level of abstraction.
- D. Incorrect. MBT supports early requirement validation, but does not replace it. The focus of model validation is completely different.

**Point Value:** 1

## Question 21 K1

Which one of the following definitions best describes test selection criteria in the MBT context?

**Answer Set:**

- A. Model-based testers apply test selection criteria to determine the test cases ready for review.
- B. Test selection criteria are specific to MBT, because they are the only possibility to avoid test case explosion.
- C. Model-based testers apply test selection criteria to guide the generation of test cases or to select test cases in order to limit the size of a test suite.
- D. Test selection criteria are part of the test adaption layer for automated test execution in MBT.

->

Chapter 3 - Term (K1) – Recall the definition of test selection criteria according to the ISTQB glossary

**Justification:**

- A. Incorrect. Test selection criteria have nothing to do with reviews.
- B. Incorrect. There are other ways to avoid test case explosion.
- C. Correct (refer to 'test selection criteria' in the ISTQB glossary).
- D. Incorrect. Test selection criteria are neither part of the test adaption layer, not limited to automated test execution.

**Point Value:** 1

**Question 22 K1**

Which one of the following definitions best describes model coverage in the MBT context?

**Answer Set:**

- A. Model coverage characterizes the degree to which model elements are planned to be or have been exercised by a test suite.
- B. Model coverage characterizes the degree to which the previously defined requirements are covered by the MBT model.
- C. Model coverage defines a random coverage of the model expressed as percentage.
- D. Model coverage is a white box test selection criteria measured during test execution.

->

Chapter 3 - Term (K1) – Recall the definition of model coverage according to the ISTQB glossary

**Justification:**

- A. Correct (see ISTQB glossary).
- B. Incorrect. Model coverage refers to the generated test cases (not requirements).
- C. Incorrect. Model coverage is not directly related to random coverage.
- D. Incorrect. In the MBT context, model coverage relates to the MBT model, not to the code.

**Point Value:** 1

**Question 23 K2**

The following list enumerates different statements about MBT test case selection.

- i. The selected tests cover the requirements linked to model elements.
- ii. The selected tests check all transitions in the state diagram except one.
- iii. The selected tests cover specific, previously defined scenarios.
- iv. The selected tests cover all tests that require some specific equipment.
- v. The selected tests check all equivalence partitions defined for a given data domain.
- vi. The selected tests cover all paths through the MBT model.

TWO of them do NOT describe coverage-based test selection. Which ones?

**Answer Set:**

- A. (i) and (ii)
- B. (iii) and (iv)
- C. (v) and (vi)
- D. (ii) and (v)

->

FM-3.1.1 (K2) - Classify the various families of test selection criteria used for test generation from models

**Justification:**

- i. Incorrect. This scenario describes requirement-based test selection.
- ii. Incorrect. This scenario describes a situation, where transition coverage was the aim, but has not been reached.
- iii. Correct. This scenario describes scenario-based test selection.

- iv. Correct. This scenario describes project-driven test selection.
- v. Incorrect. This scenario describes a specific case of data coverage.
- vi. Incorrect. This scenario describes full path coverage.

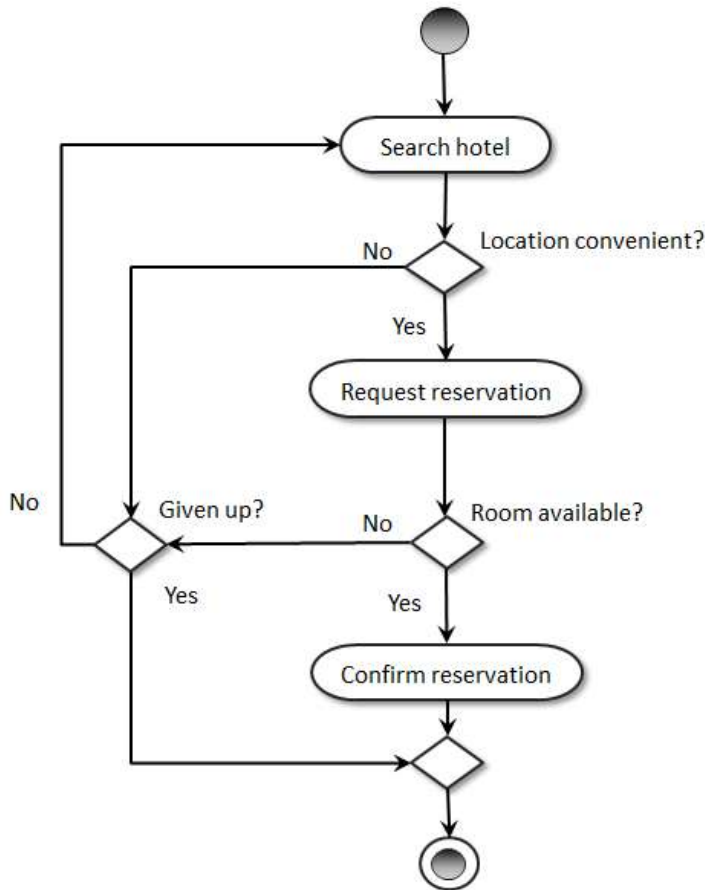
Hence

- A. Incorrect
- B. Correct
- C. Incorrect
- D. Incorrect

Point Value: 1

Question 24 K3

The system under test is an online booking portal. From the MBT model shown in the figure, several sets of test cases can be selected.



What is the minimum number of test cases required to obtain 100% decision coverage?

**Answer Set:**

- A. 1
- B. 2
- C. 3
- D. 4

->

FM-3.1.2 (K3) - Generate test cases from an MBT model to achieve given test objectives in a given context

**Justification:**

- A. Incorrect. There is no way to cover "Room available = yes" and "Given up = yes" in one path.
- B. Correct. It is possible to cover all decision points with two paths (e.g. "Start -> Search hotel (yes) -> Request reservation (yes) -> Confirm reservation (yes) -> End" and "Start -> Search hotel (no) -> Search hotel (yes) -> Request reservation (no) -> End").
- C. Incorrect. It is possible to obtain 100% decision coverage with three test cases, but the minimum number is two.
- D. Incorrect. It is possible to obtain 100% decision coverage with four test cases, but the minimum number is two.

**Point Value:** 1

## Question 25 K2

Which one of the following statements is a typical combination of test selection criteria for an MBT model?

**Answer Set:**

- A. Path coverage on structural models.
- B. Transition coverage on business process models.
- C. Gateway coverage on textual models.
- D. Transition pair coverage on state diagrams.

->

FM-3.1.3 (K2) - Provide examples of model coverage, data-related, pattern- and scenario-based and project-based test selection criteria

**Justification:**

- A. Incorrect. In some sense, it is possible to tests "paths" in structural MBT models by, for example, creating objects of given types (for a class diagram) and check the relations between them defined by the edges. However, this is NOT common practice in industry.
- B. Incorrect. A business process represents business flows, NOT states and transitions.
- C. Incorrect. Gateways are a modeling element used for business process modeling, not for textual models.
- D. Correct. Transition pair coverage is a common criterion for state diagrams.

**Point Value:** 1

**Question 26 K2**

MBT does not replace other test design techniques, but supports them. Which two of the following statements can be considered as correct regarding this support?

- i. It is possible to model boundary values in the MBT model.
- ii. MBT allows the combination of behavioral MBT models with decision tables.
- iii. Use case testing without models is impossible.
- iv. MBT only supports verification activities, but no validation activities.
- v. State machine modeling is the only way to use MBT.

**Answer Set:**

- A. (ii) and (v)
- B. (i) and (iv)
- C. (i) and (ii)
- D. (iii) and (v)

->

FM-3.1.4 (K2) - Recognize how MBT test selection criteria relate to ISTQB Foundation Level test design techniques

**Justification:**

- i. Correct. For example in activity diagrams, each boundary value may be represented by an action.
- ii. Correct. Decision table is part of test design techniques.
- iii. Incorrect. Even if it is always recommended to work with models, use case testing without models is possible.
- iv. Incorrect. MBT supports validation activities very well.
- v. Incorrect. State machine is a possible modeling language for MBT, but not the only one.

Hence

- A. Incorrect
- B. Incorrect
- C. Correct
- D. Incorrect

**Point Value:** 1

**Question 27 K1**

Tooling plays an important role in model-based testing and influences the degree of test artifact generation.

Which one of the following statements regarding automated test artifact generation is most correct?

**Answer Set:**

- A. MBT automatically implies tool-based test artifact generation.
- B. Even in a completely automated MBT approach, some post-processing of the generated test artifacts is required prior to test execution.

- C. Even if a test artifact generator is used, manual test case selection may add value to the test process.
- D. Only test cases can be automatically generated from an MBT model.

->

FM-3.2.1 (K1) - Recall degrees of test artifact generation automation

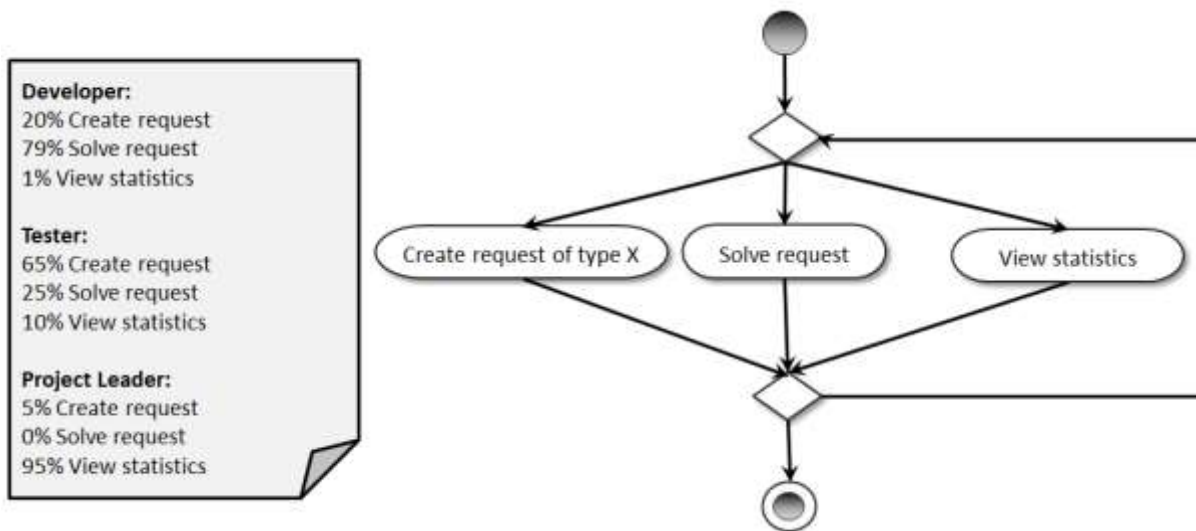
**Justification:**

- A. Incorrect. This is a common misunderstanding. An MBT approach without test generation tools has low maturity, but it is definitely an MBT approach.
- B. Incorrect. In the highest maturity approach, the model is the master and the derived artifacts are used as is without further post-processing.
- C. Correct. A common usage of MBT is to let the tool generate test cases following some coverage criteria and to manually add some specific scenario-based tests.
- D. Incorrect. More artifacts like test scripts or traceability matrix can be automatically generated from an MBT model.

**Point Value:** 1

**Question 28 K3**

The following MBT model describes the main user activities of a change request management system:



**Developer:**  
 20% Create request  
 79% Solve request  
 1% View statistics

**Tester:**  
 65% Create request  
 25% Solve request  
 10% View statistics

**Project Leader:**  
 5% Create request  
 0% Solve request  
 95% View statistics

Which of the following statements regarding test selection criteria is correct?

**Answer Set:**

- A. To test the usage profiles given in the note, stochastic test case selection is not useful.
- B. 100% transition coverage is the best test selection criterion to check the change request management workflow.
- C. Scenario-based test case selection allows you to select specific sequences from the model.
- D. It is possible to achieve 100% requirements coverage with the given information.

->

FM-3.2.2 (K3) - Apply given test selection criteria to a given MBT model

**Justification:**

- A. Incorrect. In the note, the probabilities are given to be used by stochastic test case selection.
- B. Incorrect. The entire model is not really apt to test the workflow.
- C. Correct. Selecting specific paths is exactly the idea of scenario-based test selection. An example for such a scenario is: Create request 1, Solve request 1, Create request 2, Create request 3, Solve request 3, View statistics
- D. Incorrect. We know nothing about the requirements. To apply requirements coverage as selection criterion, we need at least a link to a requirement in the MBT model.

**Point Value:** 1

**Question 29 K2**

Which one of the following statements regarding test selection criteria applied to MBT models in practice is most correct?

**Answer Set:**

- A. In MBT, testers avoid combining test selection criteria.
- B. Combining test selection criteria always decreases the number of test cases.
- C. Combining test selection criteria may increase the number of test cases.
- D. The correct way to combine test selection criteria is to apply full requirements coverage first and then another criterion.

->

FM-3.2.3 (K2) - Describe good practices of MBT test selection criteria

**Justification:**

- A. Incorrect. Combining test selection criteria is a good MBT practice.
- B. Incorrect. This is only true for composition of criteria (intersection).
- C. Correct. We may add the test cases obtained with different test selection criteria to obtain a larger set of test cases, which fits the test objective better.
- D. Incorrect. This is a possible, but not the only way to combine test selection criteria.

**Point Value:** 1

**Question 30 K1**

Which one of the following statements best defines online model-based testing?

**Answer Set:**

- A. A model-based testing approach whereby test cases are generated and executed simultaneously.
- B. The term "Online MBT" covers all model-based testing approaches where the generated test cases are automatically executed.
- C. Online MBT refers to model-based testing approaches using semi-automated tool support.



- D. A model-based testing approach whereby test cases are generated using project-based coverage criteria.

->

Chapter 4 - Term (K1) – Recall the definition of online MBT according to the ISTQB glossary

**Justification:**

- A. Correct (see ISTQB glossary).
- B. Incorrect. Automated test execution is not a specific characteristic of online MBT (with respect to offline MBT).
- C. Incorrect. Online and offline MBT are two different MBT approaches, which differ in the way the test cases are generated. Online MBT requires even more automated tool support than offline MBT.
- D. Incorrect. Online MBT is not specifically related to project-based coverage criteria.

**Point Value:** 1

**Question 31 K2**

A test team decided to use an MBT approach in the context of an HRMS – Human Resources Management System - testing project. They first produce an MBT model reflecting the main business processes with high level business actions, but without detailed test actions and concrete data values.

Which one of the following statements regarding abstract and concrete test cases is most true in this project context?

**Answer Set:**

- A. The test team can generate concrete test cases from this MBT model and execute them automatically without further adaptation.
- B. In order to obtain concrete test cases from this MBT model, additional MBT tools are required.
- C. The generated test cases are sufficiently detailed if executed manually by a certified tester.
- D. The test team can provide a test adaptation layer specification to provide the information required to generate the concrete test cases.

->

FM-4.1.1 (K2) - Explain the difference between abstract and concrete test cases in the MBT context

**Justification:**

- A. Incorrect. The MBT model developed so far in the project does not contain sufficient information to generate concrete test cases for automated execution.
- B. Incorrect. It is possible to add the required information on detailed test actions and data values in the MBT model and to generate concrete test cases using the same MBT tool as before.
- C. Incorrect. It strongly depends on the degree of abstraction of the MBT model, whether an experienced tester will be able to execute the generated test cases. However, the tester qualification has to be domain- (and even project-) specific to enable him or her.
- D. Correct. The adaptation layer specification provides information such as linking high level business actions with completely defined test actions and providing test data values.

**Point Value:** 1

**Question 32 K2**

Which one of the following statements regarding MBT methods for test execution is true?

**Answer Set:**

- A. MBT is not used with manual test execution.
- B. When using offline MBT test execution, generated test cases can be exported to the test management tool.
- C. Online test execution is generally applied with manual test execution.
- D. Offline execution implies test generation and test execution simultaneously.

->

FM-4.1.2 (K2) - Explain the different kinds of test execution in the MBT context

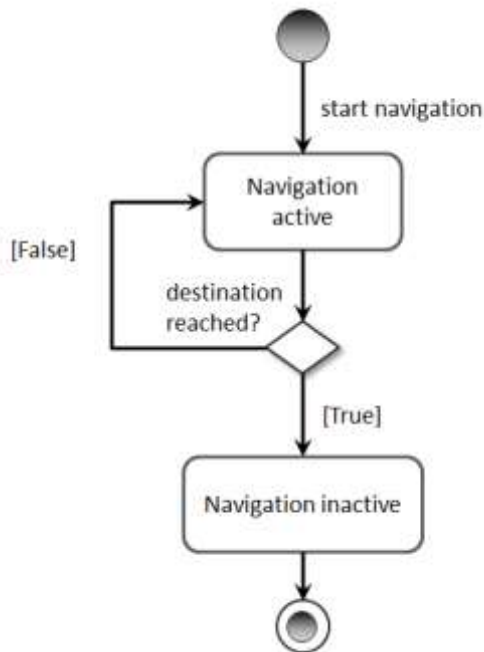
**Justification:**

- A. Incorrect. MBT is used with manual and automated test execution.
- B. Correct. Offline MBT test execution is often linked with exporting of generated tests to the test management tool.
- C. Incorrect. In principle, online test execution cannot be used with manual test execution (because of the large number of tests obtained from the MBT model).
- D. Incorrect. Offline test execution means that the test cases are generated first and executed afterwards.

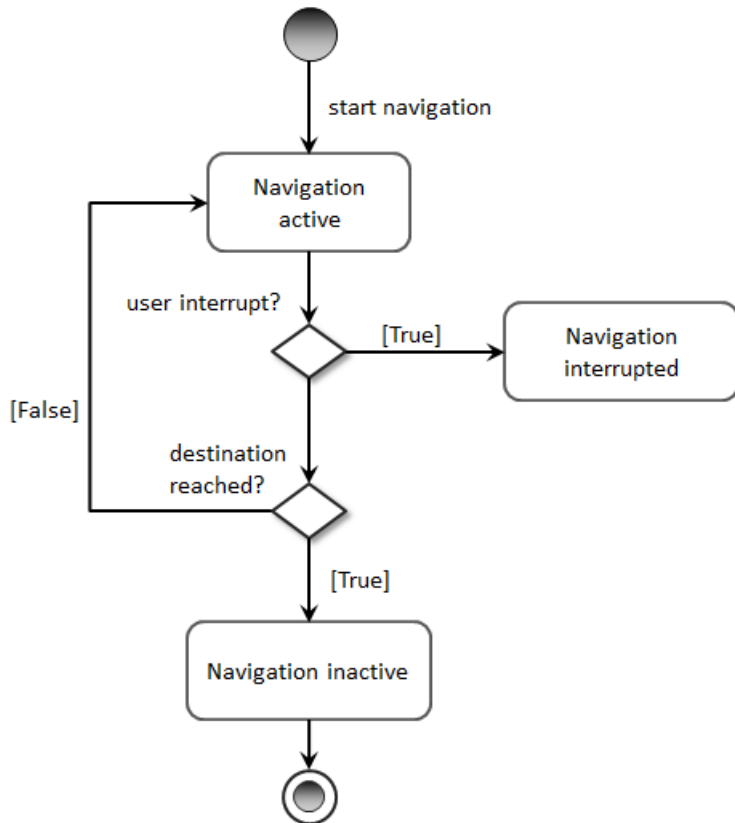
**Point Value:** 1

**Question 33 K3**

The test team created a first version of an MBT model for testing a car navigation system:



Now, a new requirement turned up. It shall be possible to change the destination or to abort the navigation. The test team decided to add a new decision “userInterrupt?”, plus a new state “Navigation interrupted” to the existing MBT model and to connect them by a transition with guard “True”. Therefore, the test team created a second version of the MBT model:



Consider the following adaptations of this second MBT model:

- i. Add a transition “abortNavigation” between the decision “userInterrupt?” and state “Navigation inactive”.
- ii. Add a guard “False” to the transition between the decision “userInterrupt?” and the decision “destination reached?”.
- iii. Add a transition with trigger “abortNavigation” between the new state “Navigation interrupted” and the existing state “Navigation inactive”.
- iv. Add a transition with trigger “changeDestination” between the new state “Navigation interrupted” and the existing state “Navigation active”.
- v. Add a guard “False” to the transition between the state “Navigation active” and the decision “userInterrupt”.

Which one of the following combination of adaptations is correct in order to cover the new requirement in the MBT model?

**Answer Set:**

- A. (i), (ii) and (iii)
- B. (ii), (iii) and (iv)

- C. (iii), (iv) and (v)
- D. (ii), (iii) and (v)

->

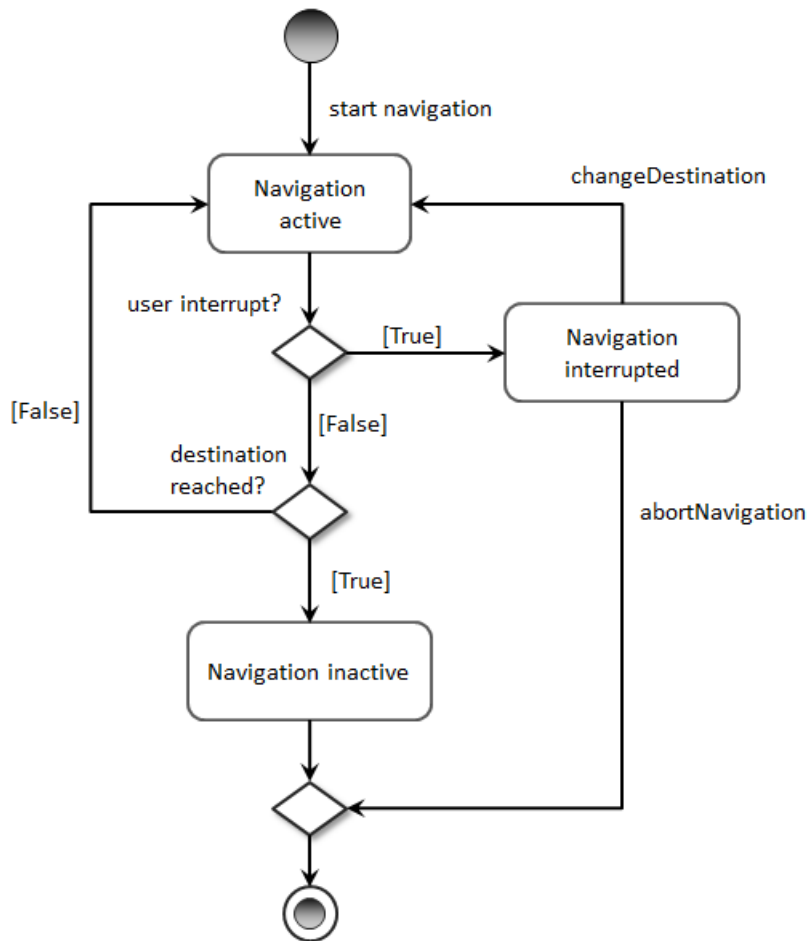
FM-4.1.3 (K3) - Perform updates of an MBT model and test generation caused by changes in requirements, test object or test objectives

**Justification:**

- i. Incorrect. Distractor; This may be a part of a possible alternative solution, but in the given situation, it is wrong, because it short-circuits the state "Navigation interrupted".
- ii. Correct. see figure below
- iii. Correct. see figure below
- iv. Correct. see figure below
- v. Incorrect. There is no decision this guard refers to.

Hence

- A. Incorrect
- B. Correct
- C. Incorrect
- D. Incorrect



Point Value: 1

### Question 34 K2

A test team is using MBT to generate manual test scripts at system testing level. Which one of the following statements regarding MBT test adaptation for test execution is most true?

**Answer Set:**

- A. In the case of manual test execution, testers need to read the MBT model to proceed to manual test execution.
- B. If abstract test cases are generated from the MBT model, a test automation engineer has to develop the test adaptation layer prior to any test execution.
- C. In the case of automated test execution, the test automation engineer adds test adaptation layer information to the MBT model to enable automated generation of concrete test cases.
- D. In general, specifying a test adaptation layer helps separating platform- and implementation-specific aspects from business workflows and rules to be tested.

->

FM-4.2.1 (K2) - Explain which kind of test adaption may be necessary for test execution in MBT

**Justification:**

- A. Incorrect. The test team generates manual test scripts, so testers do NOT need to read the MBT model during manual test execution
- B. Incorrect. The answer is true for automated test execution, but not in general.
- C. Incorrect. The test automation engineer implements the test adaptation layer according to the adaptation layer specification, which may be contained in the MBT model or provided externally.
- D. Correct. It is a good practice to keep the MBT model at a higher abstraction level and to separate logical aspects from implementation details.

**Point Value:** 1

**Question 35 K2**

Which one of the following expected benefits of MBT may best lead to a financial benefit for the test effort?

**Answer Set:**

- A. Process automation and reuse effects.
- B. Higher number of test cases automatically generated from the MBT model compared to a set of manually created test cases.
- C. Systematic coverage of the MBT model.
- D. Reducing the time-to-market.

->

FM-5.1.1 (K2) - Describe ROI factors for MBT introduction

**Justification:**

- A. Correct.
- B. Incorrect. Rather it increases the testing costs, since a higher number of test cases leads to increasing test execution effort.
- C. Incorrect. Rather it may increase the testing costs, since an improvement in systematic coverage for itself leads to a higher coverage and thus may lead to a higher number of test cases compared to a set of manually created test cases increasing the test execution effort.
- D. Incorrect. This can lead to a financial benefit for the product vendor (e.g. due to higher market acceptance) but it will not lead to direct financial benefits for the test project.

**Point Value:** 1

**Question 36 K2**

A company decided to deploy an MBT approach to test an embedded satellite flight guidance system, at the system testing level for functional testing. The motivation for using MBT is to improve the testing process.

Which one of the following characteristics of the MBT approach is the most relevant in this context?

**Answer Set:**

- A. The company combines various types of test selection criteria to achieve test objectives, and monitors requirement coverage through MBT tests.

- B. In the case where models for code generation are used, these models are fully reused for MBT without modification.
- C. All tests are executed manually.
- D. The MBT models are limited to structural aspects.

->

FM-5.1.2 (K2) - Explain how the objectives of the project influence the characteristics of the MBT approach

**Justification:**

- A. Correct. Combining test selection criteria and coverage monitoring improves the quality of testing.
- B. Incorrect. Separate models for development and MBT activities (enabling the tester's mindset and encouraging independence) help to improve the quality of testing.
- C. Incorrect. High degree of process automation including the generation of test artifacts and the execution of tests to reduce human errors
- D. Incorrect. Functional testing requires that behavioral aspects are modeled.

**Point Value:** 1

### Question 37 K1

A company decided to use MBT for acceptance testing of a transport ticketing system. Which one of the following metrics would a test manager use to best measure the progress of MBT activities?

**Answer Set:**

- A. The number of requirements managed and traced in the MBT model, and requirements coverage (percentage) by generated test cases
- B. The effort (in person-days) done for code development.
- C. The number of bugs discovered in the component testing phase.
- D. The effort (in person-days) spent on developing test models and applying test selection criteria.

->

FM-5.1.3 (K1) - Recall selected metrics and key performance indicators to measure the progress and results of MBT activities

**Justification:**

- A. Correct.
- B. Incorrect. In this context, MBT is used for acceptance testing and has no impact on code development.
- C. Incorrect. In this context, MBT is used for acceptance testing and has no impact on component testing.
- D. Incorrect. The spent effort is not the best measure for progress in this context.

**Point Value:** 1

**Question 38 K1**

An MBT approach is deployed in a project. Which one of the following statements describes good practice?

**Answer Set:**

- A. Deploying MBT with manual test execution requires additional risk management.
- B. Configuration management does not have to cover the MBT models, if the generated test cases are controlled.
- C. For projects applying continuous integration, MBT should be used for higher test levels only (system testing, user acceptance testing).
- D. Establishing traceability between requirements and MBT model elements is part of an MBT approach.

->

FM-5.2.1 (K1) - Recall good practices for test management, change management and collaborative work when deploying MBT

**Justification:**

- A. Incorrect. MBT can be used for manual and automated testing. The risk is higher for projects using test automation.
- B. Incorrect. Configuration management should be used for MBT models.
- C. Incorrect. Using MBT automated test scripts in continuous integration is a good practice.
- D. Correct. Traceability between requirements and MBT model elements is mandatory to produce the traceability matrix between test cases and requirements and to apply requirement coverage-based test selection.

**Point Value:** 1

**Question 39 K1**

Cost factors of MBT relate to initial costs and running costs. Which one of the following is an initial MBT cost?

**Answer Set:**

- A. MBT modeling and model validation efforts.
- B. MBT tool evaluation.
- C. Test adaptation efforts.
- D. Tooling support costs.

->

FM-5.2.2 (K1) – Recall cost factors of MBT

**Justification:**

- A. Incorrect. MBT modeling is a running cost.
- B. Correct. Evaluating tools is an initial cost.
- C. Incorrect. Test adaptation efforts are running cost.
- D. Incorrect. Tooling is a running cost (because of tool maintenance).

**Point Value:** 1



**Question 40 K2**

An MBT approach is used for a hospital management software project at the system testing level. A test management tool and a test automation framework are used in the project. The requirements are stored in a spreadsheet.

Which one of the following statements regarding MBT tool integration describes good practice in the given project context?

**Answer Set:**

- A. The MBT tool exports the generated test cases to the test management tool.
- B. To generate automated test scripts for the test automation framework, both tools should be purchased from the same vendor.
- C. Requirements are specified in the MBT tool and synchronized with the test management tool.
- D. The test automation framework automatically mirrors the test results back into the model.

->

FM-5.2.3 (K2) - Give examples of the integration of the MBT tool with requirements management, test management and test automation tools

**Justification:**

- A. Correct. The export of generated test cases into the test management tool is a good practice.
- B. Incorrect. Most MBT tools provide features to configure different output formats and, thus, generate automated test scripts in a format compatible with the test automation framework.
- C. Incorrect. Usually, requirements are imported into the MBT tool to support traceability.
- D. Incorrect. In some cases, it is possible to mirror execution results back into the MBT model, but this required specific tool support and is not common practice.

**Point Value:** 1