

i Introduction

Written exam in IN3240/IN4240

Duration: 4 hours

It is important that you read this cover page carefully before you start.

General information:

- No sources of information are allowed.

The assignment consists of four parts.

You may write both English and Norwegian.

Part 1 - Multiple Choice

- 14 multiple choice questions
- Questions with one answer option: 1 point for correct answer
- Questions with more than one answer alternative: 1 point for each correct answer
- Matching questions: 1, 2 or 3 points
- Maximum score for part 1: 25 points

Part 2 - Black-box techniques

- Two cases
- 10 points for correct solution of each case
- Maximum score for part 2: 20 points

Part 3 - Text questions

- 5 text assignments to be answered briefly and accurately.
- Maximum score for each question: 6 points
- Maximum score for part 3: 30 points.

Part 4 - Essay

- Maximum score for part 4: 25 points

If any tasks are unclear, you can make your own prerequisites. If so, please explain them.

Sketching

In this exam, you are permitted to make drawings/use sketching for task 3. The task is specifically marked. You are to use the sketching paper handed to you in the exam room. You can use more than one sketching sheet per task. See instructions for filling out sketching sheets in the link below the task bar.

You are not supposed to submit hand drawings for any other questions than task 3. You will NOT be given extra time to fill in the information boxes on the sketch sheets (assignment codes, candidate number, etc.)

You may NOT hand in sketching sheets for any other tasks than task 3.5. You will NOT be given extra time to fill out the "general information" on the sketching sheets (task codes, candidate

number etc.)

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1 Matching/Pairing

The specification-based (black-box) test techniques can be used in several of the areas below. However, you must match them so that all the techniques are applied in the most suitable area.

	Use case testing	State transition testing	Decision table	EP and BVA*
Testing the interaction between user and program in a mobile application.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Testing of an application that calculates the size of speeding tickets. The size of the fine depends on the size of the speeding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Testing the functionality of a check-in machine at an airport.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Testing of a bonus system based on several logical conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* EP and BVA: Equivalence partitioning and boundary value analysis

Maximum marks: 3

2 Multiple Choice

Static analysis is used primarily ...

Select one alternative:

- during integration testing
- during system testing
- in the implementation phase
- during acceptance testing
- in the planning phase

Maximum marks: 1

3 Matching/Pairing

ISTQB distinguishes between the terms test type and test level.
Determine what is a test type and what is a test level.

Please match the values:

	Test level	Test type
Testing related to changes	<input type="radio"/>	<input type="radio"/>
Integration testing	<input type="radio"/>	<input type="radio"/>
Structure based testing	<input type="radio"/>	<input type="radio"/>
Unit testing	<input type="radio"/>	<input type="radio"/>
System testing	<input type="radio"/>	<input type="radio"/>
Acceptance testing	<input type="radio"/>	<input type="radio"/>
Functional testing	<input type="radio"/>	<input type="radio"/>
Non-functional testing	<input type="radio"/>	<input type="radio"/>

Maximum marks: 4

4 Matching/Pairing

Determine which test strategy is used in each of the cases.

Please match the values:

	Methodical	Consultative	Model based	Analytical
The tests are designed and prioritized based on risk level.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tests are based on a state transition diagram of the product.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tests are based on the views of business experts.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The tests are based on the systematic use of a predefined set of test conditions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Maximum marks: 3

5 Multiple Choice

At what test level does the verification of a program take place?

Select one alternative:

- Acceptance test level
- Integration test level
- System test level
- Unit test level

Maximum marks: 1

6 Matching/Pairing

What test basis is used at the different test levels? If you mean there is more than one option, you should choose the option that is used to a lesser extent at other test levels.

	System testing	Acceptance testing	Integration testing	Unit testing
Design documents for the system architecture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Functional and non-functional requirements	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User requirements and user stories	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Source code	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Maximum marks: 3

7 Multiple Choice

Which of the following test activities is least suitable for automation?

Select one alternative:

- Functional testing
- Exploratory testing
- Beta testing
- Regression testing

Maximum marks: 1

8 Multiple Choice

What is the main difference between a *walkthrough* and an *inspection*?

Select an alternative:

- A walkthrough is led by the author, while an inspection is led by a trained moderator.
- Authors are not present during inspections, while they are during walkthroughs.
- An inspection is led by the authors, while a walkthrough is led by a trained moderator.
- An inspection has a trained leader, while a walkthrough has no leader.

Maximum marks: 1

9 Multiple Choice

Which of the following is an advantage of independent testing?

Select an alternative:

- Independent testers don't have to spend time communicating with the project team.
- The others on a project can pressure the independent testers to accelerate testing at the end of the schedule.
- Independent testers sometimes question the assumptions behind requirements, designs and implementations.
- Programmers can stop worrying about the quality of their work and focus on producing more code.

Maximum marks: 1

10 Multiple Choice

Which of the following measurements is not suitable as an exit criteria?

Select one alternative:

- Fault density
- Number of errors that have been detected but not yet corrected
- Statement coverage
- Number of undetected errors

Maximum marks: 1

11 Matching/Pairing

Determine which test activities are primarily performed by the tester and which are primarily performed by the test leader.

Please match the values:

	Tester	Test leder
Handle test automation tasks	<input type="radio"/>	<input type="radio"/>
Collect test results and report on test progression	<input type="radio"/>	<input type="radio"/>
Obtain and prepare test data	<input type="radio"/>	<input type="radio"/>
Evaluate the test results against the exit criteria	<input type="radio"/>	<input type="radio"/>

Maximum marks: 3

12 Multiple Choice

At what test level does the validation of a program take place?

Select one alternative:

- Integration test level
- Unit test level
- System test level
- Acceptance test level

Maximum marks: 1

13 Multiple Choice

Which test values should you choose if you are going to test a speed control program with the following specifications:

- If you drive 50 km/h or less, nothing happens.
- If you drive faster than 50 km/h, but not more than 55 km/h, you will receive a warning.
- If you drive faster than 55 km/h, but not more than 60 km/h, you will be fined.
- If you drive faster than 60 km/h, you will lose your driver's license.

NB! The speed is measured in whole numbers.

Select one alternative:

- 0, 49, 50, 54, 59, 60
- 50, 51, 55, 56, 60, 61
- 49, 50, 54, 55, 60, 62
- 50, 55, 60

Maximum marks: 1

14 Multiple Choice

Which of the following specification-based (black-box) test techniques is often used in combination with equivalence partitioning?

Select one alternative:

- Boundary value analysis
- Use case testing
- Decision table testing
- State transition testing

Maximum marks: 1

15 Decision table

The Norwegian government has evaluated the handling of the corona pandemic and wants to be better prepared the next time a serious pandemic hits Norway and the rest of the world. Measures to be implemented in a crisis situation are testing on arrival, as well as the use of vaccine passes, home quarantine and quarantine hotels.

In this connection, they want to develop a computer program that ensures fair treatment of everyone who comes to Norway. The program will be used at Norwegian airports and border crossings. The following specifications are given:

- Adults (persons over 18 years of age) who have a valid vaccine pass and a negative test when they arrive Norway travel freely into the country. Adults who do not meet these conditions must spend a fixed period of time in a quarantine hotel.
- Children (persons under 18 years of age) do not need a vaccine pass, but must have a negative test on arrival to travel freely into the country. If the test is positive, the child is placed in home quarantine for a fixed period of time.

a)

1. Determine the different outcomes of the program. (Actions)
2. Determine the binary conditions that underlie the outcomes.

b) Set up a decision table that contains all conceivable combinations of the binary conditions. The table must contain an action part that shows the outcome of each combination.

c) Reduce the number of rules (columns) by simplifying (rationalizing) the decision table, without losing any calculations. Explain why you are making the simplification.

d) Consider the following test cases:

1. Adult with valid vaccine pass and a negative test.
2. Adult with valid vaccine pass and a positive test.
3. Child with a negative test.
4. Child with a positive test.

Do we need more test cases to cover the business rules in the decision table?

If yes, specify the test case(s).

Fill in your answer here

Format
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Words: 0

Maximum marks: 10

16 State transition diagram

In the attached pdf document you will find a state transition diagram that describes a program that controls machine washing of cars.

NB! You shall not judge whether the state transition diagram is correct or not, but base your answers on it as it is.

In this exercise, you will, among other things, write down paths through the state transition diagram. Write the paths as sequences of states, e.g. S1, S3, S4. S6 etc. or S1 → S3 → S4 → S6 etc.

- a) Write down the shortest path through the state transition diagram, which also covers as many states as possible. What is the state coverage of the path?
- b) Each path describes a use case. How many use cases (different paths) do you need to achieve 100% state coverage? NB! Write down the paths you need.
- c) Write down the shortest path through the state transition diagram, which also covers as many transitions as possible. What is the transition coverage of the path?
- d) Each path describes a use case. How many use cases (different paths) do you need to achieve 100% transition coverage? NB! Write down the paths you need.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |  |

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Words: 0

Maximum marks: 10

17 Exercise

Be precise when answering the questions, but avoid answering with single words.

Explain the main difference between static and dynamic testing techniques. Where and when in the development process are they used? Is it sufficient to choose only one of the techniques, or should we choose both? Justify the answers.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  | 

Σ | 

Words: 0

Maximum marks: 6

18 Exercise

In this task you can hand in sketches. Use the sketching paper handed to you in the exam room for this. See instructions in the link below the task bar.

Draw a figure of the **V-model** that shows the different test activities and the different test levels. The figure should contain arrows that show the workflows and how the different test activities and test levels are related.

Fill in your answer here

Format ▼ | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |  |

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Words: 0

Maximum marks: 6

19 Exercise

Be precise when answering the questions, but avoid answering with single words.

To run tests with test execution tool, we need to write test scripts.

- a) What is a test script?
- b) What are the advantages of generic scripts versus linear scripts?
- c) What characterizes *data-driven* scripting and *keyword-driven* scripting, respectively?
What is the difference between the two scripting techniques?

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  | 

Σ | 

Words: 0

Maximum marks: 6

20 Exercise

Be precise when answering the questions, but avoid answering with single words.

HCI is a basic concept in usability testing.

- a) What does the abbreviation HCI stand for?
- b) What is the purpose of HCI and how is the term defined?
- c) Explain the different parts of the HCI framework.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  | 

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Words: 0

Maximum marks: 6

21 Exercise

Be precise when answering the questions, but avoid answering with single words.

Define and explain the purpose of entry and exit criteria in software testing.

In which phase(s) of the testing process are the entry and exit criteria determined?

Who is responsible for them?

Where and when are they checked and by whom?

Fill in your answer here

Format ▾ | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  |  |

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Words: 0

Maximum marks: 6

22 ISTQB's test principles

In this thesis you will write about ISTQB's test principles.

For each test principle you shall

- write down the name of the principle.
- explain the principle based on background and purpose.
- explain the consequences the principle has for various test activities related to test planning and test implementation throughout the program's life cycle.

Fill in your answer here

Format | **B** | *I* | U | x_2 | x^2 | I_x |  |  |  |  |  |  |  |  | 

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Words: 0

Maximum marks: 25

Question 16
Attached



Car wash

S1: The program reads the barcode on the washing ticket. If the barcode is valid, the program goes to S3. If not valid, the program goes to S2.

S2: An error message appears on the display. The program returns to S1.

S3: The barcode is valid and the door to the car wash opens. The program goes to S4.

S4: If the car does not drive in, the door to the car wash is closed and the program returns to S1. If the program detects that the car has been driven in, it determines which type of wash is selected. If brushless washing is selected, the program goes to S5. If normal wash is selected, the program goes to S6.

S6: The car is being washed. If undercarriage wash is selected, the program goes to S7. If undercarriage wash is not selected, but polishing is selected, the program goes to S8. If none of the parts is selected, the program goes to S9.

S5: The car is being washed. If undercarriage wash is selected, the program goes to S7. If undercarriage wash is not selected, but polishing is selected, the program goes to S8. If none of the parts is selected, the program goes to S9.

S7: The car is being undercarriage washed. If polishing is selected, the program goes to S8. If not, the program goes to S9.

S8: The car is being polished. The program then goes to S9.

S9: The car is being dried. The program then goes to S10.

S10: The door to the car wash opens. If the car is being driven out, the program goes to S12. If not, the program goes to S11.

S11: The alarm goes off. The program terminates.

S12: The door to the car wash is closing.

