

CS3332 Software Engineering

Final Exam

Duration: 120 minutes

1. (35 pts)

a) (15 pts)

When would you recommend **against using an Agile method** for developing a software system? Explain your reasons.

b) (20 pts)

Assume that you are developing a **training software** to help people prepare for the **Microsoft Certified Professional** exam.

- A student can request a **quiz** from the system.
- The software selects multiple questions from its **database** and composes them into a quiz.
- The software then **evaluates (rates)** the student's responses.
- If the student requests **hints**, the system provides them.
- When requested by a **professor**, the system can generate a **report** of the test results of all students.

Professors can also use the software to **add or edit questions and hints**.

Examinators are responsible for **certifying questions** to ensure their quality and relevance.

(a)

Draw a **Use Case Diagram** to model the software.

(b)

Provide the **specification of one use case** using the **form-based (tabular) technique**.

2. (20 pts)

Identify:

- **Four functional requirements**
- **Two non-functional requirements**

for a **library system**.

According to the customer's requirements:

- The system should enable **students to borrow and search for books** in the library.
 - It should also allow **librarians to add new books** to the library.
 - The system should **inform students about delayed returns**.
 - Books in the library should be **organized according to international library standards**.
 - The system should be **accessible everywhere**, therefore it should be developed as a **web-based application** using a **server-side language** such as **Ruby or PHP**.
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3. (25 pts)

a)

What is a **software architectural pattern (software architecture style)**?

Describe briefly **at least two patterns** that you know, focusing on:

- their **advantages**
- their **disadvantages**
- **when they are typically applied**

b)

Using the **basic architectural model of an information system**, suggest the components that might be part of **ACV**, an information system that allows users to **view information about flights arriving and departing from a particular airport**.

4. (20 pts)

a)

Explain why **testing can only detect the presence of errors, not their absence.**

b)

Consider a system designed to **calculate the tax to be paid:**

- An employee has **£6600 tax-free salary.**
- The next **£1600** is taxed at **10%.**
- The next **£18000** after that is taxed at **16%.**
- Any further amount is taxed at **30%.**

Identify **testing partitions** for a method `taxCalculate` that takes the **employee salary** as input.

Then design:

- A test dataset containing 3 input values that belong to different partitions.
- A test dataset containing 4 input values focusing on **defect detection**, based on the guidelines for test data selection.