

EXAMINATIONS – 2013
TRIMESTER 1

SWEN 301
Structured Methods

Time Allowed: Three Hours

Instructions:

- Closed Book.
- Answer all questions.
- Total marks are 180.
- Use the marks for each question as a guide as to how long to spend on it.
- No calculators are permitted.
- Paper dictionaries for translating between English and a foreign language are permitted.

Question 1. General Knowledge and Software Life Cycles

[32 marks]

(a) [5 marks]

What is the **system approach** to software engineering?

(b) [5 marks]

Briefly discuss why it is important to model software development processes.

(c) [10 marks]

Describe the **Spiral** model. Explain when it is appropriate to use it.

(d) [12 marks]

The planning game, Refactoring and Pair programming are three software engineering practices used in **Extreme Programming**. *Briefly explain each of them, and describe how these three practices are related to the core values of Extreme Programming.*

Question 2. Software Requirements, Design & Architecture

[50 marks]

(a) [5 marks]

Discuss why it is important to have a **context diagram** for the system to be developed.

(b) [6 marks]

What is the difference between **functional requirements** and **nonfunctional requirements**?
Give an example of functional requirements and an example of nonfunctional requirements.

(c) [5 marks]

Use cases are typically created during requirement gathering. *How might use cases be used during a software testing activity?*

(d) [12 marks]

Explain why each of the following is a desirable characteristic of a **requirement**, and explain how the characteristic can be achieved when writing **specifications**:

- Correct
- Complete
- Testable
- Traceable

(e) [12 marks]

Describe the following two **architectural styles**. For each of them, discuss advantages and disadvantages.

- Peer-to-Peer
- Repository

(f) [10 marks]

In the course we discussed several **tactics for improving performance** of software systems. *List and briefly explain them.*

Question 3. Software Testing

[32 marks]

(a) [10 marks]

System testing is performed through several steps. *List and briefly describe the steps in the system testing process.*

(b) [6 marks]

What is the importance of **Regression tests**? As regression tests may be run several times, suggest a way to save time performing them.

(c) [5 marks]

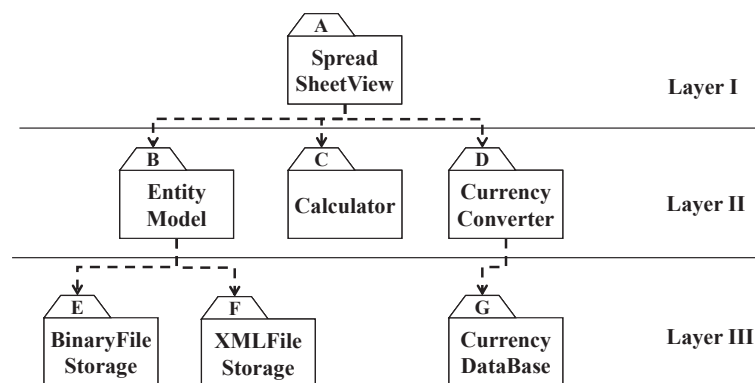
What are advantages of having separate testers and coders in a development team?

(d) [5 marks]

A program is seeded with 30 faults. During testing, 18 faults are detected, 12 of which are seeded faults and 6 of which are indigenous faults. *What is Mills' estimate of the number of indigenous faults remaining undetected in the program? Justify your answer.*

(e) [6 marks]

The following figure illustrates the component hierarchy of a software system. For **Modified Top_Down** integration testing, describe the sequence of tests undertaken for integrating the components.



Question 4. Software Deployment & Maintenance

[37 marks]

(a) [6 marks]

Describe the differences between **user training** and **operator training**. Give two examples of **operator functions**.

(b) [12 marks]

Categorise the following systems as **S-, P- or E-systems**. For each of them, explain why it belongs in that category and identify those aspects of the system that may change.

- an operating system for a microcomputer
- a floating-point acceleration system
- a system to find the prime factors of a number
- a train traffic control system

(c) [9 marks] Consider the following events requiring changes to the city library system, which have arisen after some years in service:

- A government regulation is introduced that certain books considered to be of an adult nature are only allowed to be read by children while in the library under adult supervision.
- Certain books when removed illicitly from the library fail to trigger the alarm system.
- The library is extended to hold many more books in foreign languages and to permit searching in foreign languages.

In the lectures we discussed four types of **software maintenance activities**. For each event listed above, identify what type of maintenance activity is involved: **corrective**, **adaptive**, **perfective** or **preventive**. *Justify your answers.*

(d) [10 marks]

Reengineering is a type of software rejuvenation. An alternative to reengineering a legacy system is the **acquisition of new software**, replacing the legacy software by a completely new acquisition. *Compare and contrast the process of reengineering with the acquisition of new software.*

Question 5. Free & Open Source Software

[29 marks]

(a) [6 marks]

What is the difference between a **patent** and a **copyright**?

(b) [5 marks]

Define the term **copyleft** that was discussed in the lectures.

(c) [10 marks]

Recall that the **Bazaar model** has been discussed in article "The Cathedral and the Bazaar" by Eric S. Raymond. *Briefly describe the model, and discuss when it is appropriate to use this model.*

(d) [8 marks]

In the lectures we discussed several popular **indirect sale-value models**. *Name two of these models and briefly describe them. Give an example for each of them.*
