TE WHARE WĀNANGA O TE ŪPOKO O TE IKA A MĀUI
VICTORIA
UNIVERSITY OF WELLINGTON

EXAMINATIONS — 2012

MID-YEAR

SWEN 301

Structured Methods

Time Allowed: 3 Hours

Instructions:

- Answer each of the exam questions.
- Total marks are 180.
- Use the marks for each question as a guide as to how long to spend on it.
- Calculators are not permitted.
- Paper dictionaries for translating between English and a foreign language are permitted.

Question 1. Software Life Cycles [32 marks]

(a) [10 marks]

Describe the **Rational Unified Process** model. Explain when it is appropriate to use it.

(b) [10 marks]

Discuss the validity of the following statement: "The cycles in the spiral model will follow the order of activities in the waterfall model".

(c) [12 marks]

Refactoring, **Collective Code Ownership** and **Testing** are three software engineering practices used in **Extreme Programming**. *Briefly explain each of them, and describe how these three practices support each other.*

Question 2. Software Requirements, Design & Architecture [50 marks]

(a) [5 marks]

Why are boundary and environment important for understanding a system?

(b) [8 marks]

Define the terms **verification** and **validation**.

(c) [15 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:

- unambiguous
- traceable
- testable

(d) [12 marks]

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

- Repositories
- Publish/Subscribe

(e) [10 marks]

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

Question 3. Software Testing [35 marks]

(a) [6 marks]

Suppose the company you work for develops internet applications. To reduce time to market, the company is considering dispensing altogether with integration testing. Instead, the company plans to rely on **Beta testing**, in which free trial versions of new software will be sent to existing, trusted customers to try out, with the agreement that they will report any problems they encounter. *What are the advantages and disadvantages of this approach?*

(b) [8 marks]

For each of the following systems state what kind of performance tests you would recommended. *Justify your answers.*

1. an automated bank teller system
2. a water-quality monitoring system

(c) [5 marks]

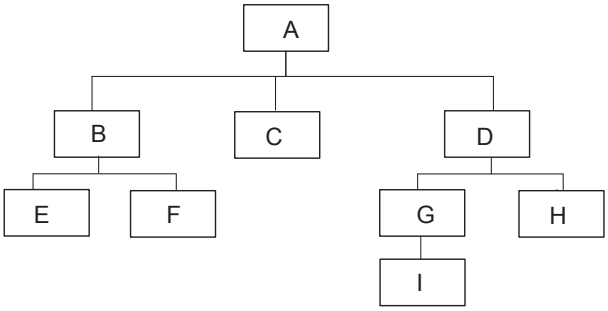
A development team wants to estimate the number of faults that have remained undiscovered in their program. They use two independent test groups to test their program. Group 1 finds 20 faults. Group 2 finds 25 faults, including 10 faults that are duplicates of faults found by Group 1. Assume that both groups are just as effective at finding faults in any part of the program as in any other part. *What is a good estimate for the total number of faults in the program? Explain your answer.*

(d) [10 marks]

Top_Down and **Bottom_Up** are two integration testing strategies. *For each of them, discuss the advantages and disadvantages.*

(e) [6 marks]

The following figure illustrates the component hierarchy in a software system. *For both Top_Down and Bottom_Up, describe the sequence of tests undertaken for integrating the components.*



Question 4. Software Deployment & Maintenance [38 marks]

(a) [6 marks]

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

(b) [10 marks]

List and describe the four **types of software maintenance activities** that we discussed in the course.

(c) [12 marks]

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

- an air traffic control system
- a system to find the prime factors of a number
- a system to find the first prime number larger than a given number

(d) [10 marks]

Reverse engineering and **reengineering** are two types of software rejuvention. *Compare and contrast the process of reengineering and of reverse engineering.*

Question 5. Free & Open Source Software [25 marks]

(a) [5 marks]

What is **free software** according to the definition of the Free Software Foundation?

(b) [5 marks]

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

(c) [10 marks]

Recall the **Cathedral model** and the **Bazzar model** that have been discussed in article "The Cathedral and the Bazaar" by Eric S. Raymond. *Briefly describe both models, and explain the essential differences between them.*

(d) [5 marks]

Loss-Leader/Market Positioner is a popular indirect sale-value model. *Briefly describe this model, and give an example.*

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