VICTORIA

UNIVERSITY OF WELLINGTON

EXAMINATIONS — 2010

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 [40 marks]

(a) [10 marks]

For each of the following process models, explain how it handles **a significant change in requirements** in a late stage of the software development process

- Waterfall model
- Spiral model
- Rational Unified Process

(b) [5 marks]

Your team is asked to develop a **data entry system** for office staff who have never used computers before. Your client considers user-friendliness and a user interface to be of utmost importance. *Which process model discussed in this course would you choose for developing this system? Justify your answer.*

(c) [5 marks]

Your team is asked to develop a **flight control system** that requires an extremely high level of reliability. Your client emphasised that such a system may face many potential hazards. *Which process model discussed in this course would you choose for developing this system? Justify your answer.*

(d) [10 marks]

Discuss the importance of the **requirements specification** during the software development process. Explain why **requirements errors** are generally among the most expensive errors to repair.

(e) [6 marks]

Define the following concepts that are used in the **Scrum model**.

- Daily scrum
- Sprint

(f) [4 marks]

Describe four values of **Extreme Programming**.

Question 2. Software Design & Architecture [40 marks]

(a) [14 marks]

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

- Peer-to-Peer
- Repositories

(b) [10 marks]

Your team is asked to develop a mobile **navigation system** that can be used to acquire GPS position data to locate its user on an electronic map, to acquire directions to desired destinations, and to indicate points of interests (such as restaurants or fuel stations) along the way. *Sketch an appropriate software architecture for this system, and explain how you would assign key functionalities to the design's components.*

(c) [6 marks]

There are three major **performance attributes** that describe constraints on system speed and capacity. *Briefly explain each of them:*

- Response time
- Throughput
- Load

(d) [10 marks]

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

Question 3. Software Testing [40 marks]

(a) [10 marks]

Define the concepts **verification** and **validation**. *Why is none of them sufficient on its own?*

(b) [5 marks]

There are three levels of software testing: unit testing, integration testing, and system testing. *Which of them constructs test cases primarily on the basis of use cases generated during requirements analysis? Justify your answer.*

(c) [5 marks]

Explain the purpose of **regression testing**.

(d) [5 marks]

A program is **seeded** with 20 faults. During software testing 15 faults are detected, 10 of which are seeded faults and 5 of which are indigenous faults. *What is Mills's estimate of the number of indigenous faults remaining undetected in the program? Justify your answer.*
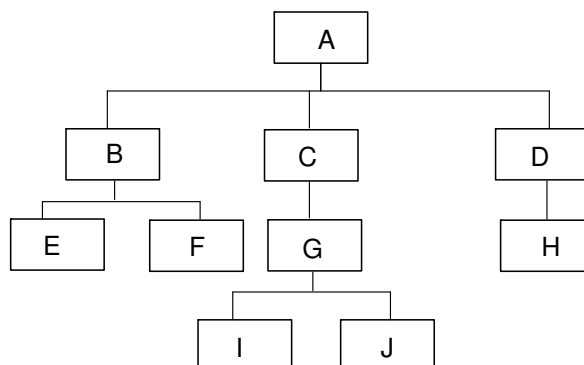
(e) [5 marks]

You claim that your program is fault-free at a 99% confidence level. Your test plan calls for you to test until you find all seeded faults. With how many faults must you seed the program before testing in order to substantiate your claim?

(f) [10 marks]

The figure below illustrates the **component hierarchy** of a software system. *For each of the following approaches, describe the sequence of tests for integrating the components.*

- Top-down approach
- Bottom-up approach

Question 4. Software Deployment & Maintenance [35 marks]

(a) [5 marks]

There are four major objectives of **user documentation** that were discussed in the course. *List and briefly explain them.*

(b) [12 marks]

In the course we discussed four **types of maintenance**. *List them, and give an example for each of them.*

(c) [8 marks]

Compare and contrast **reengineering** and **reverse engineering**.

(d) [10 marks]

The company you work for has traditionally kept its **software maintenance teams separate from software development teams**. Now it wants to move to a mission orientation where a **single team** will be responsible for both the development and maintenance of each software product. *What advantages should your company expect from the re-organisation and what problems might it encounter?*

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

(a) [8 marks]

Compare and contrast the concepts **copyleft** and **copyright**.

(b) [9 marks]

"Give away Recipe, Open a Restaurant" is a popular **indirect sale-value model**. *Briefly describe this model, and give an example.*

(c) [8 marks]

The company you are working for is developing and selling large radiology instruments for clinical laboratories. As a free add-on your company is distributing these instruments with an open-source laboratory information management system (LIMS). *Which indirect sale-value model is used by your company? Justify your answer.*

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