

1997 Paper 2 Question 8

Software Engineering I

Describe the *waterfall model* of software development and discuss its strengths and weaknesses. [12 marks]

For which of the following projects would it be suitable, and why?

- (a) an incremental compiler for Java
- (b) a clinical-record-keeping system for dentists
- (c) a word-processing package
- (d) a guidance system for an interplanetary probe

[8 marks]

1998 Paper 2 Question 8

Software Engineering I

Discuss the lessons learned from the London Ambulance Service disaster under the following headings:

(a) capturing user requirements

(b) project management

(c) quality assurance

(d) testing

[16 marks]

What in your view would be the single most important measure to take in developing a mission-critical system in order to reduce the likelihood of such a disaster? [4 marks]

1999 Paper 2 Question 8

Software Engineering I

State the advantages of the waterfall model. [10 marks]

State the disadvantages of the waterfall model. [4 marks]

What is the main criterion for deciding whether or not to use the waterfall model in a software development project? [3 marks]

Explain whether there would be any difference for a hardware development project. [3 marks]

2000 Paper 2 Question 8

Software Engineering I

One means of improving system reliability is to have three or more replicated systems and act on their majority output. Give *two* examples of failure that can be stopped by the mechanism, and *two* which cannot. At least one of each type should be illustrated by an actual case history or application. [12 marks]

An engineer attempts to improve the reliability of such a system further by multiversion programming – by having three separate systems coded by different teams and possibly in different languages. Discuss what might still go wrong. [8 marks]

2000 Paper 10 Question 1

Software Engineering I

Computer-Aided Software Engineering (CASE) tools are designed to help developers manage complexity. What are the *two* main types of complexity such a tool must deal with? [4 marks]

What are the tools traditionally used to manage each type of complexity? [6 marks]

For each type, describe briefly *one* case history in which a serious failure was caused. [10 marks]

2001 Paper 2 Question 8

Software Engineering I

- (a) State the advantages and disadvantages of the evolutionary model of software development. [8 marks]
- (b) Is it more, or less, suitable than the waterfall model for safety-critical projects? Justify your answer. [8 marks]
- (c) If you were managing the evolution of a safety-critical product, what special steps would you take for risk reduction or due diligence reasons? [4 marks]

2002 Paper 2 Question 7

Software Engineering I

- (a) Compare and contrast the problems experienced in developing the London Ambulance control system with those of the Cambridge University financial accounting system (CAPSA). [6 marks]
- (b) For *each* of these systems, describe software engineering techniques that might have been used to avoid the problems. Identify advantages and disadvantages of these techniques. [14 marks]

2003 Paper 2 Question 7

Software Engineering I

Software engineering academics said for years that a significant percentage of large software projects failed. In the run-up to Y2K, most of the world's large companies claimed that fixing the Millennium Bug was a large project whose success was critical to their survival. One would therefore expect many large companies to have failed, but none did. Who was mistaken? Justify your answer. [20 marks]

2004 Paper 2 Question 7

Software Engineering I

- (a) Describe the spiral model of software development. [8 marks]
- (b) Give *two* examples of software engineering tasks where it is likely to be useful, and *two* where it is less likely to be. [8 marks]
- (c) If you were developing a security-critical system, how would you integrate the security requirements engineering and assurance processes into the model? [4 marks]

2005 Paper 2 Question 7

Software Engineering I

A car manufacturer wishes to save weight and improve reliability by replacing most of the vehicle's wiring harness with a local area network. Systems such as engine management, anti-lock braking, traction control and stability control will thus share common platform components. Your task is to ensure that the safety of these systems, and of the vehicle electronics overall, is not impaired by this upgrade.

- (a) Describe the methodology you would adopt for the project, and justify your choice. [10 marks]
- (b) How would you then ensure that subsequent development of these subsystems – which you should assume are supplied by different subcontractors – does not compromise vehicle safety? [10 marks]