

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION Professional Graduate Diploma

SOFTWARE ENGINEERING

21st April 2005, 2.30 p.m.-5.30 p.m.

Answer THREE questions out of FIVE. All questions carry equal marks.

Time: THREE hours.

*The marks given in brackets are **indicative** of the weight given to each part of the question.*

1. a) The following is an outline specification of a project.

This project is about developing a web portal for hotel services. This means the consumables and services bought by hotel operators.

The project is to research and prototype the appearance and look/feel of the web portal, populating it to operate as a 'virtual store', with inventory provided by others. Users will be suppliers who supply the inventory for the portal, and consumers will be hotel operators who browse and buy. In addition, the portal operator will need to attract customers, both to buy and to supply.

Using the UML use-case diagrams, create scenarios that will aid requirements elicitation. Each actor and each way of acting should be given. Clearly label your scenarios with the names of the actors and the type of interaction that each actor is using. **(18 marks)**

- b) Select and explain an area of requirements that, in your opinion, is not well handled by use-case diagrams. **(4 marks)**
- c) Describe another method used by software engineers to elicit requirements. **(3 marks)**

2. a) "Software Configuration Management (SCM) is the management of change throughout the whole of the software life cycle."

Describe the basic steps involved when performing configuration management. **(5 marks)**

- b) Suppose you are a software engineer in a company that develops software components for a software product. There are older versions of the product with a large number of customers. The new product was introduced in 2002, and has been updated every year since then.

You are given the goal of trying to reduce the time taken to respond to error reports. Identify suitable steps to create a process improvement programme for your SCM, and in particular consider goals, questions and metrics to derive the steps you identify. Give reasons for the choices made. **(20 marks)**

3. Compare and contrast the following pairs of process models, giving particular attention to the tools, techniques, and life cycle phases of the project as progress is made towards a complete system:
- a) Dynamic Systems Development Method and the Incremental Model **(10 marks)**
 - b) The Spiral model and Component-based development **(15 marks)**
4. Engineering is considered to be a discipline with guiding scientific principles and universally applicable methods for the construction of systems.
- a) Discuss the guiding principles of software engineering in the context of constructing large programs and the mastering of complexity. **(15 marks)**
 - b) Evaluate the relative success of software engineering in adopting mathematical principles and producing universally applicable methods and tools. **(10 marks)**
5. The manager of a local bank has authorised requirements engineering to be carried out by a team of IT consultants with the primary aim of producing the software specification to manage customer accounts. The manager's requirements are written in natural language and state that the system should be user-friendly and calculate interest daily for interest-bearing accounts.
- a) Using the above scenario where appropriate, define each of the following pairs of terms making clear distinctions between each:
 - ii) Stakeholder and system requirements
 - iii) Functional and non-functional requirements
 - iii) Throwaway and evolutionary prototyping **(15 marks)**
 - b) Using the local bank scenario outlined:
 - i) briefly discuss the merits of using natural and structured language specification
 - ii) specify the interface to a customer account using a simple program description language (PDL) **(10 marks)**