

THE BRITISH COMPUTER SOCIETY
THE BCS PROFESSIONAL EXAMINATION
Diploma

SOFTWARE ENGINEERING 1

4th May 2005, 10.00 a.m.-12.00 p.m.
Answer FOUR questions out of SIX. All questions carry equal marks.
Time: TWO hours.

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

1. Software Engineers often use models (such as DFDs, or ERDs) as predictors of the final software product in the same way as other engineers use theory to predict the properties of their products. Discuss this concept and consider if models describe properties of software, or describe steps for an engineer to follow when developing the software. Give full reasons for your conclusion. **(25 marks)**

2. a) The name 'CASE' is sometimes used to mean *Computer Assisted Software Engineering* and other times to mean *Computer Assisted Systems Engineering*.

Briefly analyse these terms and explain if you think there is a difference between them. **(5 marks)**

- b) Discuss the 'software' and 'system' in the following scenario. In your answer, select TWO 'software' issues and TWO 'system' issues that are relevant to this development. Give your reasons for selecting and categorising each issue.

The implementation of a distributed object architecture requires middleware (object request brokers) to handle communications between the distributed objects. In principle, the objects in the system may be implemented using different programming languages, may run on different platforms and their names need not be known to all other objects in the system

(20 marks)

3. a) Discuss the process of developing a model of a system in terms of object classes with specific attributes and operations, e.g. object class diagrams, from models of how the system will be used, e.g. Use Case diagrams. **(4 marks)**

- b) Illustrate your answer from part a) with a simple example modelling the high level design of a booking system for a video library, giving both use case diagrams and object class diagrams using UML notation. **(6 marks)**

- c) Discuss the various ways using UML that the dynamic behaviour of a system can be modelled. **(6 marks)**

- d) Using the same example as in part b), model the process of booking a video using either a sequence diagram, state diagram, or an activity diagram. **(4 marks)**

- e) Discuss the need for Deployment Diagrams in OO system development. The proposed video booking system is expected to be deployed using the World Wide Web. Provide a simple deployment diagram for this system. **(5 marks)**

Turn over]

4. The following is an outline specification for a project. Select the criteria you would use to determine the life cycle model that this project should follow, and hence make a recommendation about selecting a suitable life cycle model. **(25 marks)**

The Managing Director (MD) of HiJet, a company that cleans drains, uses a PC computer with TV interface to view a video tape of the inside of a suspected pipe. On the MD's PC there is Outlook2000, MS Word, MS Project and the ACT database. These tools capture information (emails), record invoices (Word), record jobs and job progress (ACT). The MD's skill is diagnosis of faults in a pipe.

The firm wants to use its technology to gain control over the progress of a 'job'. The effort and skill must stay with human-intensive diagnosis, but as much as possible of procedural order processing should be automated. An intranet should enable three other screens in three other offices to view aspects of jobs and make changes to show job progression.

5. a) Explain the difference between software validation and software verification during the software life cycle in assuring software quality. **(5 marks)**
- b) Various categorisations of software product quality factors have been proposed. Outline ONE of these by explaining the basis for its categories and the factors associated with each category. **(10 marks)**
- c) Discuss the types of testing relevant to each of the processes, validation and verification, and indicate which of the quality factors is being assured through each type of testing. **(10 marks)**
6. "Software Product Maintenance is the management of change throughout the whole of the software product life cycle."
- a) Discuss the above statement and explain the necessity for software product maintenance throughout the software product life cycle. **(5 marks)**
- b) Outline the primary activities of software product maintenance with respect to its place within the software product life cycle. **(5 marks)**
- c) Discuss the various CASE tools that are available to support the activities of software product maintenance. **(5 marks)**
- d) Describe ONE such tool in detail indicating how a team of software engineers could use this tool during maintenance and what advantages using the tool will provide. **(5 marks)**
- e) A software development organisation has an established practice of software product maintenance using a repository where all versions of their products are stored. They now wish to develop a programme of software reuse. Of what relevance is their software product maintenance practice to their proposed software reuse programme? **(5 marks)**