

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION Professional Graduate Diploma

SYSTEMS DESIGN METHODS

30th April 2002, 10.00 a.m.-1.00 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) With the aid of a diagram illustrate the classic waterfall software process model and explain briefly, for each stage, what activities are carried out and what product results. **(10 marks)**
 - b) With the aid of a diagram explain the fundamental principles behind the prototyping approach. Compare and contrast this with the traditional waterfall approach to software development. **(10 marks)**
 - c) Explain when it is most appropriate to adopt a waterfall approach, when it is most appropriate to adopt a prototyping approach and when it is most appropriate to adopt a hybrid of the two approaches. **(5 marks)**

2.
 - a) Discuss the differences in purpose and use of:
 - i) entity relationship diagrams
 - ii) normalisation (the process of revising data structures into 3rd normal form) for database design. **(4 marks)**
 - b) Compare and contrast the formal methods approach (the use of formal mathematics for systems design) and the socio-technical approach (the analysis of social, organisational and technical aspects of systems design). **(9 marks)**
 - c) You are to develop a website for your company. Outline which system design techniques you would use for this task, justifying your choice. **(12 marks)**

3.
 - a) Define what is meant by the terms “metric” and “indicator” when used in a software engineering context and explain the role that they play in software product and process improvement. **(5 marks)**
 - b) Correctness, maintainability, and integrity are useful indicators often associated with software quality. Provide a clear definition of each of these indicators and suggest appropriate metrics to be associated with them. **(10 marks)**
 - c) Suppose that you are the manager of a software development team and have decided to introduce a number of software metrics into your organisation. Describe in detail the approach that you would take to identify the most appropriate metrics to be introduced and indicate what you would do with the results collected from the metrics. **(10 marks)**

[Turn over

4. You are the IT director of a small software house that specialises in packaged software for the shipping industry. Currently your packaged software runs under MS DOS. You intend to re-engineer the packaged software to run under MS Windows. There is no documentation for the packaged software other than a few pages of sales literature, and the code contains few comments. Explain how you would re-engineer the packaged software to fit in with the structured design method that is now used with your software house. **(25 marks)**
5. *a)* Explain how dataflow diagrams, entity relationship diagrams and entity life histories provide three different views of a system, and how they can be used to check the quality of each other. **(6 marks)**
- b)* You are the IT manager of a large IT department that has recently introduced a new systems design method for use in IT projects. Briefly outline three ways in which you could assess the benefits obtained through the introduction of the new systems design method. **(6 marks)**
- c)* Analysis and design methods are often supported by integrated collections of tools called CASE workbenches. With the aid of a diagram explain the logical structure of a typical CASE workbench, and briefly indicate the role of each component of the workbench. **(13 marks)**