THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Professional Graduate Diploma

SYSTEMS DESIGN METHODS

21st April 2005, 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)*　Explain the differences between throw away prototyping, evolutionary prototyping and waterfall approaches to systems development. Which approach to systems development would you suggest for the projects characterized by:
i)　precise and stable/unchanging requirements
ii)　vague and stable requirements, and
iii)　vague and unstable/changing requirements?

Justify your answers. **(12 marks)**

b)　DSDM (Dynamic Systems Development Method) is one of the most popular RAD (Rapid Application Development) methods. It is based on a number of principles. Some of these principles are:
- active user involvement is imperative i.e. DSDM is a user-centred approach;
- the focus is on frequent delivery of products i.e. DSDM recommends a product-based approach;
- fitness for business purpose is the essential criterion for acceptance of deliverables i.e. the focus is on delivering the business functionality at the required time;
- iterative and incremental development is necessary to converge on an accurate business solution;
- all changes during development are reversible.

Use the above principles to discuss the suitability of DSDM for the systems and projects having the following characteristics:
i)　interactive, where the functionality is clearly demonstrable at the user interface,
ii)　has a clearly defined user group,
iii)　if computationally complex, the complexity can be decomposed or isolated,
iv)　time constrained,
v)　the requirements are unclear or subject to frequent change.

For each characteristic clearly indicate related principle(s). **(10 marks)**

c)　Would you recommend using DSDM for process control/real time applications? Justify your answer.
(3 marks)

2. *a)* DFDs (Data Flow Diagrams) and ERDs (Entity Relationship Diagrams) are popular systems modeling techniques. What aspects of information systems do they model? Justify your answer. Give a detailed explanation of how you would cross-check DFDs and ERDs. **(10 marks)**

b) Suggest a 'high level' systems complexity metric which is based on DFDs and ERDs. **(6 marks)**

c) What are State Transition Diagrams (STDs) and Entity Life Histories (ELHs) and what aspect of information systems do they model?

Illustrate the difference between STDs and ELHs by producing a STD and ELH for entity X whose instances are created by event *Ev1*, updated by event *Ev2*, and deleted by event *Ev3*. Assume that *Ev2* can affect an instance of X several times. **(9 marks)**

3. *a)* Discuss how the implementation of a systems design method within an organisation might fail, and outline the measures that could be adopted in order to attempt to avoid such failure. **(15 marks)**

b) Outline and evaluate the process of reverse engineering. **(10 marks)**

4. *a)* You are an IT quality manager in a large retail company. You have been asked to create a systems design method for the company's intranet. Discuss what you would include in such an intranet design method.
(16 marks)
b) Discuss the benefits and drawbacks of formal methods for the design of safety critical applications such as medical and aerospace applications. **(9 marks)**

5. *a)* Discuss the relevance of computer aided software engineering (CASE) tools to systems development activities. **(13 marks)**

b) Outline and critically assess three quality assurance approaches that could be used to improve systems design activities. **(12 marks)**