BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 6 Professional Graduate Diploma in IT

SYSTEM DESIGN METHODS

Monday 30th March 2015 - Afternoon
Answer **any** THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours

Answer any <u>Section A</u> questions you attempt in <u>Answer Book A</u>
Answer any <u>Section B</u> questions you attempt in <u>Answer Book B</u>

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

Calculators are **NOT** allowed in this examination.

Section A
Answer Section A questions in Answer Book A

Basic Elements of System Design Methods

1.a)   Discuss why prototyping and agile approaches to systems design are
        increasingly being used instead of traditional waterfall approaches.   **(12 Marks)**

   b)   Give a brief explanation of the following terms: software reusability, software
        reuse.
        Component Based Systems Development (CBSD) methods place a lot of
        emphasis on component reuse when developing a new system and on
        developing ('fabrication') of new reusable components. Identify the main stages
        which should be provided by a typical CBSD method.   **(13 Marks)**

Construction of a Method

2. a)   Discuss why systems design methods commonly include techniques
        to model the structural, procedural/functional, and temporal/dynamic
        aspects of an IT system. Give an example of the techniques that model
        these systems aspects in a systems design method of your choice.   **(15 Marks)**

   b)   Explain how you would cross-check the three models discussed in question 2.a).
        (10 Marks)

Selecting a Method

3. a) You are in charge of five software development projects. The 'characteristics' of each of your projects are as follows:
   - Project 1. Web-site for a local company. Relatively small system. Requirements are vague and likely to change in the near future.
   - Project 2. A very large embedded system whose requirements can be easily identified and are relatively stable.
   - Project 3. A 'standard' business application. You have developed similar systems in the past.
   - Project 4. A relatively complex administrative system for one of the local hospitals. Some of the requirements seem to be pretty vague, but all the requirements are stable.
   - Project 5. A small real-time control system to be used for monitoring patients in a local hospital.

   Consider the following software development approaches/models:
   waterfall, throw-away prototyping, evolutionary prototyping, component-based development, formal development.
   Which of the above approaches/models would you choose for each of your projects? Briefly justify your choices. **(10 Marks)**

   b) Agile methods (RAD methods) are not suitable for all types of systems and systems development projects.
   (i)   Suggest at least five system/project characteristics that would be appropriate for Agile methods. Give a brief justification for each characteristic. **(10 Marks)**
   (ii) Suggest also at least two system/project characteristics that would not be appropriate for Agile methods. Give a brief explanation. **(5 Marks)**

Introducing a Method

4. a) You are an IT manager and have decided to introduce object oriented development techniques into your IT department. Discuss which approach to implementing object oriented development you would use:
    - training staff in an object oriented design method first and then an object oriented programming language,
    - training staff in an object oriented programming language first and then an object oriented design method,
    - or training in both at the same time.
    Discuss the issues to be taken into account when considering each option.
    (10 Marks)

   b) There are many reasons why a systems design method introduced in an organization might fail or does not meet expectations, such as:

    - Productivity
    - Complexity
    - Skills
    - Tools
    - Social and organizational issues.

    Provide an explanation of each of these reasons.   **(15 Marks)**

Evaluation and tuning of a method

5. a) There are various criteria that might be considered when assessing the suitability of a systems development method including: life cycle coverage; separation of analysis and design; visibility of product; designing for change; and 'extendability' of the method. Discuss the importance of these criteria when assessing a method.   **(10 Marks)**

   b) Outline the types of software tools that could be used to support systems development activities, explaining the potential benefits that they could provide.
    (15 Marks)