BCS THE CHARTERED INSTITUTE FOR IT

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

SYSTEM DESIGN METHODS

Monday 27th March 2017 – Afternoon
Answer **any** THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

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 how use case and class diagrams can be used to cross-check each other.
(6 marks)

   b) Discuss how data flow diagrams and entity relationship diagrams can be used to cross-check each other. **(6 marks)**

   c) The ABC method (see Appendix at end of paper) specifies the development process but it does not prescribe any set of systems modeling techniques. Assuming that you are required to use the Unified Modeling Language (UML) techniques, decide which techniques you would use in different stages of the method. Briefly justify your decisions. **(13 marks)**

Construction of a Method

2. a) Explain with the aid of diagrams the following software life cycle models: Waterfall, Incremental, Spiral. Explain also how the Spiral model incorporates both the Waterfall and the Incremental approaches. **(15 marks)**

   b) Consider the following software life cycle models: Waterfall, Incremental development, Evolutionary prototyping. For each of these life cycle models discuss briefly whether the ABC method process (see Appendix at end of paper) is based on it. Justify your answers. **(10 marks)**

Selecting a Method

3. a) There are a wide variety of systems design techniques available for developing IT systems. Discuss why certain design techniques are more relevant to certain types of IT systems than other design techniques. For example, compare the suitability of different design techniques for developing safety critical systems and business information systems. **(10 marks)**

   b) The ABC method (see Appendix at end of paper) is suitable for applications which have certain characteristics. Compare the suitability of this method for developing safety critical systems and business information systems. **(6 marks)**

   c) Assume that you are a project manager of three projects with the following characteristics:

   - Project 1. A medium size business application whose requirements can be easily prioritized and grouped.
   - Project 2. A 'standard' business application. You have developed similar systems in the past and expect to develop more in the future.
   - Project 3. A relatively small web-site for a local business. Requirements are vague and are likely to change in the future.

   Consider also the following software development approaches/models: Waterfall, Incremental, Evolutionary prototyping, Throw-away prototyping and Component-based development.

   Which of the above approaches/models would you choose for each of your projects? Your choices should be properly justified. **(9 marks)**

Section B
Answer Section B questions in Answer Book B

Introducing a Method

4. a) Discuss why both developers and users should be trained in the use of a new systems design method. **(10 marks)**

   b) Assume that your software organization has been using a traditional structured method based on the Waterfall approach for many years. Now they want to introduce the new method ABC (see Appendix at end of paper) that incorporates UML. Discuss how introducing the ABC method and UML may impact:

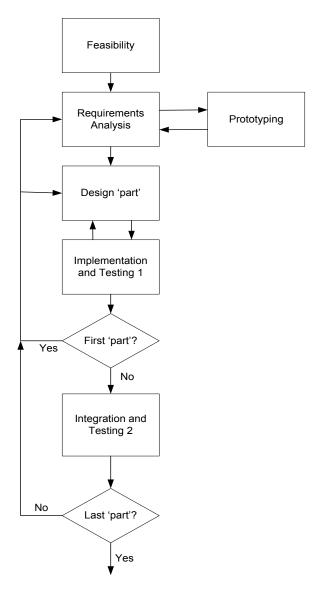   (i) the method users (i.e. developers),
   (ii) the system users.

   (15 marks)

Evaluation and tuning of a method

5. a) Explain the difference between validation and verification (V&V) in software projects. Suggest various V&V activities and techniques suitable for different stages of the ABC method process (see Appendix at end of paper). Your answer should include a brief justification of your 'allocation' of V&V activities/techniques to the ABC stages. **(12 marks)**

   b) Discuss what software tools could support the quality control of design diagrams, program specifications and programs during a software development project.
   (13 marks)

APPENDIX

Consider the following software development method. The method is called ABC and its process and stages are detailed below.