

**BCS THE CHARTERED INSTITUTE FOR IT**

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

**SYSTEM DESIGN METHODS**

**Thursday 28<sup>th</sup> March 2019 - 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 <b>NOT</b> allowed in this examination.
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**Section A**  
**Answer Section A questions in Answer Book A**

**A1 Basic Elements of System Design Methods**

- a) Explain why formal methods may be inappropriate for some software development projects. **[12 marks]**
- b) Consider the following approaches to systems development:
- waterfall,
  - incremental development,
  - evolutionary prototyping,
  - throw away prototyping.

Consider also two methods M1 and M2 (see **Appendix** at the end of the paper).

Discuss briefly which of the above approaches to systems development methods M1 and M2 are based upon, justifying your answers.

**[13 marks]**

**A2 Construction of a Method**

- a) You are a manager in a web development company. You have decided to introduce a methodology for web development.

The techniques to be used within the methodology need to cover:

- the overall structure of the website;
- the visual appearance of the pages in the website;
- the design of back end databases;
- and the user interaction with the website.

Outline which systems design techniques you would recommend to do the following, justifying your answers:

- i) Design the overall structure of a website. **[4 marks]**
- ii) Design the visual appearance of the pages in a website. **[4 marks]**
- iii) Design back end databases. **[4 marks]**
- iv) Model the user interaction with a website. **[4 marks]**

- b) The M1 method (see **Appendix** at the end of the paper) specifies the development process but it does not prescribe any set of systems modelling techniques. Assuming that you are required to use the Unified Modelling Language (UML) techniques, decide which techniques you would use in the different stages of the method. Briefly justify your decisions.

**[9 marks]**

### **A3 Selecting a Method**

- a) Discuss the characteristics of software development projects for which evolutionary and throw away prototyping would be suitable. **[6 marks]**

- b) Outline the benefits of using agile approaches to systems design. **[13 marks]**

- c) The M1 and M2 methods (see **Appendix** at the end of the paper) are suitable for applications which have certain characteristics. Discuss the suitability of these methods for developing safety critical systems and business information systems.

**[6 marks]**

**Section B**  
**Answer Section B questions in Answer Book B**

**B4 Introducing a Method**

- a) You are an IT manager in a manufacturing company. You have decided to start using the Unified Modelling Language (UML) for developing IT systems in your company. Discuss the approaches that could be used for training IT staff in the company in the use of UML.

**[10 marks]**

- b) Explain the difference between reverse engineering and re-engineering in the software industry.

**[6 marks]**

- c) Consider the following re-engineering projects you are involved in:
- Project 1. Reverse engineering to 'recover' lost design documentation.
  - Project 2. Re-engineering to restructure the entire system.
  - Project 3. Re-engineering to restructure the entire system and to add some 'new' user requirements.
  - Project 4. Re-implementation in a different programming language.

Which stages of the M1 method (see **Appendix** at the end of the paper) would you use in each of these projects? Justify your answers.

**[9 marks]**

**B5 Evaluation and tuning of a method**

- a) Discuss how statistical process control could be applied to software testing.

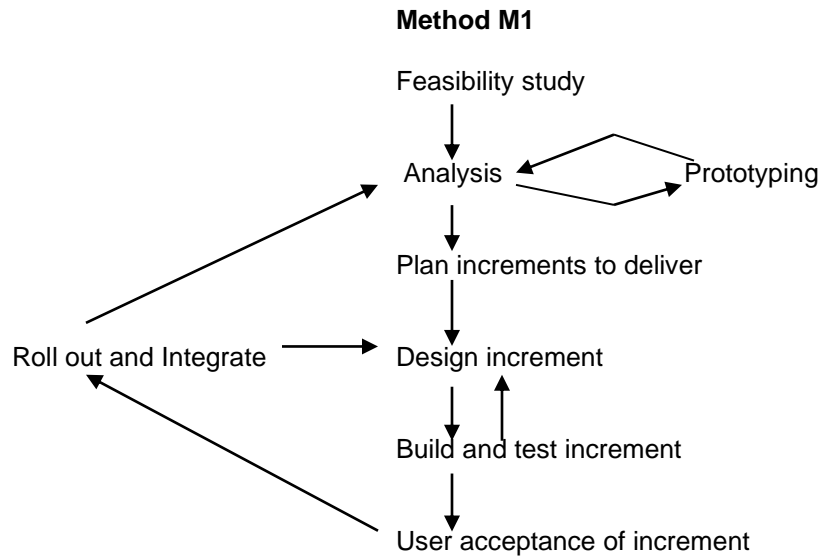
**[12 marks]**

- b) What is the difference between software process metrics and software product metrics? Describe THREE types of software process metrics that may be collated as part of a software process improvement. Give one example of each type of metric.

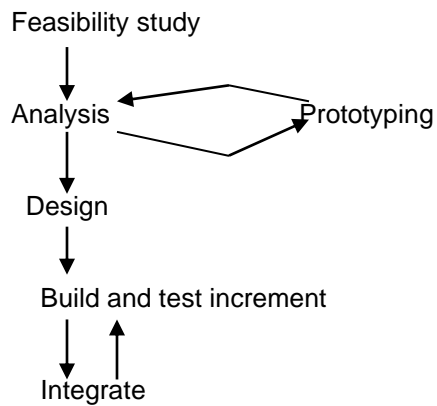
**[13 marks]**

## APPENDIX

Consider the following systems development methods. The methods are called M1 and M2. The process and stages of each method are shown below.



## Method M2



**END OF EXAMINATION PAPER**