

BCS THE CHARTERED INSTITUTE FOR IT

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

SYSTEM DESIGN METHODS

Thursday 31st March 2016 - Afternoon
Time: THREE hours

Answer **any** THREE questions out of FIVE. All questions carry equal marks.

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.

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| Calculators are NOT allowed in this examination. |
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Section A
Answer Section A questions in Answer Book A

Basic Elements of System Design Methods

1. a) Compare and contrast the data modelling capabilities provided by class diagrams and entity relationship diagrams. **(9 marks)**
- b) Compare and contrast the process modelling capabilities provided by use case diagrams and data flow diagrams. **(8 marks)**
- c) Compare and contrast the software architecture design capabilities provided by UML deployment diagrams and component diagrams. **(8 marks)**

Construction of a Method

2. a) A Rich Picture is one of the main modelling techniques used in Soft Systems Methodology (SSM). Rich Pictures are particularly useful as a way of understanding the problem situation at the beginning of the project. They focus on various 'soft' facts/aspects of the problem situation which are not represented by 'hard' modelling techniques such as structured techniques, object-oriented techniques, etc.
Which 'soft' facts/aspects can be represented in Rich Pictures? **(10 marks)**

- b) (i) The *Rapid* method (see **Appendix**) specifies the development process, but it does not force a method 'user' (i.e. developer) to use a prescribed set of systems modelling techniques. Assume that you are required to use the *Rapid* method in your project. Your task is to decide which Unified Modelling Language (UML) techniques you would use in the different stages of the method. Briefly justify your decisions.

(12 marks)

- (ii) Which UML technique is suitable for modelling system dynamics? Briefly justify your answer.

(3 marks)

Selecting a Method

3. a) Discuss how a systems development methodology might be used for systems maintenance within an organisation. (10 marks)
- b) The *Rapid* method (see **Appendix**) is suitable for projects and applications/systems which have certain characteristics related to users, functional and non-functional requirements, complexity and time constraints. Suggest five such characteristics and justify your suggestions. Additionally state types of applications which are not suitable for this method. (15 marks)

Section B

Answer Section B questions in Answer Book B

Introducing a Method

4. a) Your organization is implementing an agile systems development approach having previously used a waterfall based systems development approach. Discuss the likely impact of this upon systems developers and users in the organization. (10 marks)
- b) Every organization that wants to introduce a RAD/Agile method has an existing culture and accepted working practices. Therefore the introduction of the new method (e.g. *Rapid* method – see **Appendix**) must be carefully planned and managed to achieve a successful outcome. Suggest a plan of action for introducing *Rapid* method. Your plan should include 5 'actions'. (15 marks)

Evaluation and tuning of a method

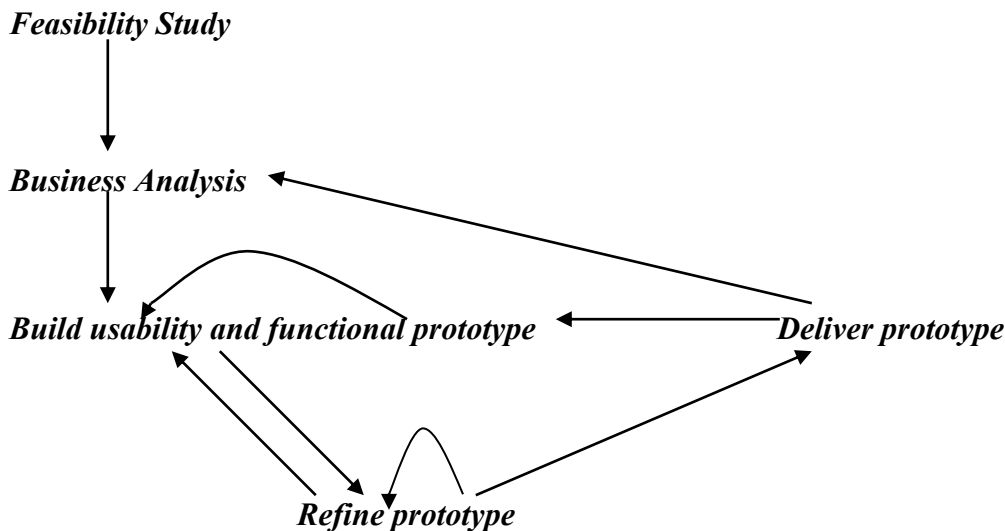
5. a) Discuss how software tools used for systems development can support systems maintenance activities. (10 marks)
- b) Explain the difference between validation and verification (V&V) in software projects. Suggest various V&V activities and techniques suitable for different stages of the *Rapid* method process (see **Appendix** at end of paper). Your answer should include a brief justification of your 'allocation' of V&V activities/techniques to the *Rapid* stages. (15 marks)

APPENDIX (for use in Questions 2b, 3b, 4b, 5b)

Rapid is a RAD/Agile method.

The method includes the following stages: Feasibility study, Business analysis, Build usability and functional prototype, Refine prototype, Deliver prototype.

The development process is as follows (see Figure below).



The stages are briefly described below.

Feasibility Study. Scope the development in terms of proposed solutions and produce both a business case and first-cut project plan. Find out who/what the system will interact with. Examine the suitability of the method for your project.

Business Analysis. Examine the business processes to be automated, their information needs, the user groups involved and their respective needs and wishes. Prioritize requirements and plan prototypes to deliver.

Build usability and functional prototype. Develop the usability and functional prototypes as well as system models. The developed prototypes are reviewed by different user groups.

Refine prototype. Engineer the prototype to a sufficiently high standard. The prototype should meet various non-functional requirements (e.g. efficiency, maintainability, etc.).

Deliver prototype. The prototype is installed in the live environment and (if applicable) integrated with previously developed prototypes. If the system is not completed then go back to Build usability and functional prototype (or in some situations to Business Analysis).