

BCS THE CHARTERED INSTITUTE FOR IT

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

SYSTEM DESIGN METHODS

Friday 19th April 2024 - 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 any Section A questions you attempt in Answer Book A

A1.

- a) Discuss what use case diagrams provide in terms of systems design. **(5 marks)**

- b) Discuss what class diagrams provide in terms of systems design. **(5 marks)**

- c) Discuss what activity diagrams provide in terms of systems design. **(5 marks)**

- d) Explain how use case and class diagrams can be cross-checked for consistency. **(10 marks)**

A2.

- a) An electricity supplier operational support system includes a management interface that shows an overview of the company's operational statistics, and an electricity grid maintenance geographical information system that shows all reported electricity supply problems.
 - i. Discuss which systems design techniques could be used to design the data structures required for the operational support system. **(5 marks)**

 - ii. Discuss which systems design techniques could be used to design the electricity grid maintenance geographical information system interface and management interface for the operational support system. **(10 marks)**

- b) How could the systems design techniques in a) support prototyping of the operational support system? **(10 marks)**

A3.

a) When selecting a new systems design method, discuss why it is important to assess the data modelling, process modelling, and temporal modelling aspects of the systems design method. **(12 marks)**

b) Consider the following projects with various characteristics:

- An application whose requirements are clear and unlikely to change, and there is NO urgent need for the application.
- An application whose requirements are unclear and vague and are likely to change, and there is NO urgent need for the application.
- An application whose requirements are unclear and vague and are likely to change, and where there is a very short timescale.

For the projects to develop the above applications, discuss which type of systems design approach (agile, prototyping, incremental, or waterfall would be appropriate).

(13 marks)

[Turn Over]

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

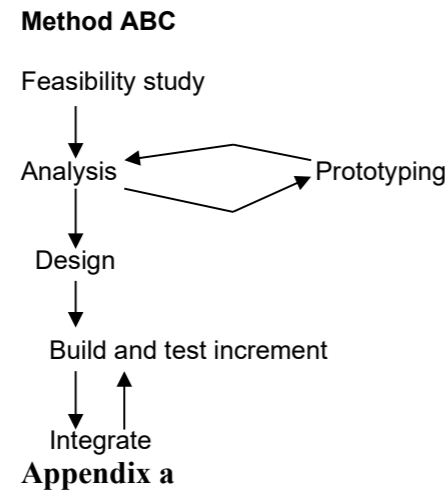
B4.

a) Explain the difference between reverse engineering and re-engineering in software industry. (6 marks)

b) Consider the following re-engineering projects you are involved in:

- Project 1. Re-engineering to restructure the entire system.
- Project 2. Re-engineering to restructure the entire system and to add some 'new' user requirements.
- Project 3. Re-implementation in a different programming language.
- Project 4. Reverse engineering to 'recover' lost design documentation.

Which stages of the ABC method (Appendix a) would you use in **each** of these projects? Justify your answers.



(11 marks)

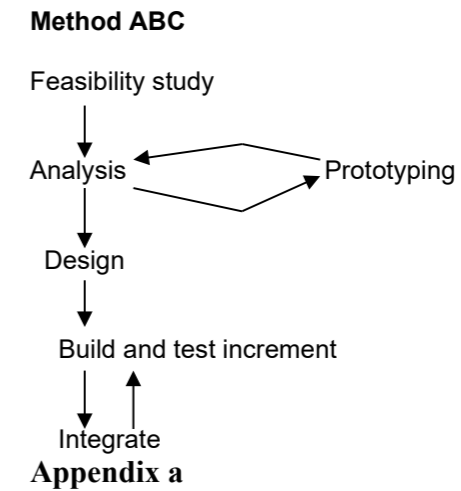
c) Your organisation wants to introduce a RAD/Agile method. It has used a traditional structured method for many years, so it has an existing culture and accepted working practices. Therefore, the introduction of the new method must be carefully planned and managed to achieve a successful outcome.

Suggest and briefly discuss at least **FOUR** actions for introducing the new method. (8 marks)

B5.

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 (**Appendix a**).

Your answer should include a brief justification of your 'allocation' of V&V activities/techniques to the ABC stages.



(15 marks)

b) Consider the following criteria that might be used in assessing systems development methods: Separation of analysis and design, code generation facility, design for change, readability of the source code, relevance of application, reverse engineering tools.

Discuss, giving appropriate arguments, which criteria are suitable, and which are **not** suitable for the above purpose.

(10 marks)

END OF EXAMINATION