BCS THE CHARTERED INSTITUTE FOR IT

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

SYSTEM DESIGN METHODS

Friday 21st April 2023 - 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
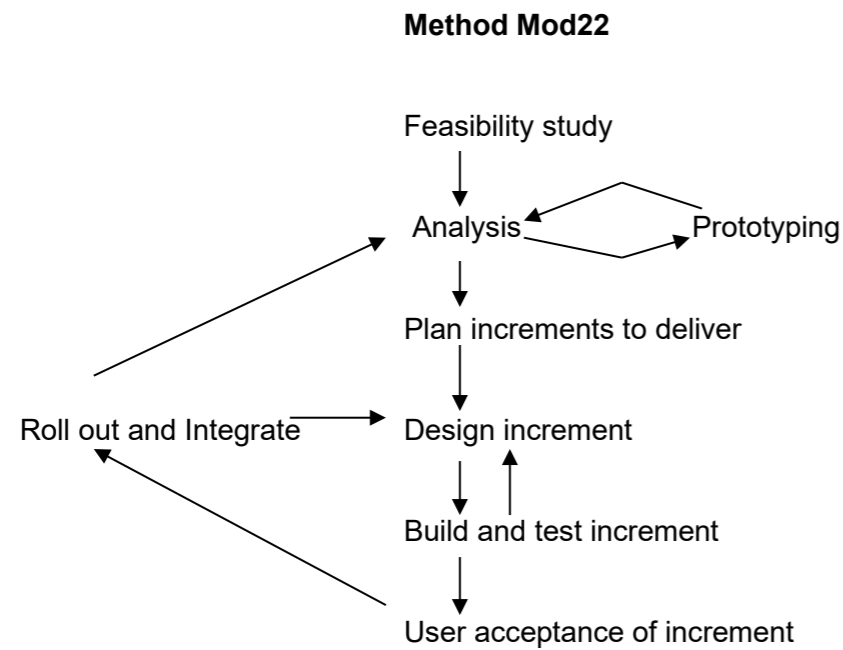**Answer Section A questions in Answer Book A**

A1.

a) How would you cross-check that a dataflow diagram and entity relationship diagram for a system are consistent with each other?

(5 marks)

b) How would you cross-check that a dataflow diagram and entity life history diagram for a system are consistent with each other?

(5 marks)

c) How would you cross-check that an entity relationship diagram and entity life history diagram for a system are consistent with each other?

(5 marks)

d) Consider the Mod22 method (see **Appendix** at the end of the paper):

   i) Identify and evaluate which approach to prototyping is used in the Mod22 method.

(5 marks)

   ii) Discuss the approach to systems development (i.e. software development process model) upon which the Mod22 method is based.

(5 marks)

A2.

a) A policing support system includes a crime mapping interface (which shows the number and type of crimes occurring in each area) and a dashboard that shows the overall set of crime statistics and police resource deployment statistics via a set of graphs and charts.

   i) What systems design techniques could you use to design the data structures required for the policing support system? Provide reasons for your choice(s).

(5 marks)

   ii) What systems design techniques could you use to design the crime mapping interface and dashboard for the policing support system? Provide reasons for your choice(s).

(10 marks)

b) The Mod22 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 structured techniques, decide which techniques you would use in the different stages of the method. Briefly justify your decisions.

(10 marks)

APPENDIX

Consider the following systems development method. The method is called Mod22.
The process and stages of the method are shown below.

Method Mod22

Feasibility study

Analysis ⟷ Prototyping

Plan increments to deliver

Roll out and Integrate → Design increment

Build and test increment

User acceptance of increment

END OF EXAMINATION

A3.

a) When selecting a new systems design method, discuss how the comparison of a project undertaken using **TWO** different systems design methods could help to assess the following aspects of the systems design methods:

    i) The efficiency of the systems design method.

    (8 marks)

    ii) The effectiveness of the systems design method.

    (8 marks)

b) Consider the following projects with various characteristics:

    i) An application whose requirements are unclear/vague and are likely to change in the future. There is a need for an urgent delivery of the entire system.

    ii) An application whose requirements are unclear/vague, but they are unlikely to change in the future. An early delivery of a partially developed system is expected.

    iii) An application whose requirements are clear and are unlikely to change in the future. An early delivery of a partially developed system is expected.

    iv) An application whose requirements are clear and are unlikely to change in the future. There is no need for an urgent delivery of the entire system.

Discuss which of the above projects can be developed using the Mod22 method (see **Appendix** at the end of the paper) and which projects are not appropriate for this method.

(9 marks)

B4.

a) Evaluate the suitability of the training techniques that you could use when a new systems design method is being introduced into an organisation, for the following scenarios:

    i) Training large numbers of staff regarding an overview of the new systems design method.

(5 marks)

    ii) Training small numbers of staff in the detailed operation of the new systems design method.

(5 marks)

    iii) Training individual staff in the systems design method over a period of time, when only short intervals of time are available for training.

(5 marks)

b) Your software organisation has been using a traditional structured method based on the Waterfall approach for many years. They now want to introduce the new method Mod22 (see **Appendix** at end of paper) that incorporates UML.

Illustrate how introducing the Mod22 method and UML may impact:

    i) The users of the method (i.e. developers).

    ii) The system users.

(10 marks)

B5.

a) When developing a new system, describe and explain which techniques would be suitable for:

    i) Checking the quality of designs and code.

(5 marks)

    ii) Checking that the system conforms to its specification.

(5 marks)

    iii) Checking that the users find the system acceptable to use.

(5 marks)

b) Suggest various V&V (Validation and Verification) activities and techniques that would be suitable for different stages of the Mod22 method process (see **Appendix** at end of paper). Your answer should include a brief justification of your allocation of the V&V activities/techniques to the Mod22 stages.

(10 marks)

[Turn Over]