

BCS THE CHARTERED INSTITUTE FOR IT

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

SOFTWARE ENGINEERING 2

Friday 28th September 2018 - Morning

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. [Software management]

- a) It is believed that the quality of software is determined by the quality of its developers in terms of their knowledge, discipline, and commitment.

Explain the typical project manager's problem of people selection, motivation, and team effectiveness in an IT department, and discuss the extent to which the Personal Software Process model can provide a solution.

(12 marks)

- b) Explain how a software project manager would estimate and measure the software development productivity of a team.

(5 marks)

- c) Software cost estimation models are empirical models derived from data from many software projects. These have been widely used and evaluated. Discuss the relevance of software cost estimation models to an Agile software project development team.

(8 marks)

A2. [Advanced use of UML including OCL and use of assertions, pre- and post-conditions]

- a) The managing director of a medium financial services company recently attended a seminar on advanced UML and has asked you to:

Explain the following terms: invariant, pre- and post- conditions.

Illustrate the above terms using a customer bank account as an example. You may assume that the following bank account operations should be specified using pre- and post- conditions:

- deposit – to deposit a specified amount,
- withdraw – to withdraw a specified amount if the resulting balance is greater than 0.0.

(15 marks)

- b) Briefly discuss whether the continuing development of the UML as an open standard will result in the creation of tools which:

- facilitate reverse engineering, and
- automatically generate production quality code from designs.

Justify your answer.

(10 marks)

A3. [Software metrics]

a) Give brief outlines of the following software metrics and, using specific examples, explain how each might be used to perform the quantitative assessment of software quality:

- i) architectural design metrics;
- ii) object oriented design metrics;
- iii) analysis metrics.

(15 marks)

b) Discuss the view that developments in metrics have not given any practical support to software professionals in any stage of the software development life cycle.

(10 marks)

Section B
Answer Section B questions in Answer Book B

- B4. [Software reuse, Component based software engineering, Software product lines, Design patterns]

As a member of the software development team for a new production control system, you have been allocated the task of designing the software module that picks items from a production line, inspects the completeness of manufacture, and displays the state at various locations. The state information can be any one of “perfect”, “rework required”, “discard”, and “undecided”.

- a) Give a broad overview of design patterns and specify ONE pattern you might consider using for this software module. You should highlight key aspects of the choice made using diagrams and annotations based on the scenario described.
(15 marks)

- b) Discuss the core composition of a software product line and give a brief outline of the various specialisations.
(10 marks)

- B5. [Software as a service, including web services and dynamic reconfiguration of Software systems]

- a) Give an outline of the underlying principles of web service standards and discuss how these can provide support for the development of inter-organisational applications.
(15 marks)

- b) Select a typical process model for a manufacturing business and demonstrate the design of a service-oriented system for such a company.
(10 marks)