

BCS THE CHARTERED INSTITUTE FOR IT

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

SOFTWARE ENGINEERING 2

Tuesday 20th March 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

- a) Software evolution processes vary considerably depending on the type of software being maintained, the development processes used in an organisation and the people involved in the process. However, they include some fundamental activities. Write a brief report that outlines a typical software evolution process. **(12 marks)**

- b) Software maintenance costs are influenced by a number of technical and non-technical factors. Some of the factors are: module independence, programming style, documentation, staff stability, hardware stability, and software age.

Which of the above factors is a software engineer able to control when **developing** new software? For each of these 'controllable' factors, explain how a software engineer would attempt to minimize future maintenance costs.

(6 marks)

- c) After a major release of a software system, there often follows a period of corrective maintenance. Discuss why this can occur, how it could be avoided and whether it is inevitable.

(7 marks)

A2

- a) Outline three reasons why assertions are useful in software design.

(9 marks)

- b) A system is required to keep track of students who belong to a World Cinema club. The maximum number of club members is 50. Some of the typical functions provided by the system are as follows:

- join (sNumber) – to add a new student (whose number is sNumber) to the club provided that the upper limit (i.e. 50) is not exceeded,
- leave (sNumber) – to delete a student (whose number is sNumber) from the club,
- retrieve (sNumber) – to retrieve details of the student whose number is sNumber,
- is_a_member (sNumber) – to return true if a student (whose number is sNumber) is a member of the club and false otherwise,
- no_in_club – to return the current number of club members.

Define and develop formal (e.g. using OCL) and natural language specifications for this system. The specifications should include pre and post conditions for the following operations: join, leave, retrieve as well as the invariant for the club. State all assumptions made.

(16 marks)

Section B
Answer Section B questions in Answer Book B

B3

- a) Discuss **TWO** aspects of the requirements engineering process and assess their usefulness in capturing, specifying, and communicating requirements throughout the software lifecycle.

(16 Marks)

- b) Discuss and suggest how advances in natural language processing can help engineers detect requirement ambiguities and defects.

(9 Marks)

B4

- a) Give a brief outline of a traditional software-process-improvement (SPI) model used in large organizations, and discuss the challenges very small software companies might face when implementing these models.

(16 Marks)

- b) Discuss how small software companies can adopt aspects of SPI in practice, to realise external and internal opportunities and benefits.

(9 Marks)

B5

- a) Compare and contrast **TWO** software engineering approaches that aim to satisfy the need to develop software quickly, in an environment of rapidly changing requirements.

(16 Marks)

- b) Discuss the view that agile methods lack maturity and problems remain, as well as opportunities, for improving the process of software construction.

(9 Marks)

END OF EXAM