BCS THE CHARTERED INSTITUTE FOR IT

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

SOFTWARE ENGINEERING 2

Tuesday 21st March 2017 – Morning
Answer **any** THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours

Answer any <u>Section A</u> questions you attempt in <u>Answer Book A</u>
Answer any <u>Section B</u> questions you attempt in <u>Answer Book B</u>

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) Write a brief overview of the various forms of software process metrics available today, and discuss how they might be usefully employed from the initial project stages, through to the commissioning of a new system. Illustrate your answers with examples.

(10 marks)

b) Maintainability is one of the most important software quality characteristics. Give the definition of software maintainability.

It has been suggested that maintainability is influenced by the following software quality sub-characteristics: analyzability, changeability, stability, testability. Justify this claim.

(10 marks)

c) Consider the following software attributes: Maintainability, Cyclomatic complexity, Lines of Code count (LOC), Reliability, Number of errors.

Which of these attributes can be measured directly and which indirectly? Justify your answers.

(5 marks)

A2.

a) What is the main idea behind an incremental development process? Illustrate your answer using, as an example, a system with 15 functional requirements (leading to 15 user services) where requirements Fr1,…Fr5 have the lowest priority (i.e. they are the least important), requirements Fr6,….Fr10 are more important, and requirements Fr11,….Fr15 are the most important to users. Discuss the advantages and disadvantages of incremental development.

(8 marks)

b) Assume that you are a project manager of three projects with the following characteristics:

- Project 1. A complex real-time system whose requirements can be relatively easily identified and are stable.

- Project 2. A web-site for a local library. Requirements are vague and are likely to change in the future.

- Project 3. An order processing system with a web-site for a local business. Requirements are vague but stable (i.e. unlikely to change in the near future).

Consider also the following software development approaches/models: waterfall, incremental, evolutionary prototyping, throw-away prototyping and component-based development. Which of the above models would you choose for each of your projects? Your choices should be properly justified.

(9 marks)

c) Discuss the view that modern life cycle models with their emphasis on prototyping, create systems that are often fragmented and difficult to integrate; of unsatisfactory reliability, performance, and functionality; and of limited longevity.

(8 marks)

A3.

a) Explain the difference between software reusability and software reuse.

(4 marks)

b) Discuss briefly benefits of and problems associated with software reuse.

(10 marks)

c) Component based systems development (CBSD) methods place a lot of emphasis on component reuse, hence they differ from 'traditional' systems development methods.

You are asked:

(i) To briefly explain the main differences between 'traditional' and CBSD process/life cycle models;

(4 marks)

(ii) To discuss the main stages of CBSD methods.

(7 marks)

Section B
Answer Section B questions in Answer Book B

B4.

a) Define the term software process improvement, and explain how the process triangle of product, people and technology can impact quality and performance

(5 marks)

b) Give a brief explanation of what improvements can be made to the construction and infrastructure management processes of a traditional development process cycle.

(8 marks)

c) A small to medium sized software house is considering the use of a reference framework such as CMMI, and ISO/IEC 12207 for improving its own processes.

Write a report that presents a brief outline of ONE of these reference frameworks highlighting the degree of coverage of the software process, independence of specific methodologies, and acceptance amongst software professionals and communities.

(12 marks)

B5.

The developer of an application which manages team-based projects, having previously operated as a sole trader, has seen a major growth in customer numbers. The decision has been taken to employ up to six members of staff for the continued development and maintenance of the application.

a) Write a report that:

(i)   Outlines to the former sole trader, the issues involved in selecting people for software development and maintenance work today;

(ii)   Discusses key issues and techniques for team organization, cohesion, and motivation.

(16 marks)

b) Briefly explain the People Capability Maturity Model (P-CMM) and discuss any similarity with aspects of the agile philosophy.

(9 marks)