BCS THE CHARTERED INSTITUTE FOR IT

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

SOFTWARE ENGINEERING 2

Friday 8th October 2021 – Morning

Time: THREE hours

Answer **any** THREE questions out of FIVE. All questions carry equal marks.

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) You are in charge of four software development projects. The 'characteristics' of each of your projects are as follows:

- Project 1. Website for a local company. Relatively small system. Requirements are vague and likely to change in the near future;
- Project 2. A very large embedded system whose requirements can be easily identified and are relatively stable;
- Project 3. A 'standard' business application. You have developed similar systems in the past;
- Project 4. A relatively complex administrative system for one of the local hospitals. Some of the requirements seem to be pretty vague, but all the requirements are stable.

Consider the following software development approaches/models:

i) Waterfall;
ii) Throw-away prototyping;
iii) Evolutionary prototyping;
iv) Component-based development.

Which of the above approaches/models would you choose for each of your projects? Briefly justify your choices.

(12 marks)

b) Explain the main differences between throw-away prototyping and evolutionary prototyping.

(6 marks)

c) Explain why programs that are developed using evolutionary prototyping are likely to be difficult to maintain.

(7 marks)

A2.

a) Discuss how the following concepts differ from one another, and give examples of how each might be measured:

    i) Software process and product metrics;
    ii) Software quality characteristics and sub characteristics;
    iii) Coupling, cohesion and complexity metrics.

(16 marks)

b) Portability is one of the most important software quality characteristics. Give the definition of software portability.

It has been suggested that portability is influenced by the following sub-characteristics:

    i) Adaptability;
    ii) Installability;
    iii) Co-existence;
    iv) Replaceability.

Justify this claim.

(9 marks)

Section B
Answer Section B questions in Answer Book B

B3.

A college is seeking to establish a Virtual University College platform for itself. As a Requirements Engineer, you have been contracted on the project to automate the student records system.

a) For each of the following requirements engineering activities, identify the tasks, tools, and methods available to you on this particular project:

   i)   Requirements elicitation;
   ii)   Requirements analysis;
   iii) Requirements validation;
   iv)   Requirements management.

(20 marks)

b) Comment on how the use of integrated tool-support for multiple stages of the requirements engineering process can improve its efficiency and effectiveness.

(5 marks)

B4.

a) For each of the following architectural styles, give a brief summary of their design elements, examples of usage, and particular strengths when compared to other styles:

   i)   Traditional, language influenced styles;
   ii)   Layered styles;
   iii) Data-flow styles;
   iv)   Shared memory styles.

(16 marks)

b) Briefly discuss the view that modern architectural frameworks promise to dramatically improve developers' productivity and make it easier for those without previous programming experience to develop complex apps.

(9 marks)

B5.

a) Give an overview of Lehman's Laws and discuss their applicability to real-world software practice.

(15 marks)

b) Discuss whether Lehman's Laws remain applicable to some of the major modern trends of software such as architectural design patterns, open source development, and software as a service.

(10 marks)

End of Examination