

**BCS THE CHARTERED INSTITUTE FOR IT**

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

**SOFTWARE ENGINEERING 2**

Tuesday 17<sup>th</sup> March 2020 - 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 <b>NOT</b> allowed in this examination.
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**Section A**  
**Answer Section A questions in Answer Book A**

**A1.**

- a) Briefly describe the purpose and the main features of OCL (Object Constraint Language).  
**(9 marks)**
- b) A system is required to manage a very large digital music library. Some of the typical library functions include:
- i) add(mentry) – to add a new musical entry (mentry) to the library;
  - ii) delete(mentry) – to delete a musical entry (mentry) from the library;
  - iii) retrieve(mentry) – to retrieve a musical entry (mentry).

You may also assume that there will be no more than 2,000 musical entries, and none of these will be repeated.

In this context, define and develop natural language and formal (e.g. using OCL) specifications for the system. Your answer should include pre- and post-conditions and possible invariants. State all assumptions made.

**(16 marks)**

**A2.**

- a) Discuss briefly and contrast the following preventive maintenance activities:
- i) reverse engineering;
  - ii) re-engineering;
  - iii) restructuring.

Illustrate your discussion using examples.

**(9 marks)**

- b) Outline the steps of a typical reverse engineering process.  
**(6 marks)**
- c) Discuss the principal factors that affect the cost of software re-engineering.  
**(10 marks)**

**[Turn Over]**

**Section B**  
**Answer Section B questions in Answer Book B**

**B3.**

A software company would like to adopt a new software process improvement framework to enhance the quality of their software, reduce costs and accelerate their development processes.

- a) Discuss the various process improvement frameworks available that can help the company quality and productivity objectives.

**(15 marks)**

- b) After 18 months of implementing the process improvement framework, the company's process capability profile exhibited maturity scores of 3 in Project monitoring and control, 1 in Risk management, 4 in Configuration management, and 2 in Requirements management.

Give a summary of the indicative nature of these scores and any possible actions the company may consider to improve those areas.

**(10 marks)**

**B4.**

The requirements engineering process aims to produce as outputs, the system requirement specification, agreed by stakeholders supported by various system models. Consider an example application domain and complete the following tasks:

- a) Discuss the general inputs, techniques and tools of the requirements engineering process that would be applied to elicit and model the requirements of stakeholders.

**(15 marks)**

- b) Identify the weaknesses of most requirements engineering practice, and briefly discuss whether an ideal process can exist for the application domain selected.

**(10 marks)**

**B5.**

- a) For **EACH** of the following software development approaches, provide an overview of the approach and explain to which development situations the approach is most suited.

- i) Prototyping;
- ii) Software reuse;
- iii) Design patterns.

**(15 marks)**

- b) A company wishes to develop a safety-critical patient monitoring system for a hospital. Discuss the benefits and potential problems of combining the above approaches in the development and delivery of such a system.

**(10 marks)**

**END OF EXAMINATION**