

**BCS THE CHARTERED INSTITUTE FOR IT**

**BCS HIGHER EDUCATION QUALIFICATIONS  
BCS Level 5 Diploma in IT**

**SOTWARE ENGINEERING 1**

**Wednesday 30<sup>th</sup> March 2016 - Afternoon**

Answer **any** FOUR questions out of SIX. All questions carry equal marks.  
Time: TWO 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.
---

**Section A  
Answer Section A questions in Answer Book A**

- A1.** Maintaining software contributes significantly to the overall cost of a software product.
- a)** The cost of changing software during its maintenance phase can be reduced by investing in good Software Engineering techniques during its development phase. Identify **THREE** Software Engineering techniques you believe contribute to reducing the cost of maintenance and describe how each of these techniques achieves this.  
**(6 marks)**
- b)** When a system requires significant and continual change, a decision must be made as to whether or not it is better to discard the old system and build a new one to replace it. Create **FIVE** questions you would ask to assist making that decision.  
**(10 marks)**
- c)** A software development company has been experiencing significant issues regarding the maintenance of some of its existing systems.

You are a senior Software Engineer responsible for the evolution of a new software product. You have to decide how your Software Engineers will be split between the development team and the maintenance team of the new product.

Discuss and compare which factors would influence whether there should be separate teams for development and maintenance, one team covering both activities, or a small overlap between the teams.

**(9 marks)**

**A2.**

- a) Agile Development is a process that values customer collaboration over contract negotiation. Discuss **THREE** issues a Software Engineer should be mindful of when adopting this approach during software development. **(9 marks)**
- b) Agile Development is a process that values responding to change over following a plan. Discuss **THREE** issues a Software Engineer should be mindful of when adopting this approach during software development. **(9 marks)**
- c) Compare and contrast the features of software development projects which would make them either suitable or not suitable for agile development. **(7 marks)**

- A3.** You have been asked to project manage the development of a small, interactive system for a village library. The system will provide functionality for adding new members (borrowers), updating members' details, lending books and returning books.

Discussions with the library staff have revealed the following facts: there is some confusion and uncertainty about the content and layout of the interface and also the requirements for adding new members and updating members' details; the library may soon be taken over by the main city library.

Discussions with your Software Engineers have revealed the following facts: the uncertainty about the requirements means that the total development time will be difficult to predict; some of the new team members are unfamiliar with testing tools; some key team members may be unavailable at critical times; the team are planning to use some reusable software components which to date have not been tested.

- a) List **SIX** different types of risk. **(6 marks)**
- b) Create a risk checklist for this project by providing **ONE** example, from the scenario above, for each type. **(9 marks)**
- c) Develop a strategy for managing **FIVE** of the risks identified in part b). Your answer should be in the form of a table with **ONE** strategy for each risk. **(10 marks)**

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

**B1.**

- a) Briefly describe the difference between a static and dynamic view of components in a UML model.  
(4 marks)
- b) Name any three UML diagrams that can be used to model dynamic behaviour and briefly describe the purpose of each one.  
(6 marks)
- c) You have been given some requirements for an internet based tool hire site. These include the ability of the system to register a new customer with details of name, address, telephone number and email. The system has to generate a unique id for each new customer. Once registered a customer can login and browse the tools catalogue and select the tool or tools they wish to hire. Tools are hired out in multiples of whole days. When a tool is hired out the catalogue displays its outstanding hire period, if a tool is not already out or booked it is displayed as immediately available. If a customer selects an available tool the order is fulfilled and the display is updated. If a customer selects a tool already hired, the system puts the customer on back order and updates the display with the additional hire period. When back orders become available for fulfilment customers are notified by email.
- 1) Using the UML Use Case Diagram, show a suitable model of the tool hire site requirements.  
(10 marks)
- 2) Using an appropriate UML diagram, show a model of the flow of control by time sequence.  
(5 marks)

**B2.**

Software verification is part of a testing process which is concerned with ensuring that the product is being built correctly.

- a) In the context of traditional software development
- 1) Give an outline of the unit testing process for verification.  
(5 marks)
- 2) Compare Top-Down and Bottom-Up integration testing in the verification process.  
(8 marks)
- b) In the context of Object Oriented software development
- 1) Give a brief description of how unit testing would be carried out.  
(4 marks)
- 2) Describe the process of integration testing for software verification.  
(8 marks)

**B3.**

- a)** Computer Aided Software Engineering (CASE) tools can be classified according to their function. Briefly explain how the following CASE tools might be used.

- |                                       |                  |
|---------------------------------------|------------------|
| 1) Business Process Engineering tools | <b>(2 marks)</b> |
| 2) Project Planning tools             | <b>(2 marks)</b> |
| 3) Requirements Tracking tools        | <b>(2 marks)</b> |
| 4) Documentation tools                | <b>(2 marks)</b> |
| 5) Database Management tools          | <b>(2 marks)</b> |

**b)**

- 1)** Integrated CASE tools seek to bring together a range of software engineering activities. Outline a set of requirements that an integrated CASE tools should have.

**(5 marks)**

- 2)** Describe the role of an integrated CASE tool data repository and outline the typical contents of such a tool.

**(10 marks)**