BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

SOFTWARE ENGINEERING 1

Friday 30th March 2012 - 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 NOT **allowed in this examination.**

Section A

Answer Section A questions in Answer Book A

A1. A small taxi firm has been operating for many years based: the details of the existing customers and the number of completed services (to and from airports) have been regularly saved on disc. The drivers manage all the bookings, and they also keep the details of the transfers to and from airports; the courier services are allocated among the drivers based on their timetable. Once completed, these services are regularly backed up.
The taxi service owner has lately decided to introduce a Content Management System into the business, in order to manage the bookings more efficiently: customers would be able to pay online or by phone; the courier service will have to be booked online; and customers will be able to leave comments on a blog.

Considering the above scenario:

a) List and describe at least THREE possible risks that the service is exposed to in its current business process.

(9 marks)

b) List and describe at least THREE possible risks that the service will be likely to face when the Content Management System has been implemented.

(9 marks)

c) Analytically select and describe ONE technique for estimating the effort and the costs associated with the project of building the Content Management System.

(7 marks)

A2. a) Consider a program implementing an *instant messaging system* and outline THREE possible types of error that can occur. The errors should be related to different ways in which the software implementing the messaging system could fail, by reproducing and completing the following table in your answer book:

Type of error	Example of this error type in an instant messaging system

(9 marks)

b) For two of the examples given in part a) provide a suitable error message that would be appropriate to inform users in the event of a failure occurring and explain the reasons why this can be considered informative to the users.

(10 marks)

c) Discuss the difference between a software *error*, a program *fault* and a system *failure* illustrating your answers with relevant examples.

(6 marks)

A3. a) Discuss the practice of software reuse within the software life cycle and describe at least THREE of its benefits.

(9 marks)

b) In the context of software reuse, give an example of a reusable component.

(4 marks)

c) Identify three possible risks that can occur when a system is built using reusable components and explain how these risks could be reduced.

(6 marks)

d) In the context of software reuse, explain why access to the source code may be desirable and in some cases necessary for the validation of the reusability of a component.

(6 marks)

Section B

Answer Section B questions in Answer Book B

B4. a) It is important that software is *fit for purpose*. Explain what "fit for purpose" means in this context. Describe various ways in which software developers can try to ensure that software is fit for purpose.

(8 marks)

b) Define the following types of testing and briefly outline scenarios in which each type of testing would be used.

i) Regression testing

ii) Acceptance testing

iii) Unit testing.

(12 marks)

c) Outline the role and nature of testing in *agile* software development. What practices can or should be used, and why?

(5 marks)

B5. A health clinic provides medical services to patients in a small town. Five doctors and three nurses work at the clinic; they consult with patients, prescribe medicines and carry out minor medical treatments. Patients with more serious conditions are referred to specialists at the local hospital. A medical information system is being designed for use in the clinic. The system will manage information about employees (doctors, nurses and administrator), patients and their contact details, appointments and consultations, medicines and prescriptions, treatments given, and referrals.

a) Produce a UML class diagram for use in constructing the system using an object-oriented programming language. Your diagram must include all applicable classes and relationships. There is no need to show the attributes and operations for each class.

(12 marks)

b) Explain and give an example of the *generalisation* relationship in UML class diagrams. What construct(s) in code does it correspond to?

(7 marks)

c) Explain the relationships between UML class diagrams and UML use case diagrams.

(6 marks)

B6. a) List the types of software tool available for use in the *development and maintenance of software systems*. Explain how each type of tool is used and what benefits its use can bring. Express your answer using a table as shown overleaf.

Type of tool used	**How tool is used**	**Benefits of tool use**
1. …		
2. …		
3. …		
4. …		
5. …		
6. …		
7. …		
8. …		

etc.

(8 marks)

b) List the types of software tool available for use in *planning, analysis and design of software systems*. Explain how each type of tool is used and what benefits its use can bring. Express your answer in a table similar to that used for part (a) above.

(8 marks)

c) The software tools used in system planning, analysis, design, development and maintenance offer various forms of integration. Explain how different tools may be integrated and what capabilities this integration makes possible. Express your answer in the form of a diagram showing the different software tools and types of integration available between them, annotated to explain the capabilities that result from integration.

(9 marks)