**BCS THE CHARTERED INSTITUTE FOR IT**

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

**SOFTWARE ENGINEERING 1**

Wednesday 2nd April 2014 - 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.**
*Software Engineering; the nature of software, theoretical models, the software crisis, the cost of maintenance, the cost of quality.*

OldStyle Computing is a company created in the 1970s, producing software and hardware for single processors and mainframes for a number of established clients. After a major downsizing of its business, the company has decided to shift its focus to more established software engineering techniques, and would require some understanding of how software engineering has changed in the last twenty years.

a) Explain how the concept of “abstraction” can produce added value to the company.

**(5 marks)**

b) Describe how software architecture can be leveraged by the company to advance the state of the art of its development approach.

**(5 marks)**

c) Outline how metrics could be utilised by the company to monitor its development business.

**(5 marks)**

d) Apart from the use of abstraction, architecture or metrics, describe TWO other software engineering approaches that could be employed by the company in its new business.

**(10 marks)**

**A2.**
*Software Engineering key practices; the multidisciplinary nature of software design, team work, productivity, testing, product maintenance, and software product life cycle.*

In the context of software product life cycle, different process models can be used by software organisations to develop end-user products.

a) Identify and describe THREE differences between the traditional Waterfall model, and the V model to software development.

**(2x3 marks)**

b) Provide an example of a project that could benefit from the implementation of a Waterfall model, and identify the characteristics of its main development phases (requirements, design, implementation and testing).

**(3+8 marks)**

c) Describe and outline the FOUR phases of a spiral model, and outline how the risk factor affects this model.

**(8 marks)**

**A3.**

*Project Management; project estimating and project planning; management and maintenance of software products in the consumer marketplace, total cost of system ownership, software life-cycle cost modelling, project development cost modelling, project and product risk management.*

The director of a company is trying to estimate the costs of the activities involved in various parts of a project:

a) Describe TWO advantages of the Work Breakdown Structure (WBS) technique, and TWO characteristics of the Product Breakdown Structure (PBS) visualisation.

**(4 marks)**

b) Describe TWO attributes of a PERT chart, and explain how a PERT chart compliments the WBS and PBS views.

**(2+2 marks)**

c) Define and exemplify the following terms:

i) critical path
ii) slack time
iii) estimation error

**(9 marks)**

d) Identify TWO reasons why the estimated length of an activity could radically differ from its actual duration.

**(8 marks)**

**Turn Over]**

## Section B

Answer Section B questions in Answer Book B

**B4.**

*OO notation for describing software components and architecture*

a) Briefly describe the process of Object Oriented Development (OOD) within:

i) Analysis
ii) Design
iii) Implementation

**(6 marks)**

b) Throughout the various phases of the project life cycle, the UML can be used to graphically model processes. From a UML context explain the content and purpose of the following diagrams and state where in the software life cycle they are likely to be used

i) Class Diagram
ii) Object Diagram
iii) Component diagram

**(9 marks)**

c) A departmental library offers staff access to journals for reference. A member of staff can make a request for a journal. If it is available the request is satisfied, if it is not available the request is placed on a request list to await further processing.

i) Provide a UML use case diagram to show this system.
ii) Provide a UML sequence diagram showing the message sequence for the request list.

**(10 marks)**

**B5.**

*Validation, verification, and testing*

a) Give a definition, with examples of the Validation & Verification process within the software life cycle of a large project.

**(10 marks)**

b) Describe the software program inspection process and state the advantages it is thought to have over testing.

**(10 marks)**

c) Give one example of an automated static analysis tool.

**(5 marks)**

**B6.**

*Software Engineering Tools and Environments*

a) Identify and describe the role that upper and lower CASE tools have in various phases of the software life cycle.

**(12 marks)**

b) Explain what software reuse is and identify a range of benefits and problems associated with using this approach to development.

**(8 marks)**

c) Outline any one technique that supports software reuse which might be used in a CASE tool repository.

**(5 marks)**