BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

Software Engineering 1

Monday 10th May 2021 – Afternoon

Answer **any** FOUR questions out of SIX. All questions carry equal marks.

Time: TWO hours

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 B
Answer Section B questions in Answer Book B

B4.

a) Describe how the following methods are used in software product maintenance:

   i)   Corrective maintenance;
   ii) Adaptive maintenance;
   iii) Perfective maintenance.

(15 marks)

b) Explain why it is generally more expensive to add a new software feature during maintenance than it would be for the same feature to be included in the original development phase.

(10 marks)

B5.

a) Describe **THREE** software validation techniques that can be used to ensure customer requirements are being met.

(9 marks)

b) Describe **THREE** software verification techniques that can be used to ensure CORRECT implementation of functionality.

(9 marks)

c) Explain possible benefits of a project development strategy that includes an independent test group (ITG) whose primary responsibility is for software testing.

(7 marks)

B6.

a) Describe the typical stages that a software product goes through from initial concept to its disposal.

(12 marks)

b) Describe the key features of a software repository suitable for use in the control of an incremental development project.

(13 marks)

END OF EXAMINATION

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

A1.
a) Explain what *use cases* and *use case diagrams* are, and how they can be used to capture the functional requirements for a software system.

(5 marks)

b) Explain the role of *pre-conditions* and *post-conditions* in detailed use case descriptions.

(3 marks)

c) Using the example of a simple booking system for a local taxi company, discuss in detail the process you might follow to identify use cases for a new software system. You should assume that the business is already operating, but without a computer system.

(8 marks)

d) Briefly explain the difference between a *use case* and a *scenario*. Illustrate your answer with an example use case and related scenario from the taxi booking system discussed in part c) above. You do not need to give full details of the use case or scenario.

(4 marks)

e) Explain how use cases and scenarios can be used later in the software development life-cycle after requirements elicitation.

(5 marks)

A2.
a) For large systems, software quality management can be structured into **THREE** main activities: quality assurance, quality planning, and quality control. Describe **EACH** of these activities.

(6 marks)

b) Describe **THREE** software quality attributes which might form part of a quality plan.

(6 marks)

c) Give **TWO** examples of software quality control techniques, and explain how they would be included in the Software Development Life Cycle (SDLC).

(6 marks)

d) The cost of improving software quality can be divided between prevention costs, appraisal costs and failure costs. For **EACH** of these, give at least **TWO** specific examples of activities which incur such costs, and comment on the relative cost values.

(7 marks)

A3.
Consider the following class diagram, which represents the design of a system to simulate the actions of a security light outside a building:
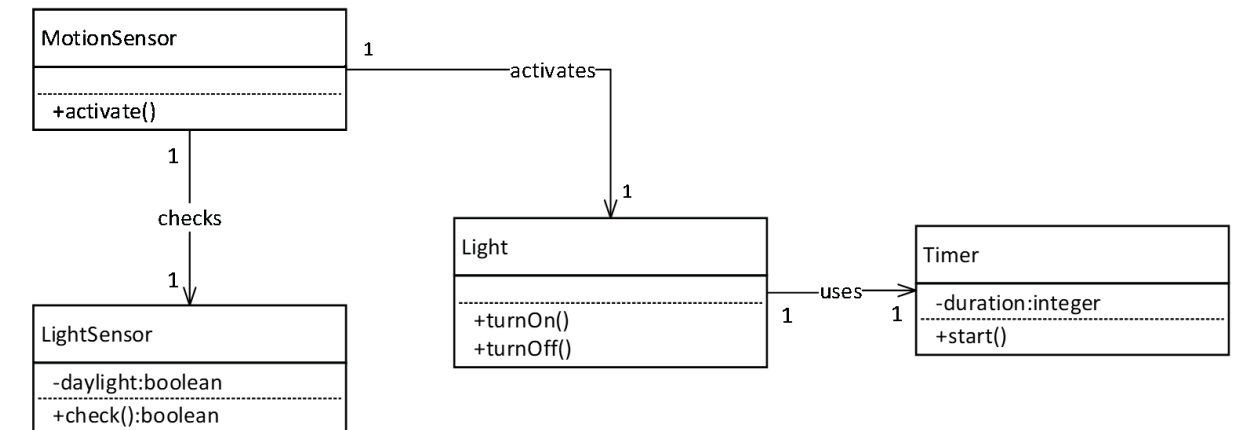
The informal specification for the behaviour of the system is as follows:

i) When the MotionSensor is activated, if it is not daylight, then the Light is turned on. If it is daylight, the MotionSensor does not turn the Light on.
ii) When the Light comes on, a Timer is started. The Light is turned off when the Timer runs out (expires) after a pre-set duration which is measured in seconds.

a) Describe what the class diagram represents, include all structural constraints.

(12 marks)

b) Using the class diagram and the description of the system's behaviour, draw a sequence diagram for the following scenario:

During the hours of darkness, a user activates the motion sensor by walking under the light. After the timer has expired and it has become daylight, the user walks under the light and activates the motion sensor a second time.

Clearly state any assumptions you need to make about the system behaviour.

(13 marks)

[Turn Over]