BCS THE CHARTERED INSTITUTE FOR IT

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

SOFTWARE ENGINEERING 2

Wednesday 16th April 2025 - Morning

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 **NOT** allowed in this examination.

Section A
Answer Section A questions in Answer Book A

A1.

a) Assess the fundamental difference between a fat-client and a thin-client approach to client–server systems architectures.

(5 marks)

b) You have been asked to develop a system for stocks & shares information where dealers can access information about companies and evaluate various investment scenarios using a simulation system.

Each dealer uses this simulation in a different way, according to their experience and the type of stocks in question.

Assess what architecture is most appropriate for this system. Your answer should show clearly where the different types of functionalities are located. Justify the architectural model that you have chosen.

(20 marks)

A2.

a) Evaluate appropriate reliability metrics for the following classes of software system:

i. A system that monitors patients in a hospital intensive care unit.
ii. An automated vending machine control system.
iii. A system to control braking in a car.
iv. A system to control a refrigeration unit.
v. A management report generator.

(10 marks)

b) Discuss the usage of **each** of the above systems and discuss appropriate values for the reliability metrics.

(15 marks)

A3.

The Department of Public Works for a large city has decided to develop a web-based Pothole Tracking and Repair System (PHTRS). A description follows:

Citizens can log onto a website and report the location and severity of potholes. As potholes are reported, they are logged within a “public works department repair system” and are assigned an identifying number, stored by street address, size (on a scale of 1 to 10), location (middle, curb, etc.), district (determined from the postcode), and repair priority (determined from the size of the pothole).

Work order data is then associated with each pothole and includes the pothole location and size, repair crew identifying number, number of people on crew, equipment assigned, hours required to complete repair, hole status (work in progress, repaired, temporary repair, not repaired), amount of filler material used, and cost of repair (computed from hours required, number of people, material and equipment used).

Finally, a damage file is created to hold information about reported damage due to the pothole and includes the citizen’s name, address, phone number, type of damage, and cost of the damage. PHTRS is an online system; all queries are to be made interactively.

a) Explain what are meant by pre- and post-conditions in UML models. Discuss when you would use pre- and post-conditions when developing models.

(5 marks)

b) Draw a UML use case diagram for the PHTRS system explaining any assumptions about the manner you make about how users interact with this system.

(12 marks)

c) Draw a sequence model for the PHTRS system clearly identifying any additional assumptions you have made.

(8 marks)

[Turn Over]

Section B
Answer Section B questions in Answer Book B

B4.

a) The Waterfall model was one of the earliest Software Development Lifecycle models and many of the stages and methods within it are still in place in more modern lifecycle models.

Assess the significance of the Waterfall model in the progression of Software Development Lifecycle models from Waterfall to early iterative models such as the Spiral model and current Agile Models such as Kanban and Scrum.

(15 marks)

b) You have been hired as a developer to produce a new app which is to deliver outstanding patient services for people requiring hospital treatment. The healthcare provider has requested such an app to improve patient service and use of medical resources and is to be used primarily by the patients. For now, this is a high-level idea with not much indication of how to go forward. They would like to get some use from the app as quickly as possible.

Discuss how the evolutionary prototypal model may be a good option for the developers to help the healthcare provider deliver this new application. Use examples from the case study throughout.

(10 marks)

B5.

A global professional services company, ABC Services, were sued by the Car Rental Company, HCarZ, over a website redesign which ended in failure. HCarZ sued ABC Services for the $32 million it paid ABC Services in fees, and more millions to cover the cost of fixing the website.

Evaluation of the project showed that many of the problems could have been due to failure to implement up to date ‘requirement engineering’ methodologies.

a) Explain what is meant by a ‘requirement engineering’ process and identify the steps/stages involved.

For **each** of these identified steps/stages, discuss why it is important for ABC Services to implement these in the future.

(9 marks)

b) Explain the strategies you would implement for these stages to ensure the website was delivered on time and as intended to be used by HCarZ.

(10 marks)

c) Discuss the benefits of writing test cases at the same time as specifying a requirement. You should illustrate your answer with examples.

(6 marks)

END OF EXAMINATION