

BCS THE CHARTERED INSTITUTE FOR IT
BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

SOFTWARE ENGINEERING 1

Tuesday 26th April 2022 – 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) Describe how the following three factors influence the way in which a software project team work as a group:
- i) Group composition **(3 marks)**
 - ii) Group cohesiveness **(3 marks)**
 - iii) Group communications. **(3 marks)**
- b) Explain the term 'software maintenance debt' and state how it could be reduced. **(7 marks)**
- c) Describe the following three types of software maintenance:
- i) Maintenance to repair software **(3 marks)**
 - ii) Maintenance to adapt an application to a new operating environment **(3 marks)**
 - iii) Maintenance to add or alter functionality. **(3 marks)**

A2.

- a) Explain how software verification can be achieved using the following two testing methods.
- i) Unit testing **(6 marks)**
 - ii) Integration testing. **(6 marks)**
- b) Describe the purpose of a test plan for a software validation process. **(5 marks)**
- c) Explain the role of the following two methods in customer acceptance testing:
- i) Alpha testing **(4 marks)**
 - ii) Beta testing. **(4 marks)**

A3.

- a) Explain how the following three cost estimation techniques are used in software development cost modelling:
- i) Expert judgement **(4 marks)**
 - ii) Estimation by analogy **(4 marks)**
 - iii) Algorithmic based modelling. **(4 marks)**
- b) Describe **each** of the following three categories of risks that can affect a software development initiative:
- i) Project risks **(3 marks)**
 - ii) Product risks **(3 marks)**
 - iii) Business risks. **(3 marks)**
- c) Explain how a risk transfer strategy can be used in a software project. **(4 marks)**

[Turn Over]

Section B
Answer Section B questions in Answer Book B

B4.

You have been asked to work on the software design for a ride-sharing mobile phone app, which matches people who require transport with drivers in the local area who have spare seats in their vehicles.

The initial system requirements include the following:

- Users should be able to register as either a vehicle owner/driver or a passenger, with a name, mobile phone, and payment details. They will be assigned a unique identification. Users who own vehicles also need to register the type, colour, and registration plate of their vehicle, along with the number of passenger seats it has.
- Passengers can request a ride from their current location to a destination of their choosing. They may also specify the type of vehicle (small car, luxury car, tuk-tuk, etc.) and number of seats required. Based on their choice, the system will calculate a price for the journey.
- When logged in, drivers in the area will be notified of suitable passenger requests and given the option to accept or reject each ride. Drivers can only accept one ride at a time.
- Once a driver has accepted a passenger for a ride, the passenger will be notified of the driver's name and vehicle's details and have the option to track the vehicle's location on a map.
- The driver must inform the system when a passenger has been collected, and again when they have arrived at the agreed destination. Payment will be taken automatically from the passenger at the end of the ride. The passenger will have the opportunity to rate and give feedback to the driver through the app.
- Up until the point the driver collects the passenger, either user may cancel the ride.

a) Draw a class diagram to show the static structure of the system. **(12 marks)**

b) Draw a sequence diagram to illustrate the scenario of a passenger successfully requesting a ride and being driven to their destination. The diagram should be consistent with the class diagram you drew in answer to part a). **(13 marks)**

B5.

- a) You have joined a small software development team. Your colleague has told you that the team will be following an iterative/incremental development life cycle, and that the next project will have one analysis iteration followed by a design iteration and finally two construction iterations. The first construction iteration is likely to produce software with many bugs, but these will be fixed in the second construction iteration.
- i) Discuss your colleague's misunderstandings about iterative development. **(6 marks)**
- ii) Describe **TWO** potential disadvantages of incremental delivery. **(5 marks)**

After talking to your colleague again, you have discovered that the new project is similar to one the team completed last year. The domain is well understood, the product will use existing technology, the requirements are not expected to change, and all the resources for the project are available.

- iii) Suggest an appropriate development life cycle for this project. Justify your choice. **(5 marks)**
- b) Describe **THREE** desirable features of a repository to support software configuration (or source code) management, and briefly explain why they are needed. **(9 marks)**

B6.

- a) i) Outline the benefits of developing a software prototype early in the development process. **(6 marks)**
- ii) Briefly describe the concept of a 'throwaway prototype'. **(3 marks)**
- iii) In order to avoid delay and cost over-run, a manager might instruct an engineer to deliver a throwaway prototype to a client. Discuss the potential problems with this approach. **(6 marks)**
- b) Discuss the potential advantages and disadvantages of using Commercial-Off-The-Shelf (COTS) software products as the basis for software re-use. **(10 marks)**

End of Examination