



**BSc EXAMINATION**

**COMPUTER SCIENCE**

**Software Design and Development**

**Release date:** Friday 12 March 2021 at 12 midday Greenwich Mean Time

**Submission date:** Saturday 13 March 2021 by 12 midday Greenwich Mean Time

**Time allowed:** 24 hours to submit

**INSTRUCTIONS TO CANDIDATES:**

**Section A** of this assessment consists of a set of **TEN** Multiple Choice Questions (MCQs) which you will take separately from this paper. You should attempt to answer **ALL** the questions in Section A. The maximum mark for Section A is **40**.

Section A will be completed online on the VLE. You may choose to access the MCQs at any time following the release of the paper, but once you have accessed the MCQs you must submit your answers before the deadline or within **4 hours** of starting, whichever occurs first.

**Section B** of this assessment is an online assessment to be completed within the same 24-hour window as Section A. We anticipate that approximately **1 hour** is sufficient for you to answer Section B. Candidates must answer **TWO** out of the **THREE** questions in Section B. The maximum mark for Section B is 60.

Calculators are not permitted in this examination. Credit will only be given if all workings are shown.

You should complete Section B of this paper and submit your answers as **one document**, if possible, in Microsoft Word or a PDF to the appropriate area on the VLE. You are permitted to upload 30 documents. However, we advise you to upload as few documents as possible. Each file uploaded must be accompanied by a coversheet containing your **candidate number**. In addition, your answers must have your candidate number written clearly at the top of the page before you upload your work. Do not write your name anywhere in your answers.

## SECTION B

Candidates should answer any **TWO** questions from Section B.

### Question 1

- (a) You are provided with the following requirement for a shopping website:  
"User can add item to shopping trolley."  
Write out a step by step process using which a tester can test this requirement. [4]
- (b) Write TWO related requirements that would be needed to support the shopping trolley activity using the EARS syntax. [4]
- (c) The Coursera platform has the following features, available to different user roles: user can edit course quiz (admin user), user can report content issues (University of London student user and admin user), user can view course advert video (any logged in Coursera user). Write out a matrix test plan to cover the THREE features and the THREE user types. [6]
- (d) Describe the difference between usability and accessibility testing. Do you think they have conflicting objectives? Think of an example of a piece of software and relate your explanation to that piece of software. [6]
- (e) Describe the process of test-driven development. What are the three laws? [3]
- (f) What is the difference between a debugger and debugging? [2]
- (g) Explain with a diagram the workflow involved if TWO programmers are working on the same program using the git system. Explain what happens if they both edit the same file and how to overcome it. [5]

## Question 2

- (a) For each of the following, write out a very simple example code fragment that illustrates it, with clear comments in the code to explain why it illustrates that item.
- i. Pathological module coupling [4]
  - ii. Communicational module cohesion [3]
  - iii. Logical module coupling. [3]
- (b) Choose a language from C++, Javascript or Python.
- i. Name THREE features of that language that allow you to write modular code. [3]
  - ii. For each feature, explain how it allows you to write modular code. [6]
- (c) Name a metric that can be used to measure module complexity and explain how it works. [3]
- (d) You have been hired to work on a legacy piece of software. The entire program has been written as functions in a single file with global variables. Describe TWO problems that can arise with this code arrangement, considering module coupling, complexity and cohesion. [4]
- (e) Give an example of a high profile failure involving software that failed at least in part because of a lack of good engineering practice. Explain briefly what the failure was and how it relates to bad engineering practice. Do not use the example of the Ariane rocket. [4]

### Question 3

- (a) Name THREE specific techniques that can be used to make programs more robust. [3]
- (b) For each one of the techniques you named in a), write a code fragment and an explanation of how it works. [9]
- (c) Name and state the purpose of THREE git commands. [6]
- (d) Reflect on your experience of test-driven development during the course. State ONE advantage of the test-driven development workflow and ONE disadvantage. [4]
- (e) Reflect on your experience writing code. Think of a bug you had trouble finding or fixing. Do you think you could have used one of the robust programming techniques taught in the course to solve this problem more easily? Describe your bug. State which technique you could have used to solve it. Describe how you would have used that technique. [8]

END OF PAPER