UNIVERSITY OF
LIVERPOOL

EXAMINATION January 2022

COMP319 : SOFTWARE ENGINEERING II

TIME ALLOWED : Twenty Four Hours

INSTRUCTIONS TO CANDIDATES

Answer ALL questions

The exam consists of two parts. a timed MCQ quiz and this written paper

This written paper is 70% of your final mark the MCQ test is

30% of your final mark

There is a total of 70 Marks on this paper

You MAY use a calculator in this exam

Question 1   **[30 Marks]**

Look at the following description for a Java class used as a document checker.

The class is used to open, decode and process documents in a number of different file formats, for example docx or ASCII text.

For each document it needs to be able to:
a) Count the words in the document
b) Spell check the document returning a list of the words that it thinks are in error and for each word its line and column number in the document. The code should support the following methods and attributes:

String lines[];   // Contents of the document

void open()

                                // Tries to open the document for processing
                                // It then processes the document into an array of
                                // Strings and stores them in attribute lines (see above)
                                // Each string is a line in the document

This method will throw an exception if the file does not exist
This method will throw an exception if the file is in the wrong format
The format of the document will be described by the postfix in the file name so a file essay.pdf will be in the portable document format
The filename will be passed to the Document class when constructing new instances of documents.
Striing [] decodeDocument(InputStream inputStream)
Reads the document from the input stream and decodes it into lines of text
int countWords()   // Returns the number of words in the document

SpellingMistakes [] spellcheck()   // Spell checks the document and returns

the mistakes.

SpellingMistake is a class partially defined as follows

```
public class SpellingMistake {
        private String word;  // word in question
        private int row;        // row position in document
        print int column;       // column position in document
}
```

You should complete this class with constructors, getters and setters as part

of your solution.

i)   Explain with the aid of class diagrams and simple code examples how the Factory and Façade pattern can be used to design this code. In your answer include a description of the Factory pattern and class diagrams showing your solution [15 Marks] and code examples in Java [15 Marks].
In your code you should use the Façade structure and provide access to the spell checking service using a singleton class called SpellChecker.
The code examples do not have to show the internal workings of the methods that involve decoding the documents or performing the spell checking. For your example assume there are 3 document formats, pdf, docx and txt. Your factory should produce an instance of a different concrete class for each format. Make sure your solution correctly follows the Myers open/closed principle.

You will need in your solution, an interface definition, an abstract class definition and 3 concrete class definitions.

Question 2   **[40 Marks]**

A web development company has a number of issues with its software development processes. This has been leading to poor customer satisfaction and after a detailed internal review the following issues were revealed.

    a) Much of the code was poorly commented, complex and hard to follow

    b) When developers left the company it was hard to other developers to work on their code and sometimes the more complex parts of the code have to re-written when used in new projects.

    c) A lot of the projects seemed to be released with many bugs in the Beta release stage, this leads to lack of confidence in the products.

    d) Customers complained that the products were not to their satisfaction with poor validation, so features which were not very important were included in the final cut, while mission critical features were left out

    e) The costing of projects are led by the sales team with advice from the development team. Often the projects are under-costed leading to either losses for the project or the project needing negotiating at the later stages leading to poor customer satisfaction.

Explain how this organisation could apply techniques recommended in Agile, SCRUM and XP to deal with these issues. For each section you need to justify how your solution will help with the given problem. To get full marks please support your answer with relevant research if available. Please structure your answer under 5 headings a,b,c,d and 5. You should include a bibliography.

Marking criteria: 6 Marks for each part a, b, c, d and e.
10 marks for research and bibliography.

YOUR ANSWER, WILL BE PLAGERISM CHECKED, PLEASE DO NOT CUT/PASTE FROM ANY SOURCE.
If you need to quote that is ok but you should put in quotations and include source".
Guidelines for word lengths no more than 600 words.