## Question 1:

a) With the aid of examples outline the meaning and define the following terms in your own words:

    a. SCRUM
    b. The Waterfall Model
    c. Pair Programming
    d. Test Driven Development

[12 marks]

b) In the context of Software Testing, describe in your own words the following:
    a. Black box testing
    b. White box testing

[8 marks]

## Question 2:

a) Provide the HTML and corresponding Bootstrap classes to split a row into two separate sections, each sized 6 columns wide on a large device and medium device. In the case of smaller devices, the columns should stack on top of each other.

[6 marks]

b) Explain the steps involved (in your own words) in a browser requesting and displaying a simple HTML webpage, located on a remote server.

[4 marks]

c) Explain in your own words how the grid system in Bootstrap works. In your answer discuss the purpose of rows and columns and describe how the grid facilitates responsive design.

[5 marks]

d) What are style classes? Give an example of a class and an id-based CSS selector.

[5 marks]

## Question 3:

a) Using JavaScript, write code to iterate through an array of objects (called myArray), removing objects placed at **odd** index positions in the array. Assume the array contains 8 vehicle objects which take the following form ({**make**: "Ford", **model**: "Focus", **age**:2} , … , {**make**: "Toyota", **model**: "Yaris", **age**:5}). You may use the splice method to remove the objects from the array, however each time splice is called it will re-index the array. To counter this, you should iterate through the array in reverse.

[9 marks]

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b) The splice method can be used to remove items from an array. Considering the above array which contains 8 vehicle objects, write code to show how the splice method can be used to delete the last three objects in the array.

[3 marks]

c) Write JavaScript code that upon button click reads 3 numbers from 3 text boxes and doubles each number before saving the result in the text box it came from.

[8 marks]

## Question 4:

You have been asked to build a server backend using Firebase, which comprises a collection of RESTful APIs built using Firebase functions and a Firestore database. The backend is designed to support an Instagram style application. Each image shared by the users of the application should contain a description of the image, the upload time and date, the number of likes and the number of re-shares.

a) Provide a sample JSON document which contains data for a single image shared on the platform.

[4 marks]

b) Write the NodeJS code to create a server-side API using Firebase Functions which returns all image documents in the collection, sorted in **ascending** order by upload time.

[5 marks]

c) Write the NodeJS code to create a server-side API using Firebase Functions which is used for accepting the image data sent via POST to the server. Assume that the request body contains JSON data. Prior to saving check the request body to see if there is a description. If no description is provided then the response to the user should be *image not saved* and no data should be saved in the database. If a description is provided then the data should be saved and the response to the user should be *image saved successfully*. Provide code to save the data in the request body to the Firestore database.

[6 marks]

d) Write the NodeJS code to create a server-side API using Firebase functions which deletes individual documents from the collection by parsing the query string, extracting the id and removing the document found.

[5 marks]

**END**

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