

**UNIVERSITY OF BOLTON**

**SCHOOL OF CREATIVE TECHNOLOGIES**

**GAMES PROGRAMMING**

**SEMESTER ONE EXAMINATIONS 2019/2020**

**GAMES HARDWARE DEVELOPMENT**

**MODULE NO: GAP5005**

Date: Monday 13<sup>th</sup> January 2020

Time: 10:00 – 12:00

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**INSTRUCTIONS TO CANDIDATES:**

Section A: **ANSWER ALL THREE** questions. These are worth 20 marks each and are technically-based questions.

Section B: There is **ONE** **COMPULSORY** question. This is worth 40 marks and is an essay style question.

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**SECTION A: ANSWER ALL THREE questions from this section**

**Question 1: Mobile Development**

- a) In mobile devices, explain how accelerometers work and explain what they measure. You are expected to use diagrams to illustrate your answer. **(4 marks)**
- b) Discuss how gyroscopes and accelerometers combine to create improved functionality over solely using an accelerometer. **(4 marks)**
- c) Discuss the technical limitations that need to be considered by developers when developing for mobile device and explain how developers can identify and mitigate some of these limitations. **(12 marks)**

**Question 2: Data Persistence**

- a) Using the .NET Binary Formatter, explain the process used to save/load data in games. You should take the time to detail what is happening in each step. You are expected to use diagrams to help illustrate the process. **(10 marks)**
- b) The method we choose to save/load data often does not support some data types (such as Vector3). Using Vector3 as an example, describe the steps you could take to overcome this implication. **(4 marks)**
- c) Discuss the advantages of using JSON files over XML files to create data persistence systems in games. **(4 marks)**
- d) Discuss a scenario where it would be beneficial to save data to JSON files on the user's computer instead of saving to binary and highlight why it could be problematic to save all of your data using this method. **(2 marks)**

**Section A continues over the page....**

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### Question 3: Virtual Reality

- a) Highlight three ways in which user movement/position can be tracked by using appropriate hardware. **(4 marks)**
- b) In the context of virtual reality devices, explain the difference between 3DoF and 6DoF. **(4 marks)**
- c) The mainstream virtual reality headsets currently on the market can be split into four categories: **Holder** (Google Cardboard), **No Tether – Mobile** (Samsung Gear VR), **Tethered to Console** (PlayStation VR), and **Tethered to PC** (Oculus Rift). Using the four specific system examples in this question, detail the strengths and weaknesses of each. **(12 marks)**

**END OF SECTION A**

**SECTION B: COMPULSORY.** The question below is worth 40 marks and a long-form response is expected.

### Question 4: Engines

There are many game engines available for developers to use, but the industry is spearheaded by two; the Unity and Unreal game engines. These two game engines are used by developers of all levels, ranging from students, to studios such as Lucid Games who employ over a hundred developers.

- a) Taking the stance of a large studio who develop for multiple devices, what are the strengths and weaknesses of opting to develop using one of these leading game engines? You may also want to discuss the alternative options available to these studios and discuss what impact opting to for a non-commercial alternative could have on the development team.

**(40 marks)**

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**END OF QUESTIONS**

Past Examination Paper