UNIVERSITY OF LONDON

GOLDSMITHS COLLEGE

Department of Computing

B. Sc. Examination 2019

IS53032B
Advanced Graphics and Animation

Duration: 2 hours 15 minutes

Date and time:

This paper is in two parts: part A and part B. You should answer ALL questions from part A and TWO questions from part B. Part A carries 40 marks, and each question from part B carries 30 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.

There are 100 marks available on this paper.

THIS PAPER MUST NOT BE REMOVED
FROM THE EXAMINATION ROOM

Part A

Multiple choice

Question 1

(a) What is used to represent a transform? [4]

    a) a number

    b) a vector

    c) a matrix

    d) a quaternion

(b) Which of the following is typically performed in a fragment shader? [4]

    a) transforming vertices

    b) texturing polygons

    c) animating objects

    d) simulating physics

(c) What is an avatar? [4]

    a) a 3D virtual character that is controlled by computer algorithms and represents a non-player character

    b) a 3D virtual character that is controlled by and represents a user

    c) a 3D virtual character whose movements are based on live tracking or motion capture of a users' movements

    d) all of the above

(d) What is global illumination? [4]

    a) Simulation of light with a direction but no position, like sunlight

    b) Simulation of light with a position but no direction, like a lightbulb

    c) Simulation of lighting boucing off walls and other objects

    d) Simulation of lighting performed on whole polygons in a vertex shader

(e) A point light has... [4]

    a) A position and a direction

    b) A position but no direction

    c) A direction but no position

    d) Neither position nor direction

(f) A vector has: [4]

a) a rotation and a translation

b) a direction and a translation

c) a direction and a magnitude

d) a magnitude and a translation

(g) Which of these would be best animated using keyframe animation?   [4]

    a) The path of a tennis ball that has been hit by a racquet

    b) The movement of a tennis raquet that is being held by a user

    c) A children's cartoon character

    d) The movement of a character that is played by a particular actor

(h) In modern games a 3D character is typically represented as?   [4]

    a) A compound object consisting of several transforms

    b) A polygon mesh

    c) A game object

    d) All of the above

(i) What is forward kinematics used for?   [4]

    a) Character Animation

    b) Lighting

    c) Rendering

    d) Texture Mapping

(j) What is a texture?   [4]

    a) A polygon

    b) An image

    c) A vertex

    d) A vector

Part B

Question 2

(a) Why is creating realistic Character Animation a great challenge? [6]

(b) Motion Capture is often used in Human Body animation. Please describe at least three methods to collect Motion Capture data. What are the pros and cons of each method? [9]

(c) Describe an animation technique used to create expressive characters, and explain with an example of how it is used. [15]

Question 3

(a) Describe how ambient lighting works and its purpose in a traditional graphics pipeline [3]

(b) Describe four stages of the Graphics pipeline. For each stage, describe a way in which the graphics processing could be made faster [12]

(c) Explain flat shading, Gouraud shading, and phong shading [15]

Question 4

(a) Describe the three main transforms. For each give its name and what it does. [9]

(b) Describe the technique of Texture mapping and give an example of what it can be used for [9]

(c) A popular interaction in VR is picking up and throwing objects, ideally at other objects or people. Describe the graphics and animation techniques needed to make this possible. [12]