THIS PAPER IS NOT TO BE REMOVED FROM THE EXAMINATION HALLS

UNIVERSITY OF LONDON **CO3346 ZB**

BSc Examination

CREATIVE COMPUTING

Sound and Music

Date and Time: Friday 5 May 2017: 14.30 - 16.45

Duration: 2 hours 15 minutes

There are FOUR questions in this paper. Candidates should answer **THREE** questions. All questions carry equal marks, and full marks can be obtained for complete answers to a total of **THREE** questions. The marks for each part of a question are indicated at the end of the part in [.] brackets.

Only your first THREE answers, in the order that they appear in your answer book, will be marked.

There are 75 marks available on this paper.

A handheld calculator may be used when answering questions on this paper but it must not be pre-programmed or able to display graphics text or algebraic equations. The make and type of machine must be stated clearly on the front cover of the answer book.

Question 1 Algorithmic composition

(a) Algorithmic composition can be called meta composition. Why? [2]

(b) List and briefly describe **THREE** examples of approaches that have been used by algorithmic composers. [9]

(c) Select one of the above approaches. Do you think it is likely to produce interesting music or not? Justify your answer. [2]

(d) List **THREE** key components in a swarm music system and explain what their functions are. [6]

(e) Is the Java language useful for algorithmic composition? State **THREE** clear reasons to justify your answer. [6]

Question 2 Musical Interaction

(a) Describe **TWO** aspects of music relating to pitch and **TWO** relating to rhythm. [4]

(b) What is meant by a pitch interval? Why might it be more useful than absolute pitch for comparing two melodies? [3]

(c) What is the purpose of beat tracking? [2]

(d) If you were designing a beat tracking algorithm that could work with raw audio input, what descriptors would you extract from the audio and why? [4]

(e) Why does the metric hierarchy of a piece of music make beat tracking difficult? Draw a diagram that illustrates what is meant by a metric hierarchy. [6]

(f) Write a step by step description of an algorithm that can detect the beat in a piece of music. The algorithm takes an audio file as the input. [6]

Question 3 Music Information Retrieval

(a) List **THREE** typical tasks in MIR ordered by specificity (highest specificity first). Explain why each has this specificity level. [9]

(b) What is a recommender system typically used for? [2]

(c) A record company wants to sell more music. Describe step by step a process that would allow them to find customers for their music if they have access to the music playlists from their iPods/ music players and a method to contact them. [6]

(d) Briefly describe the purpose of content based document retrieval. Why is it different from meta data based retrieval and what are the inputs and outputs? [4]

(e) Draw a flow chart showing a content based document retrieval system [4]

Question 4 Pure Data

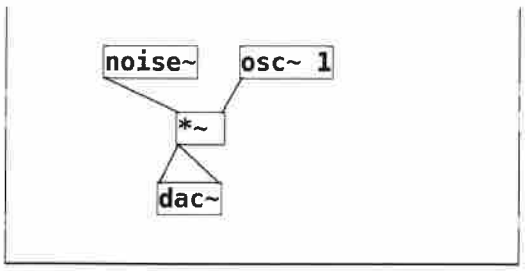
(a) A musician wants to learn about sound synthesis and asks you if they should learn Java or Pure Data. Give **THREE** reasons for or against learning either. [6]

(b) Livecoding is a computer music performance technique where a musician writes and modifies a computer music program in front of a live audience. The sound output from the program should be continuous, as you would expect at any concert. Is it possible to livecode in Pure Data? Give **TWO** clear reasons to support your answer.

[4]

(c) What was the most interesting sound you heard from a Pure Data patch? Why was it interesting and how do you think it was made? [2]

(d) Draw one second of the waveform you would expect to hear coming from the computer when you run this Pure Data patch.



[5]

(e) Describe the principle behind additive synthesis and explain why it can be considered computationally expensive to generate complex timbres with this technique. [3]

(f) Draw a PD patch that implements additive synthesis. Annotate the patch to explain how it works. [5]

END OF PAPER