

**CARDIFF CARDIFF UNIVERSITY
EXAMINATION PAPER**

Academic Year:	2001-2002
Examination Period:	Lent 2002
Examination Paper Number:	CMP632
Examination Paper Title:	Multimedia Systems
Duration:	2 hours

Do not turn this page over until instructed to do so by the Senior Invigilator.

Structure of Examination Paper:

There are **THREE** pages.

There are **FOUR** questions in total.

There are **NO** appendices.

The maximum mark for the examination paper is 100% and the mark obtainable for a question or part of a question is shown in brackets alongside the question.

Students to be provided with:

The following items of stationery are to be provided:

One answer book.

Instructions to Students:

Answer **THREE** questions.

The use of translation dictionaries between English or Welsh and a foreign language bearing an appropriate departmental stamp is permitted in this examination.

1. (a) Give a definition of *multimedia* and a *multimedia system*. [2]

(b) What are the key distinctions between multimedia data and more conventional types of media? [4]

(c) What key issues or problems does a multimedia system have to deal with when handling multimedia data? [7]

(d) An analog signal has bandwidth that ranges from 15Hz to 10 KHz. What is the rate of sampler and the bandwidth of bandlimiting filter required if:

(i) the signal is to be stored within computer memory. [3]
(ii) the signal is to be transmitted over a network which has a bandwidth from 200Hz to 3.4 KHz. [4]

(e) Assuming that each signal is sampled at 8 bits per sample what is the *quantisation noise* and the *signal to noise ratio* expected for the transmission of the signals in (d)(i) and (d)(ii). [7]
2. (a) What is MIDI? [2]

(b) How is a basic MIDI message structured? How is a MIDI message used to control how musical notes are played and also what instrument sounds the note? [8]

(c) You have been asked to advise on a Multimedia production that is to send an audio production of a network. The transmission is to occupy as low a bandwidth as possible but yet maintain as high as possible audio fidelity. The audio production will involve voices, for narration and dialog, music both electronic and acoustic instruments and sound effects.

Comment on the most appropriate methods in which to deliver such a presentation and also address to relative merits and drawbacks of the methods you suggest in your solution. [17]

- 3 (a) Why is integration of multimedia data a potential problem for multimedia systems? Briefly how are these problems addressed in such systems? [7]
- (b) What is MHEG and what is its target application domain? [3]
- (c) Describe giving suitable code fragments how you would effectively combine a video clip and an audio clip in an MHEG application and start a subtitle text display 20,000 milliseconds into the video clip. You may assume that both clips are of the same duration and must start at the same instant. The Video should be displayed in the whole of the presentation and the subtitles should run along the bottom of the presentation. [17]
4. (a) Why is data compression necessary for Multimedia activities? [3]
- (b) What is the distinction between *lossless* and *lossy* compression? What broad types of multimedia data are each most suited to? [5]
- (c) Briefly explain the compression techniques of *zero length suppression* and *run length encoding*. Give one example of a real world application of each compression technique. [7]
- (d) (i) Show how you would encode the following token stream using zero length suppression and run length encoding:
- ABC000AAB00000000DEFAB00000
- (ii) What is the compression ratio for each method when applied to the above token stream?
- (iii) Explain why one has a better compression ratio than the other. What properties of the data lead to this result? [12]