# CARDIFF CARDIFF UNIVERSITY
# EXAMINATION PAPER

| | |
|---|---|
| **Academic Year:** | 2000-2001 |
| **Examination Period:** | Lent 2001 |
| **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.

1. (a) Why is data compression necessary for Multimedia activities? [3]

   (b) Briefly explain how the LZW Transform operates. What common compression methods utilise this transform? [10]

   (c) Show how the LZW transform would be used to encode the following sequence of text based tokens:

   ABCBCABCEAB

   [14]

2. (a) Briefly outline the basic principles of Inter-Frame Coding in Video Compression. [8]

   (b) What is key difference between I-Frames, P-Frames and B-Frames? Why are I-frames inserted into the compressed output stream relatively Frequently? [6]

   (c) A multimedia presentation must be delivered over a network at a rate of 1.5 Mbits per second. The presentation consists of digitized audio and video. The audio has an average bit rate of 300 Kbits per second. The digitised video is in PAL format and is to be compressed using the MPEG-1 standard. Assuming a frame sequence of:

   IBBPBBPBBPBBI…..

   and average compression ratios of 10:1 and 20:1 for the I-frame and P-frame respectively, what is the compression ratio required for the B-frame to ensure the desired delivery rate?

   You may assume that for PAL the luminance Signal is sampled at the spatial resolution of 352x288 and that the two chrominance signals are sampled at half this resolution. The refresh rate for PAL is 25Hz. You should also allow 15% overheads for the multiplexing and packetisation of the MPEG-1 video. [13]

3. (a) What key features of Quicktime have led to its adoption and acceptance as an international multimedia format? [4]

(b) Briefly outline the Quicktime architecture and its key components. [10]

(c) JPEG2000 is a new image compression standard. Outline how this new standard might be incorporated into the Quicktime architecture. Your answer need not consider the details of the actual compression methods used in JPEG2000; instead it should focus on how, given the compression format, you could extend Quicktime to support it. [13]

4. (a) When designing multimedia systems, what *two levels of functionality* need to be considered? Briefly define these levels. [4]

(b) For each common multimedia data type discuss what common functionalities should be supported by a multimedia system. [8]

(c) You have been commissioned to produce a Multimedia mail system. What media should be supported in such a mail system and how should an application facilitate assembly, delivery and reading of the mail? [15]