University of Stirling

Department of Computing Science & Mathematics

Computing Science Examination
Spring Semester 2002

IT82 : Multimedia

Someday xxth May 2002 **0900-1100 hours**

Attempt **THREE** questions.

You must attempt **Question 1** from the **Sound** section of the paper.

All questions carry equal marks.

The approximate distribution of marks among the parts of each question is indicated.

You may use an electronic calculator.

IMPORTANT NOTE

It is essential that you write your registration number on the front of each answer book.

Also, when you have completed the examination, the number of answer books which you have used must be prominently written on the front of one book.

Sound

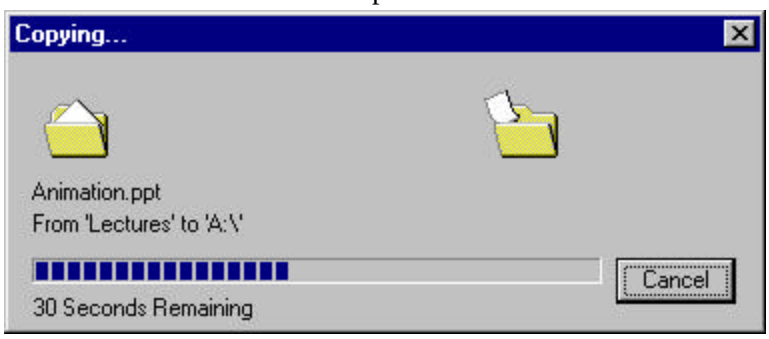
Question 1

a) Sound is digitised using an Analogue to Digital Converter (ADC). Describe the two key parameters in digitisation, and briefly describe how they affect the quality of the recorded sound. **[8]**

b) Describe the principle of perceptually based sound compression, including the phenomenon of *masking* in your answer. Give an example of one perceptually based compression technique and its application. **[6]**

c) Which compression technique would you expect to be most successful for songs and why? **[3]**

d) Systems such as Windows on a PC can use visible *progress bars* to indicate the progress of certain time-consuming background tasks, such as downloading a large file over the Internet. Here is an example:



i) Describe how one could use sound to indicate the progress of such tasks, especially with respect to the successful completion of the task and the possibility of errors. **[4]**

ii) State one possible advantage and one disadvantage of using sound in your proposed way. **[4]**

Graphics

Question 2

a) Bitmaps and vector-based images are two of the most popular approaches to representing image data. Discuss their advantages and disadvantages in the context of graphics-heavy web pages. **[8]**

b) Computer-based fonts are either bitmapped or vector-based. Describe the differences between these two representations for fonts, and their advantages and disadvantages? **[8]**

c) The word below is printed in 16pt Courier New font.

DAWN

i) Describe three techniques that might be used to display this word in the illustrated font on a computer screen with maximum visual accuracy and appeal. **[6]**

ii) How would your answer change if the above word was to be displayed on a computer screen at a much smaller font size (e.g. 8pt) and with a low screen resolution. **[3]**

Question 3

a) Two of the most common colour models used for handling the representation of colours in graphical images are the RGB and CMY models. RGB is often referred to as an *additive* colour model, whereas CMY as a *subtractive* model. Explain these terms, mentioning how the two models are related to each other. **[5]**

b) In what circumstances are each of the above mentioned colour models most appropriate? **[2]**

c) RGB colour model is device-dependent. What does this mean? Suggest why device-independent colour models are necessary, giving an example of one such (device-independent) colour model? **[2,4]**

d) A photograph showing a 'stack of green leaves lying on green grass' has been scanned using 16-bit colour, but is to be shown on a computer monitor that only has a restricted colour palette of 256 colours. The scanned image actually contains 1,010 different colours.

i) How would you choose the 256 colour palette to provide the best visual results? **[4]**

ii) How can one increase the apparent number of colours displayed? **[4]**

iii) Suggest and justify an appropriate file format for the original 16-bit colour image. **[4]**

Question 4

a) What is *animation* and how is it achieved given a set of still images? **[3]**

b) What advantages does the use of *vector-based graphics* bring when creating images for use in an animation? **[4]**

c) To attract the user's attention, the opening sequence of a multimedia presentation shows a number of photos, with each photo appearing first at some point on the edge of the screen before moving in a straight line, and at a steady pace, across the screen to its final position.

i) Describe how this sequence could be animated using *keyframes* and *tweening.* **[6]**

In another multimedia presentation, there is a sequence in which a ball drops from the top of the screen till it bounces when it reaches the bottom of the screen. It continues to bounce up and down, reaching a lower height each time, before finally coming to rest at the bottom of the screen.

ii) Describe how this sequence could be animated in 2D using *keyframes* and *tweening,* highlighting any differences from your answer in i). **[6]**

d) What differences arise when doing animation in 3D as opposed to 2D? How is track-based animation used in 3D? **[3,3]**

Multimedia

Question 5

a) Why is it vital to *scope* a project before beginning the design of a multimedia presentation, and what does *scoping* seek to establish? **[6]**

b) What are the characteristics of a good *prototype* multimedia presentation? **[7]**

c) Applying for a new job involves many steps, including deciding what job you would like to do, finding out what jobs are available in your area, assessing whether a company would be good to work for etc.

i) Carry out a *hierarchical task decomposition* of the steps involved in finding a new job **[5]**
ii) Do a *knowledge analysis* of this task **[4]**
iii) Give three examples of *entity relationships* from this scenario. **[3]**

END OF EXAMINATION