OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND, CORK

COLÁISTE NA hOLLSCOILE, CORCAIGH
UNIVERSITY COLLEGE, CORK

SUMMER EXAMINATION 2006

BSc Computer Science

CS4405: Multimedia Compression and Delivery

Professor Susan Craw
Professor Gregory Provan
John O'Mullane

The use of electronic calculators is permitted

Answer *ALL* questions

$1\frac{1}{2}$ Hours

1. **Topic: Fundamentals of Audio and Video Coding** (20 MARKS)

   a) Describe using an example how an analogue audio signal is *digitised*.   (*4 marks*)

   b) Describe using an example how a digital signal is *quantised*.   (*4 marks*)

   c) Describe using a diagram, an *image formation model*.   (*4 marks*)

   d) Describe briefly the colour model used for *digital video*.   (*4 marks*)

   e) What is meant by the term *deinterlacing*? Briefly describe two deinterlacing techniques.

   (*4 marks*)

2. **Topic: MPEG Standards** (30 MARKS)

   a) For MPEG-1 video describe how

      i. intra-frames are encoded   (*6 marks*)

      ii. A good match for motion estimation is calculated.   (*4 marks*)

   b) For MPEG-4

      i. Describe the steps involved in *VOP-based motion compensation*. Note a VOP is a Video Object Plane.   (*8 marks*)

      ii. What is an alpha-map?   (*2 marks*)

   c) For MPEG audio

      i. Describe how psychoacoustic techniques are used to compress audio.   (*6 marks*)

      ii. Illustrate using a diagram the basic MPEG Audio encoder and decoder.   (*4 marks*)

3. **Topic: Multimedia Distribution** (30 MARKS)

   a) Explain what is meant by *streamed multimedia content*.   (*4 marks*)

   b) Explain the steps a client must follow in order to display a presentation using RTSP.

   (*6 marks*)

   c) Explain the role of an MPEG-4 hint track.   (*4 marks*)

   d) Describe how Quality of Service can be improved when using best-effort networks, such as the Internet, for multimedia delivery.   (*6 marks*)

   e) Describe a scheme for recovering from packet loss.   (*6 marks*)

   f) Explain how damaged macroblocks can be estimated   (*4 marks*)