OLLSCOIL NA hÉIREANN
THE NATIONAL UNIVERSITY OF IRELAND, CORK

COLÁISTE NA hOLLSCOILE, CORCAIGH
UNIVERSITY COLLEGE, CORK

AUTUMN EXAMINATION 2006

BSc Computer Science

CS4405: Multimedia Compression and Delivery

Professor Susan Craw
Professor Gregory Provan
Dr. 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) Explain briefly why the YCbCr colour model is used in digital video. (*4 marks*)

   e) Describe two deinterlacing techniques. (*4 marks*)

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

   a) For MPEG-1 video describe how

      i. Inter-frames are encoded. (*8 marks*)

      ii. Motion compensation is performed. (*2 marks*)

   b) For MPEG-4

      i. Describe how MPEG-4 video encoding differs from MPEG-1 coding. (*6 marks*)

      ii. Describe the different kinds of alpha-maps. (*4 marks*)

   c) For MPEG audio

      i. Describe the psychoacoustic techniques used to compress audio. (*5 marks*)

      ii. Illustrate using a diagram the basic MPEG Audio encoder. (*5 marks*)

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

   a) Explain how *streamed multimedia content* differs from downloadable 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 the main obstacles for delivering streamed multimedia content on best-effort networks, such as the Internet. (*6 marks*)

   e) Describe two schemes for recovering from packet loss. (*8 marks*)

   f) Describe how MPEG-4 content is made resilient to packet loss. (*2 marks*)