

FC11-R3: MULTIMEDIA TECHNOLOGY AND VIRTUAL REALITY

NOTE:

1. Answer question 1 and any FOUR questions from 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.

- a) Name three general strategies to reduce the size of a digital media file. Explain which of these strategies does not necessarily sacrifice the quality of the media file?
- b) What will be the minimum sampling rate? When an audio file is recorded without-audio aliasing with the highest frequency on 10KHz?
- c) What is meant by the terms *static* media and *dynamic* media? Give two examples of each type of media.
- d) What is the inverse transform? How may such a transform scheme be used to compress data?
- e) What is Quality of Service (QoS) translation? What is the difference between perceptual QoS and application QoS?
- f) Explain how shared packet redundancy may be applied to reduce the packet loss rate in voice-over-IP (VoIP).
- g) What is RAID technology and what advantages does it offer as a medium for storage and delivery of large data?

(4x7)

2.

- a) Briefly explain how the Discrete Cosine Transform Operates, and why is it so important in data compression in Multimedia applications?
- b) What is temporal redundancy and what compression technique is used to minimize it in a digital video sequence?
- c) What is scrambling? Why is it used in digital broadcasting?

(6+6+6)

3.

- a) What is MPEG-4? State at least three differences between MPEG-1 and MPEG-2 compression standards.
- b) Explain the principle of variable length coding and the algorithm for Huffman coding. Where is it used?
- c) What is motion estimation? What are the methods for motion estimation?

(6+6+6)

4.

- a) Describe 6 properties that make Virtual Reality (VR) a usable tool for training/entertainment etc.
- b) Describe, how different input-devices are used in a virtual reality system.
- c) Outline the different techniques that can be used for tracking user movements in VR applications and compare their benefits and limitations.

(6+6+6)

5.

- a) What are the characteristics of the Internet Protocol (IP), which enable it to facilitate the interconnection of heterogeneous networks? How do these characteristics fit with the needs of real time multimedia applications?
- b) Distinguish between H.263 and H.261 codes?
- c) Why is TCP not suitable for real-time traffic? How does RTP overcome the limitation of TCP for real-time traffic? Also comment on quality of service guarantees in RTP.

(6+4+8)

6.

- a) Give a brief definition of multicasting within the context of computer networks. Why is multicasting relevant to multimedia traffic? At what level in the networking stack would it be appropriate to facilitate multicasting for time sensitive traffic and why?
- b) Explain, what is meant by sample rate and sample length in the context of digitizing sound. Describe the dynamic range of sound.
- c) Explain, how video-conferencing standards are different from video and/or audio compression standards.

(6+6+6)

7.

- a) What is the difference between “lossless” and “lossy” compression? Why are “key frames” so important to interframe compression?
- b) What are haptic devices? What role do these device play in a virtual reality system?
- c) Describe the steps involved in creating interactive 3D product using VRML.

(6+6+6)