

C11-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) 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.
- b) Explain how Huffman Tree is developed and used to compress text.
- c) What is DCT? Explain its role in compression.
- d) Explain the difference between block media and continuous media.
- e) Explain the principle of operation of LZ compression algorithm.
- f) How are MPEG files generated? Explain the different types of frames used in it.
- g) Explain about immersed and not-immersed systems in virtual reality.

(7x4)

2.

- a) What is the role of color models in image compressions?
- b) Use Run Length Encoding and Differential Pulse Code Modulation to encode the string AAAAAAAAAAABBBAAAAAAAAABCBABC. Which scheme does result in the highest compression? Assume that numbers can be represented with a given Huffman code and that characters take 8 bits.
- c) What are the three modes of compression in JPEG? Explain, why ZigZag scan is used instead of raster scan in JPEG.

(4+8+6)

3.

- a) What are the major factors that are taken into account when considering storage requirements for Multimedia Systems?
- b) What is RAID technology and what advantages does it offer as a medium for the storage and delivery of large data? Briefly explain the *eight* levels of RAID functionality.
- c) A digital video file is 40 Mb in size. The disk subsystem has four drives and the controller is designed to support read and write onto each drive, concurrently. The digital video is stored using the *disk striping* concept. A blocksize of 8 Kb is used for each I/O operation.
 - i) What is the performance improvement in *sequentially* reading the complete file when compared to a single drive subsystem in terms of the number of operations performed?
 - ii) What is the percentage performance improvement for this system compared to a single drive system?

(4+8+6)

4.

- a) Give a definition of a Multimedia Authoring System. What key features should such a system provide? What are differed Multimedia Authoring paradigms available? Describe each paradigm briefly.
- b) Why does MPEG result in higher compression ratios than JPEG? Given the DCT, quantization table and Huffman code, show how a macroblock would be compressed using MPEG.

(9+9)

5.

- a) What is the main difference between the proposals of "Differentiated Services" (DiffServ) and "Integrated Services" (IntServ) for the Internet? For multimedia applications, one would like some kind of QoS guarantees for available bandwidth, delay, jitter and loss rate. Please discuss how the DiffServ and IntServ address these issues.
- b) What are the advantages and disadvantages of using RTP-over-TCP to carry
 - i) video-on-demand
 - ii) Internet phone calls, compared to RTP-over-UDP?

(10+8)

6.

- a) Explain the following terms in context of virtual environment:
 - i) Degrees of freedom
 - ii) Augmented Reality
 - iii) Latency
 - iv) Telepresence
- b) Describe Position interpolator and Colour interpolators. What is the difference between interpolator and script?
- c) What are the various sources of latency in virtual environments? What effects does this latency have on user of the system?

(8+6+4)

7.

- a) In multimedia there are a number of general guidelines to help assist designer to develop effective presentations and applications. Such guidelines include: Thematic congruence; Information loading; User compatibility; Viewpoints Consistency and Reinforcement. Explain what is meant by each guideline, and in each case describe how the directive assists in multimedia design together with an example.
- b) One of the main considerations with multimedia design is the possibility of multiple concurrent media and the affect on user understanding. Describe what media types when presented concurrently are readily comprehensible and which types are difficult for the user to manage.

(10+8)