

Answer THREE questions.

Question 1.

- a) Describe the three levels of *virtualization* that Ellis identifies. What perceptual cues are necessary for each stage?

*[16 Marks]*

- b) At what level of *virtualization* can presence occur? Explain what other criteria intrinsic and extrinsic to the display system can enhance or detract from presence.

*[17 Marks]*

*[Total 33 Marks]*

Question 2.

- a) A collaborative virtual environment system is to be built with N client systems. Each client produces position updates with frequency 10Hz. Discuss the relative benefits of a client-server architecture and a peer-peer architecture with reference to load on different parts of the system, and effect on user-experience.

*[14 Marks]*

- b) If N is very large then neither a pure client-server nor peer-peer architecture will suffice. Outline the range of common approaches to scaling the number of clients.

*[19 Marks]*

*[Total 33 Marks]*

Question 3.

- a) What is the role of *proprioception* in the design and implementation of successful virtual environments?

[16 Marks]

- b) Discuss how differences in display systems can affect collaboration between people in a collaborative virtual environment.

[17 Marks]

[Total 33 Marks]

Question 4.

- a) Explain the *duplex theory* of audio spatialisation. Discuss the ambiguities that arise.

[9 Marks]

- b) Describe the process of doing full spatialisation for both headphone and surround speaker systems.

[12 Marks]

- c) A headphone audio spatialisation system is set up within a CAVE-like system. Describe all sources of latency in the audio system. How will these differ from the latencies in the visual system? How might the latency be combated?

[12 Marks]

[Total 33 Marks]

CONTINUE

Question 5.

- a) Define the terms *Exact*, *Approximate* and *Conservative* when referring to visibility culling.

[5 Marks]

- b) What is the difference between the *from-point* and *from-region* visibility culling algorithms? What are their respective merits?

[6 Marks]

- c) Describe the *shadow frusta* method for visibility culling in general scenes.

[10 Marks]

- d) Describe the *dual ray-space* algorithm for computing from-region visibility in urban models.

[12 Marks]

[Total 33 Marks]

Question 6.

- a) Assume you are dealing with a large, very densely *point-sampled* model. Describe an algorithm for rendering it in real-time without using polygons.

[9 Marks]

- b) Suppose we convert the above model into triangles. Describe a *continuous* Level-of-Detail method for rendering it in real-time.

[11 Marks]

- c) What are *dynamic impostors* in image-based-rendering and how can they be used to accelerate rendering? Describe criteria that can be used to test the validity of an impostor as the viewpoint moves towards it or parallel to it.

[13 Marks]

[Total 33 Marks]