## B4.4-R3: COMPUTER GRAPHICS & MULTIMEDIA SYSTEMS

**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) What is the difference between raster-scan CRT and random-access CRT?

b) What is the relationship between the translations $T_{tx,ty}$ , $T_{-tx,-ty}$ and $(T_{tx,ty})^{-1}$ ?

c) Explain the Z-buffer algorithm for removing hidden surfaces.

d) Explain one vanishing point projection from a point on z-axis.

e) What do you mean by digital audio? Synchronization of audio and video streams is important for multimedia communication. Why?

f) Describe the transformation $M_L$ that reflects an object about a line L.

g) Explain the special visual effect morphing in graphics animation.

**(7x4)**

**2.**

a) Indicate which raster locations would be chosen by Bresenham's algorithm when scan converting a line from screen coordinate (1,1) to screen coordinate (8,5).

b) Perform a 45° rotation of triangle A(0,0), B(1,1) and C(5,2) about P(-1,-1)

c) Explain the difference between the perspective projection and the parallel projection.

**(6+6+6)**

**3.**

a) Explain the technology of CCD cameras.

b) Explain the steps of the Cyrus-Beck line-clipping algorithm.

c) Let R be the rectangular window whose lower left-hand corner is at L(-3,1) & upper right-hand corner is at R(2,6). Clip the line segments AB and CD where A(-4,2),B(-1,7),C(-1,5) and D(3,8).

**(6+6+6)**

**4.**

a) What is the difference between $G^\circ$ and $C^\circ$ continuity? Explain the difference between $C^\circ$, $C^1$, $C^2$ continuity. Suggest a scheme for approximating a set of 2D points using a curve that satisfies $C^2$ continuity.

b) Briefly describe the Phong Shading model.

**([3+3+6]+6)**

**5.**

a) What type of coding is JPEG, in the coding classification? Which part of the JPEG algorithm introduces losses and why?

b) Is it necessary to compute lighting information before clipping for rendering a 3D scene? Explain.

c) What is a MIDI file?

**(9+6+3)**

**6.**

a) Explain the Z-buffer algorithm for removing hidden surfaces.

b) Explain, how temporal redundancy is exploited in compression of video in MPEG-1.

**(9+9)**

**7.** Write short notes on any **two** of the following:

a) MPEG

b) Gourand Shading

c) Types of Multimedia Authoring Systems

**(2x9)**