Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/MCA/SEM-4/MCA-402/2010

2010

GRAPHICS AND MULTIMEDIA

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 10 × 1 = 10

   i) HTML is

      a) Hyper Text Modification Language

      b) Hyper Text Mark-up Language

      c) Holistic Text Mark-up Language

      d) Hyper Text Mark-up Linguistics.

   ii) A point within the clipping boundary always will have the code

      a) 0000 b) 0001

      c) 0100 d) 1000.

   iii) Reflection of an object is same as rotation with angle

      a) 45° b) 90°

      c) 180° d) 360°.

iv) Which one is not the neighbour of a pixel (x, y) in 4-connected method ?

a) (x, $y + 1$) b) ($x + 1$, $y + 1$)

c) (x, $y - 1$) d) none of these.

v) Which one is not a type of MPEG frame ?

a) I-frame b) B-frame

c) A-frame d) all of these.

vi) GKS is

a) Geometric Kernel System

b) Graphical Kernel Software

c) Graphical Kernel System

d) Geometric Kernel Software.

vii) If the resolution of a monitor is 320 ∞ 200 then the aspect ratio is

a) 8 : 5 b) 3 : 13

c) 13 : 4 d) all of these.

viii) MIDI is

a) Musical Instrument Digital Interface

b) Multiple Instrument Digital Interface

c) Musical Interchangeable Digital Interface

d) Multiple Interchangeable Digital Interface.

ix) Cyrus Beck Line Clipping Algorithm can clip lines with boundaries

a) rectangular b) any convex

c) both of these d) none of these.

x) Parametric equation of straight line (where $0 \leq t \leq 1$) is

a) $P(t) = P_0 + (P_1 - P_0)\ t$

b) $P(t) = P_0 + (P_1 + P_0)\ t$

c) $P(t) = P_0 - (P_1 - P_0)\ t$

d) $P(t) = P_0 - (P_1 + P_0)\ t$.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Compare and contrast between lossy and lossless compression technique.
3. Describe the difference between Gouraud shading and Phong shading.
4. The Cohen-Sutherland algorithm uses the concept of region-codes for each end of the line. What are region codes ? Define the region codes for a typical rectangular clipping area and show all the possible values.
5. Explain the reflection of a 2d figure about an arbitrary line with equation $y = mx + c$. Derive its transformation matrix.
6. What do you mean by hidden surface removal ? Distinguish between object-space and image-space methods for hidden surface removal.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Draw a schematic diagram of a monochrome (black and white) CRT and include a brief description of the major components.

   b) Describe the meaning of interlaced video and the reason for using interlaced video formats.

   c) Assume that a certain full-colour (24 bit per pixel) RGB raster system has a 2048 by 2048 frame buffer.

      i) How many distinct colour choices would be available ?

      ii) How many different colours could we display at one time ?

      iii) If 240 megabytes/second can be transferred, how much time (in seconds) will it take to load the frame buffer and what would be the maximum frame rate (frames per second) ?

   7 + 3 + (1 + 1 + 3)

8. a) Identify two main advantages of Bresenham's algorithm for the scan conversion of lines.

   b) Describe Bresenham's circle drawing algorithm (with mathematical derivations).

   c) What is aliasing ? Briefly explain any one technique of antialiasing of lines.

   d) Compare and contrast boundary fill algorithm and flood fill algorithm. 2 + 6 + 4 + 3

9. a) Derive the transformation matrix for rotation about any axis in 3d.

   b) A triangle is defined by $\begin{bmatrix} 2 & 4 & 4 \\ 2 & 2 & 4 \end{bmatrix}$.

   Find the transformed coordinates after the following transformations :

   i) 90° rotation about origin

   ii) Reflection about line $y = -x$.

   c) Describe Cyrus-Beck algorithm for two dimensional parametric line clipping. 5 + 4 + 6

10. a) Derive the equation of Bezier cubic polynomial curve with control points $p0$, $p1$, $p2$ and $p3$. Express the equation in matrix from. What is Bending matrix ? What is the importance of Bending matrix ?

    b) A Bezier curve is defined by the ordered control points (2, 1), (3, 2), (5, 0) and (6, 2). Choose another set of control points so that two curves are joined smoothly (have first ordered continuity). (4 + 1 + 1 + 1) + 5 + 3

11. a) Explain the following in respect of digitization of analog signals with suitable example :

    i) Sampling rate

    ii) Sampling rosolution

    iii) Quantization error.

    b) Discuss about inter-frame and intra-frame compressions relating to MPEG.

    c) Write an HTML script that creates a thumb nail image that is linked to the full sized image. (2 + 2 + 2) + 4 + 5