



Name : .....

Roll No. : .....

Invigilator's Signature : .....

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

**GRAPHICS AND MULTIMEDIA**

Time Allotted : 3 Hours

Full Marks : 70

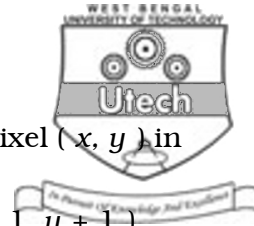
*The figures in the margin indicate full marks.*

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

**GROUP – A**

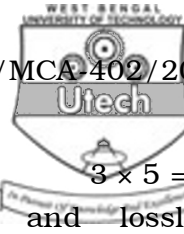
**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - 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)  $45^\circ$
    - b)  $90^\circ$
    - c)  $180^\circ$
    - d)  $360^\circ$ .



- 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  $320 \times 200$  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  $p_0$ ,  $p_1$ ,  $p_2$  and  $p_3$ . Express the equation in matrix form. 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 resolution  
 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