

A10.3-R3: COMPUTER GRAPHICS

NOTE:

1. There are **TWO PARTS** in this Module/Paper. **PART ONE** contains **FOUR** questions and **PART TWO** contains **FIVE** questions.
2. **PART ONE** is to be answered in the **TEAR-OFF ANSWER SHEET** only, attached to the question paper, as per the instructions contained therein. **PART ONE** is **NOT** to be answered in the answer book.
3. Maximum time allotted for **PART ONE** is **ONE HOUR**. Answer book for **PART TWO** will be supplied at the table when the answer sheet for **PART ONE** is returned. However, candidates, who complete **PART ONE** earlier than one hour, can collect the answer book for **PART TWO** immediately after handing over the answer sheet for **PART ONE**.

TOTAL TIME: 3 HOURS

TOTAL MARKS: 100
(PART ONE – 40; PART TWO – 60)

PART ONE
(Answer all the questions)

1. Each question below gives a multiple choice of answers. Choose the most appropriate one and enter in the “tear-off” answer sheet attached to the question paper, following instructions therein. (1 x 10)
- 1.1 A “Picking” Input Device is an example of a
 - A) Sampling Based Input Device
 - B) Request Based Input Device
 - C) Physical Input Device
 - D) Logical Input Device
- 1.2 Orthographic views are created by
 - A) Ignoring the z component of a model
 - B) Moving the camera infinitely far along the axis of projection
 - C) Mapping the current point position along similar triangles to the viewing plane
 - D) None of the above
- 1.3 This projection technique does NOT have the direction of projection perpendicular to the viewing plane.
 - A) Orthographic Parallel Projection
 - B) Axonometric Parallel Projection
 - C) Oblique Parallel Projection
 - D) All of the above
- 1.4 Antialiasing techniques are used to correct aliasing errors that are seen as
 - A) Jaggies
 - B) Staircasing
 - C) Missing or malformed polygons
 - D) Disintegrated textures
- 1.5 JPEG images
 - A) Can hold more colours than GIF images
 - B) Support background transparency
 - C) Are not supported by Netscape or Microsoft browsers

D) Are suitable for black and white line drawings

- 1.6 The process of creating computer animation by specifying a number of model poses and allowing the computer to interpolate these poses to produce smooth movement is called
- A) stop motion animation
 - B) keyframing
 - C) rotoscoping
 - D) rendering
- 1.7 B-spline curves allow-
- A) Only the first order derivatives to be continuous at the end point of the curve.
 - B) Only the second order derivatives to be continuous at the end point of the curve.
 - C) Both the first and second order derivatives to be continuous at the end point of the curve.
 - D) First derivative at one end and second derivative at the other end of the curve.
- 1.8 The sizes of graphics files for use on the web are reduced using
- A) Compression
 - B) Depression
 - C) Impression
 - D) Compilation
- 1.9 Output, which is made up of pictures, sounds, and video, is called.
- A) COM
 - B) Hard copy
 - C) Graphics
 - D) Multimedia
- 1.10 The result of subdivision algorithm is to perform-
- A) Breadth first search
 - B) Depth first search
 - C) Logarithmic search
 - D) None of the above

2. Each statement below is either TRUE or FALSE. Choose the most appropriate one and ENTER in the “tear-off” sheet attached to the question paper, following instructions therein. (1 x 10)

- 2.1 Using Cohen-Sutherland line clipping, it is impossible for a vertex to be labeled 1111.
- 2.2 The viewing transformations for orthographic projection include a shear matrix.
- 2.3 Ray tracing can be used to implement both illumination and visible-surface determination.
- 2.4 Raster output devices use frame buffers to hold the generated image in memory.
- 2.5 A mouse drag is one way to implement a stroke input device.
- 2.6 JPEG files can be saved numerous times with no resulting loss in image quality.
- 2.7 In computer animation each frame in the sequence is called Key-Frame.
- 2.8 Changing the frames with respect to time is animation.
- 2.9 Any shear (in x and/or y) can be represented by a translation to the origin, a rotation, a scaling, a reverse of the rotation, and a reverse of the translation.
- 2.10 For the scan-line polygon fill algorithm, each horizontal edge should be ignored.

3. Match words and phrases in column X with the closest related meaning/word(s)/phrase(s) in column Y. Enter your selection in the “tear-off” answer sheet attached to the question paper, following instructions therein. (1 x 10)

| X | | Y | |
|------|--|----|-----------------|
| 3.1 | Technique used to create the illusion of one object changing shape to another | A. | Bézier Curves |
| 3.2 | use(s) lossless compression only | B. | Digital Camera |
| 3.3 | These are curved lines and curved objects that are defined by mathematical formulas. | C. | Morphing |
| 3.4 | Abbreviation for dots per inch, which indicates the resolution of images. | D. | GIF format |
| 3.5 | The pictures can be downloaded to a computer system, and then manipulated with a graphics program and printed. | E. | Tweening |
| 3.6 | File format in which the image is represented as a collection of geometrically defined objects | F. | JPEG |
| 3.7 | The process of extracting a portion of a picture | G. | Filtering |
| 3.8 | The technique of splitting a raster-scan pattern into two separate patterns is | H. | Raster Graphics |
| 3.9 | System used for representing colors on computer | I. | Interlacing |
| 3.10 | An artificial environment created with computer hardware and software. | J. | Clipping |
| | | K. | Vector Graphics |
| | | L. | Virtual Reality |
| | | M. | DPI |
| | | N. | RGB |

4. Each statement below has a blank space to fit one of the word(s) or phrase(s) in the list below. Enter your choice in the “tear-off” answer sheet attached to the question paper, following instructions therein. (1 x 10)

| | | | | | |
|-----------|-------------|-----------|-----------------------|-----------|------------------|
| A. | Perspective | B. | Refresh Rate | C. | Animation |
| D. | Keyboard | E. | Parallel | F. | Tweening |
| G. | MPEG | H. | Mouse | I. | MIDI |
| J. | Morphing | K. | Persistence of Vision | L. | Cohen-Sutherland |
| M. | Bezier | N. | Mid-Point | | |

- 4.1 _____ is the process of filling in frames from one keyframe to another so that the motion appears fluid.
- 4.2 The physiological phenomenon that enables us to see images in motion (i.e., movies, TV, video, and animation) is known as _____.
- 4.3 It is easier to locate hidden surface when _____ project is used.
- 4.4 We can use the _____ video standard to define the format of the video data.
- 4.5 The _____ Algorithm performs initial tests on a line to determine whether intersection calculations can be avoided.
- 4.6 A vanishing point is generated with a _____ view.
- 4.7 _____ curves start from a control point and end at a control point.
- 4.8 The number of times image is redrawn on a CRT is known as _____.
- 4.9 Playing instrumental music in the background of a text document on display is very easy with _____ files.
- 4.10 A(n) _____ cannot be used to input the location of a point on the screen.

PART TWO
(Answer any **FOUR** questions)

- 5.**
- a) A line from $P_1(-1, 1)$ to $P_2(9, 3)$ is clipped to the rectangular window, whose coordinates are $(0, 0)$, $(8, 0)$, $(8, 4)$ and $(0, 4)$. Find the visible portion of the line using Cyrus Back algorithm.
 - b) How are different shades of colour are generated on the RGB merits.
 - c) Name the MIDI hardware devices.

(7+4+4)

- 6.**
- a) Describe the hardware devices through which graphical data can be presented to a computer.
 - b) Given a rectangle on the screen, describe the steps to double the size of the rectangle subject to condition that the centre of the rectangle does not change. Assume some coordinates of the rectangle and show that your procedure is able to carry out the doubling process. What is the name of the process?
 - c) Define the following:
 - i) Presentation
 - ii) Graphics
 - iii) Animation.

(5+7+3)

- 7.**
- a) What do you understand by the term vanishing points? Which type of projection, is associated with vanishing points? Describe the transformation matrix to yield one vanishing point in the system.
 - b) What are the main issues considered for the design of multimedia system?
 - c) Compare the performance of stack based and queue based fill algorithms.

(5+5+5)

- 8.**
- a) Describe three base types of encoded output frames.
 - b) Write a routine to design a two dimensional Cubic Bezier Curve shapes having first order piecewise continuity by using interactive technique for selection of control points.
 - c) Describe Zooming and Panning.

(6+6+3)

- 9.**
- a) Briefly describe the Phong shading model. Compare its performance with Gouraud model.
 - b) Compare and contrast JPEG and MPEG compression techniques and describe importance of compression with reference to web applications
 - c) Differentiate between
 - i) Image Format
 - ii) Graphic Format
 - iii) File Format.

(6+6+3)