B2.53-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 Which of the following step gives detailed drawing of the scene, at a certain time, in the *animation sequence*?
A)   Storyboard layout
B)   Object definitions
C)   Key-frame specification
D)   Generation of in-between frames

1.2 Calculations performed in *scan-conversion* and other graphics algorithms typically take advantage of
A)   Coherence property
B)   Symmetry property
C)   Continuity property
D)   Equality property

1.3 *Picture definition* is stored in a memory called
A)   RAM
B)   ROM
C)   Frame Buffer
D)   Picture Memory

1.4 Translation operations can result in
A) panning
B) zooming
C) interlacing
D) viewing

1.5 If an image has a *height* of 2 inches and *aspect ratio* of 1.5, what will be its *width*?
A) 6
B) 3

C) 1.5
D) 0.75

1.6 Which of the following transformation magnifies an object about its center?
A) Ss . T-v . S-s
B) Tv . Ss . T-v
C) Tv . Rɵ . T-v
D) Tv . R-ɵ . T-v

1.7 Which spline section is completely specified with four consecutive control points?
A) Natural cubic splines
B) Kochanek-Bartels splines
C) B-splines.
D) Cardinal splines

1.8 Which device places a *negative charge* on the paper, one complete row at a time along the length of the paper?
A) A laser
B) A LCD
C) An electrostatic
D) Plasma

1.9 B-spline curves allow
A) Only the first order derivative to be continuous at the end points of curve
B) Only the second derivative to be continuous at the end points of curve
C) Both first and second derivative to be continuous at the end points
D) First derivative at one end and the second derivative at the other end of the curve

1.10 Which one of the following, transmits digital information to the computer?
A) joystick
B) mouse
C) graphics tablet
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 Emissive displays use optical effects to convert sunlight or light from some other source into graphics pattern.

2.2 A reflection about the line $y = -x$, is equivalent to a reflection relative to the x axis followed by a counterclockwise rotation of 90^0.

2.3 The CMY color model is useful for describing color output to hard-copy devices.

2.4 Key-frame systems allow object-motion characteristics to be specified as part of the object definition.

2.5 MIDI files occupy less space than WAV files.

2.6 A shadow mask CRT has three phosphor color dots at each pixel position.

2.7 The back faces of an opaque polyhedron are completely blocked by the polyhedron itself and visible from view.

2.8 Surface rendering algorithm must be applied if a realistic rendering of the scene is required.

2.9 Bresenham's algorithm is generalized to lines with arbitrary slope by considering the symmetry between the various octants but not for quadrants of the xy plane.

2.10 The scan rate and resolution characteristic of monitor together make a steady and flicker-free image.

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
This is a lossless compression	**A.**	Bezier Curve
Transformation of object shapes from one form to another	**B.**	Digital Camera
Curved lines and curved objects that are defined by mathematical formulae	**C.**	Morphing
Images resolution is indicated in this unit	**D.**	GIF format
The pictures can be downloaded to a computer system and then manipulated with a graphics program and printed	**E.**	Tweening
File format in which the image is represented as a collection of geometrically defined objects	**F.**	RGB
The process of extracting a portion of a picture	**G.**	Filtering
The technique of splitting a raster-scan pattern into two separate patterns is	**H.**	Raster Graphics
System used for representing colors on computers	**I.**	Interlacing
An artificial environment created with computer hardware and software	**J.**	Clipping
	K.	Vector Graphics
	L.	Virtual Reality
	M.	DPI

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.	Pitch	**B.**	Chromaticity	**C.**	Additive modeling
D.	Surface rendering	**E.**	Interpolate	**F.**	Depth queuing
G.	Purity	**H.**	Aspect ratio	**I.**	Zero-order geometric continuity
J.	Framing	**K.**	Rotational method	**L.**	Vector
M.	LCD	**N.**	Digitizer	**O.**	First-order geometric continuity
P.	Intersection	**Q.**	Wire frame	**R.**	Subtractive modeling

4.1 _____ becomes important in preventing distortion when an image is resized or incorporated into other software.

4.2 The distance between the centers of the phosphor dot pattern on the inner side of the display screen is called as _____ of a color CRT.

4.3 The character representation method is called _____ font, where graphical primitives such as lines are used to define the outline of each character.

4.4 A(n) _____ for splitting a concave polygon processes counterclockwise around the polygon and translates each polygon vertex V in turn to the coordinate origin.

4.5 _____ is applied by choosing maximum and minimum intensity values and range of distances over which the intensities are very low.

4.6 When polynomial sections are fitted so that the curve passes through each control point, the resulting curve is said to _____ the set of control points.

4.7 For _____ condition two curves section must have the same coordinate position at the boundary.

4.8 The term _____ is used to refer collectively to the two properties describing color characteristic: purity and dominant frequency.

4.9 _____ is the process of building the model by assembling many simpler objects.

4.10 Real time animations using _____ display on a video monitor useful for testing performance of a vehicle or system.

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

5.
a) As in the raster line algorithm, we sample at unit intervals and determine the closest pixel position to specified circle path each step. Write down the steps of Midpoint circle algorithm.
b) Apply reflection transformation on the diamond-shaped polygon whose vertices are A (-1, 0), B (0, -2), C (1, 0) and D (0, 2) about
    (1) The horizontal line y=2,
    (2) The vertical line x=2, and
    (3) The line y=x+2
c) To reorder polygon surface using depth-sorting method some test are performed. Write those various tests in order of increasing difficulty.

(5+6+4)

6.
a) A more accurate method for rendering a polygon surface is phong shading. Explain phong shading technique.
b) Projections are general mappings that transform an *n*D coordinate system into an *m*D coordinate system. Explain parallel projections with diagrams.
c) Describe application areas of multimedia.

(4+5+6)

7.
a) The display file is divided into segments and each segment carries information associated with it. Write an algorithm to create a segment.
b) The picture can be defined by pixel intensity and number of successive pixel on given scan line with the same intensity is called run length encoding. Which are the advantages and disadvantages of run length encoding method?
c) In the Cohen-Sutherland algorithm, the line segment's endpoints are tested to see if the line can be trivially accepted or rejected. Write down the steps to perform the trivial acceptance and rejection tests of endpoints for this algorithm.

(5+3+7)

8.
a) There are several techniques that are incorporated into graphics package to aid the interactive construction of pictures. Explain the rubber-band method in detail.
b) Describe classification of visible-surface detection algorithm.
c) The operation of most video monitors is based on the standard cathode-ray tube. Explain working of CRT and various properties of video display devices.

(3+5+7)

9. Explain any three of the following:
a) Wireframe model for visual representation of 3D object.
b) Image processing operations.
c) Advantages and disadvantages of MIDI format.
d) Virtual reality.

(5x3)