## B.TECH/IT/6<sup>TH</sup> SEM/INFO 3232(BACKLOG)/2021

# COMPUTER GRAPHICS & MULTIMEDIA (INFO 3232)

## **Time Allotted : 3 hrs**

Full Marks: 70

 $10 \times 1 = 10$ 

Figures out of the right margin indicate full marks.

## Candidates are required to answer Group A and <u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

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

## Group – A (Multiple Choice Type Questions)

- 1. Choose the correct alternative for the following:
  - (i) Which of the following color models are defined with three primary colors ?
     (a) RGB and HSV color models
     (b) CMY and HSV color models
     (c) HSV and HLS color models
     (d) RGB and CMY color models
  - (ii) Which of the following statement(s) is (are) true?
    I. Two successive translations are additive
    II. Two successive rotations are additive
    III. Two successive scaling operations are multiplicative
    (a) I & II
    (b) only II
    (c) II & III
    (d) All the above
  - (iii) A technique used to approximate halftones without reducing spatial resolution is known as

     (a) Halftoning
     (b) Dithering
     (c) Error diffusion
     (d) None of the above
  - (iv) Match the following :

a. Cavalier	i. The direction of projection is chosen so that there is no		
Projection	foreshortening of lines		
	perpendicular to the xy plane.		
b. Cabinet	ii. The direction of projection is chosen so that lines		
Projection	perpendicular to the xy planes are		
	foreshortened by half their lengths.		
c. Isometric	iii. The direction of projection makes equal angles with all of		
Projection	the principal axis.		
d.	iv. Projections are characterized by the fact that the direction		
Orthographic	of projection is		
Projection	perpendicular to the view plane.		
code: a b c d			
(a) i iii iv ii	(b) ii iii i iv (c) iv ii iii i (d) i ii iii iv		

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(v)	Consider a window bounded by the lines : $x = 0$ ; $y = 0$ ; $x = 5$ and $y = 3$ . The line segment joining (-1, 0) and (4, 5), if clipped against this window will connect the points			
	(a) (0, 1) and (2, 3) (c) (0, 1) and (4, 3)	(b) (0, 1) and (3, 3) (d) (0, 1) and (3, 2)		
(vi)	<ul><li>Which of the following statement(s) is/are correct?</li><li>(a) Persistence is the term used to describe the duration of phosphorescence.</li><li>(b) The control electrode is used to turn the electron beam on and off.</li><li>(c) The electron gun creates a source of electrons which are focused into a narrow beam directed at the face of CRT.</li><li>(d) All of the above.</li></ul>			
(vii)	The colour of an object is largely de If Kd = (0.8, 0.4, 0), then what shall blue and magenta ? (a) White and Red (c) Black and White	etermined by its diffuse reflection coefficient. be the colour of the object, if the light used is (b) Red and Blue (d) Black and Red		
(viii)	A point P(2, 5) is rotated about a transformed point P'? (a) (1, 4) (b) (-1, 4)	pivot point (1, 2) by 60°. What is the new (c) (1, - 4) (d) (- 4, 1)		
(ix)	Which of the following is used for object? (a) Quad Tree (c) Run length coding	the boundary representation of an image (b) Projections (d) Chain codes		
(x)	In homogenous coordinate system ( (a) Cartesian points (c) Origin point	x, y, z) the points with z = 0 are called (b) Parallel points (d) Point at infinity		
Group – B				
(a)	Show and explain how the decision Drawing Algorithm are designed.	parameters according to Bressenham's Line		
(b)	Which raster locations would be illuminated by Bresenham's algorithm when scan converting a line from $(1, 1)$ to $(8, 5)$ ? Draw the equivalent plot.			

(c) What is the major advantage of Bressenham's Line drawing Algorithm over DDA Line Drawing Algorithm?

5 + (4 + 2) + 1 = 12

- 3. (a) What is the size of a pixel on a 21-inch diagonal screen with physical aspect ratio 8:5 operating in 1152 x 800 mode?
  - (b) Explain the working principle of LED Display with suitable Diagram.

2.

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(c) "The transformation matrix required for conversion of CMY colour model to [R] [C] [1]

RGB colour model is  $\begin{bmatrix} R \\ G \\ B \end{bmatrix} = \begin{bmatrix} C \\ M \\ Y \end{bmatrix} - \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ ." - Do you agree? Justify your answer.

3 + 5 + 4 = 12

## Group – C

- 4. (a) Give the transformation that maps the square (0,0)-(1,0)-(1,1)-(0,1) into the trapezoid (0,0)-(1,0)-(0.75,1)-(0.25,1).
  - (b) Give the window-to-viewport transformation that maps a window centered at (0,0) to a 19-inch diagonal screen of resolution 1152×900 in such a way that the area of images in the viewport is twice
  - (c) Describe the effect of the scaling transformation S(-1,1).
  - (d) To what point is (7,8) transformed when the coordinate system is rotated 82 degrees counterclockwise?

3 + 3 + 3 + 3 = 12

- 5. (a) Illustrate the best-case and worst-case situations for line clipping using (a) the Cohen-Sutherland algorithm and (b) the Liang-Barsky algorithm. Justify your answer.
  - (b) Prove or disprove that two successive rotations are commutative.
  - (c) Compute the transformation matrix for reflecting an object with respect to a given line with parametric equation y=mx+c in terms of m and c, where m=gradient of the line (angle of the line to x-axis) and c=is intercept on y-axis.

 $(1.5 \times 4) + 2 + 4 = 12$ 

## Group – D

- 6. (a) Compare between Bezier Curve and B-Spline Curve.
  - (b) Which Hidden Surface Elimination Model can work in case of curved surfaces? Why?
  - (c) What is cubic spline? What do you mean by parabolic splines?

4 + 4 + (2 + 2) = 12

- 7. (a) Explain the working principle of Area Subdivision Method for hidden surface elimination.
  - (b) Explain how the illumination changes in case of presence of one or more than one illumination components.

6 + 6 = 12

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- 8. (a) An 8 min long stereophonic sound clip stored in a CD where sampling is done at 44.1 KHz and bit depth is 16. If the size of the CD is 700 MB then how many times the clip can be recorded on the CD?
  - (b) What are sprite and spline in the light of animation? Explain your answer with diagram and example.
  - (c) Why we transmit YC signals instead of RGB signal?

4 + 4 + 4 = 12

- 9. (a) Consider a TV camera where the maximum intensity of the colour signal is represented by 5 volt. An unsaturated Yellow signal is formed by mixing 70% Red, 20% Blue and 30% Green light. What is the luminance & Chrominance output voltage? What would these values be if the Yellow colour becomes saturated?
  - (b) Draw KD Tree from the given dataset:
     A(50,60,50), B(30,70,90), C(20,50,80), D(25,80,100), E(10,40,70), P(80,50,40), Q(85,60,45) and R(90,70,70).

(4+4)+4=12

Department & Section	Submission Link
IT	https://classroom.google.com/c/MzY5MTMwOTk0ODkz/a/MzY5MTMwOTk0OTY2/details