

- (c) 20% intensity of Blue, 30% intensity of Green and 100% intensity of Red light are mixed together to form certain colour X. Find the value of YC signal components to represent colour X if maximum voltage is given as 5 volts.

- (d) What are the different formats for video signals? Compare them.

3 + 3 + 3 + (1 + 2) = 12

9. (a) Compare different types of Quad-trees in terms of their efficiency.
- (b) Why K-D tree is better than normal BST? From the given set of feature vectors, form a K-D tree.
(2, 3, 4), (4, 6, 9), (3, 1, 7), (1, 5, 2), (2, 6, 2), (3, 9, 5), (2, 10, 2), (5, 3, 1)
- (c) What are the different features that can be used to search video data?
- (d) What is Virage?

3 + (4 + 1) + 2 + 2 = 12

Time Allotted: 3 hrs

Full Marks: 70

Figures out of the right margin indicate full marks.

**Candidates are required to answer Group A and
Any 5 (five) from Group B to E, taking at least one 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: **10 × 1 = 10**
- (i) Which colour model is used to represent a coloured image on a paper?
(a) RGB (b) HSB (c) CMYK (d) CIE L*a*b.
- (ii) How many steps the DDA algorithm will execute to draw a line between (0, 0) and (-20, -40)?
(a) 20 (b) 40 (c) -20 (d) -40.
- (iii) What will be the initial value of the decision parameter to draw a circle using Mid-point Circle Drawing Algorithm, where the centre is at (2, -2) and diameter is 10 units?
(a) -7 (b) -4 (c) -9 (d) -17.
- (iv) If a blue coloured surface is to be re-coloured in red, which of the following area filling algorithm should be applied?
(a) Boundaryfill algorithm (b) Floodfill algorithm
(c) Areafill algorithm (d) Polyfill algorithm.
- (v) If an input matrix generated from vertices of an object is multiplied with a transformation matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Then which of the following will not occur?

- (a) Size of the object will not change
(b) Shape of the object will not change
(c) The object will be shifted to origin (0, 0)
(d) The object will be rotated by 0° counter-clockwise.

- (vi) Which of the following describes the advantage of Liang Barsky Algorithm over Cohen Sutherland Algorithm?
 (a) Easy to find the line which are completely outside the window
 (b) Does not need any bitwise operation
 (c) No floating point operation is required
 (d) Number of cross point calculation is lesser.
- (vii) By changing the waveform of the sound, which of the following characteristics of the sound can be modified?
 (a) Timber (b) Volume
 (c) Pitch (d) Beat.
- (viii) Which technique is used to visualize the content of the previous and next key-frames in animation?
 (a) morphing (b) motion cycling
 (c) masking (d) onion skinning.
- (ix) In CBIR, what is the reason behind information loss occurred during representation of image using the extracted features only?
 (a) Sensory Gap (b) Semantic Gap
 (c) Data Gap (d) Formatting Gap.
- (x) How many frames are broadcasted in one second in PAL broadcasting standard?
 (a) 50 (b) 30
 (c) 25 (d) 60.

Group - B

2. (a) With an appropriate block diagram, describe working principle of a digital camera.
 (b) What is interlacing? What is the importance of it in video broadcasting?
 (c) What is subtractive colour model and where is it used?
 (d) What is dithering? Where is it used?
3. (a) What is LUT? State two usage of LUT in multimedia systems.
 (b) What do you mean by Histogram? Where is it used?
 (c) Compare Raster Graphics and Vector Graphics Systems of Image Representation.
 (d) What is CCD?

$$3 + (2 + 2) + 3 + 2 = 12$$

$$(2 + 2) + (2 + 2) + 3 + 1 = 12$$

Group - C

4. (a) Write an algorithm to implement Liang Barsky Line Clipping Method.
 (b) A window is defined between the corners (100, 50) and (50, 100). Find which portion of the line, defined between (120, 120) and (60, 40), will be displayed, using Liang Barsky Line Clipping Algorithm.
 (c) What is the major disadvantage of Sutherland-Hodgman Polygon Clipping Algorithm?
5. (a) What is homogeneous coordinate system? Where is it used?
 (b) Find out the composite transformation matrix for reflection with respect to a line having equation $x = my - c$.
 (c) Scale a square defined with vertex points (10, 10), (20, 10), (20, 20), (10, 20) twice of its original size with respect to the point (15, 15).

$$6 + 4 + 2 = 12$$

$$2 + 5 + 5 = 12$$

Group - D

6. (a) Write down the properties of Bezier Curve.
 (b) What do you mean by Horizon and Vanishing Point? Explain your answer with example.
 (c) What are the different types of projections? Explain them with appropriate diagram.
7. (a) Briefly state how Area-Subdivision Method works to detect visible surface of a 3D object.
 (b) What are the different types of light sources?
 (c) What are the different illumination components? Briefly discuss their effects to illuminate objects.

$$4 + 3 + 5 = 12$$

$$5 + 2 + (2 + 3) = 12$$

Group - E

8. (a) What is Sprite and Spline?
 (b) Why YC signal is used at the time of Broadcasting video signals?