

**COMPUTER GRAPHICS & MULTIMEDIA  
(INFO 3232)**

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



- (c) "The transformation matrix required for conversion of CMY colour model to 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 × 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?
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.

**4 + 4 + (2 + 2) = 12**

**6 + 6 = 12**

**Group - E**

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	<a href="https://classroom.google.com/c/MzY5MTMwOTk0ODkz/a/MzY5MTMwOTk0OTY2/details">https://classroom.google.com/c/MzY5MTMwOTk0ODkz/a/MzY5MTMwOTk0OTY2/details</a>