MCA/4TH SEM/MCAP 2203(BACKLOG)/2021

COMPUTER GRAPHICS
(MCAP 2203)

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) On raster system , lines are plotted with
(a) Lines (b) Dots
(c) Pixels (d) None of the mentioned.

(ii) If the boundary is specified in a single colour, and if the algorithm proceeds pixel by pixel until the boundary colour is encountered is called
(a) Scan-line fill algorithm (b) Boundary-fill algorithm
(c) Flood-fill algorithm (d) Parallel curve algorithm.

(iii) Consider the point (2, 5) in the XY plane. Assume that the point is rotated counter-clockwise in the plane by 90 degrees about the origin. What are the coordinates of the resulting point?
(a) (-2, 5) (b) (2, -5)
(c) (-2,-5) (d) (-5, -2).

(iv) The translation distances (dx, dy) is called as
(a) Translation vector (b) Shift vector
(c) Both a and b (d) Neither a nor b.

(v) Let the maximum number of pixels in a line be M. The number of subdivisions at most necessary for using the mid-point subdivision method of clipping is
(a) $\log_2 M$ (b) 2^M
(c) M / 2 (d) $(M / 2)^2$

(vi) Which of this is compulsory for 2D reflection?
(a) Reflection plane (b) Origin.
(c) Reflection axis (d) Co-ordinate axis.

(vii) In Cohen-Sutherland line clipping, a line with end point codes 0000 & 0100 is
(a) partially visible (b) completely visible.
(c) completely invisible (d) cannot be determined.

(viii) 'Skala' is an example of which type of clipping?
(a) curve clipping (b) point clipping.
(c) polygon clipping (d) line clipping.

(ix) For a Bezier curve, which of the following properties guarantees that if a line is drawn through the curve, the number of intersections with the curve will be less than or equal to the number of intersections with the control polygon?
(a) Coordinate System Independence (b) Convex-Hull
(c) Symmetry (d) Variation Diminishing.

(x) We control the location of a scaled object by choosing the position is known as
(a) Pivot point (b) Fixed point
(c) Differential scaling (d) Uniform scaling.

Group – B

2. (a) Describe the meaning of 'interlaced' video and the reason for using interlaced video formats.

(b) Compare between Direct Coding & Colour Lookup Table Implementation with suitable example. Explain resolution of an image.

4 + (6 + 2) = 12

3. (a) Establish the point circle drawing algorithm. Estimate the pixel positions of a circle of radius 10 units applying midpoint algorithm.

(b) Compare and contrast the boundary fill algorithm and flood fill algorithm

(4 + 3) + 5 = 12

Group – C

4. (a) Explain the reflection of a 2D rigid body about an arbitrary line with equation $y = mx + c$. Derive its transformation matrix.

(b) What is meant by the term 'Affine Transformation'? Explain. Prove that Successive rotation is commutative to the rotation angle.

6 + (3 + 3) = 12

5. (a) 2D viewing transformation is performed from a WINDOW with its corner coordinates from (xw_{min}, yw_{min}) to (xw_{max}, yw_{max}) to a VIEWPORT with corner coordinates from (xv_{min}, yv_{min}) to (xv_{max}, yv_{max}). Derive the expression as suitable matrix operation.

(b) Shear a square A(0,0), B(1,0), C(1,1) and D(0,1) with respect to X axis, Y axis, towards both direction with the following shearing co-efficient. $Sh_x = 2$, $Sh_y = 3$.

5 + (2 + 2 + 3) = 12

Group – D

6. (a) Find the equation of a Bezier curve which passes through the points (0,0) and (-2.1) and is controlled by the points (7,5) and (2,0). Determine the tangent of this graph at t=0.

   (b) Briefly discuss about the continuity of a spline curve.

(5 + 2) + 5 = 12

7. (a) Explain the following terms with respect to a curve:
first order parametric continuity, second order parametric continuity, second order geometric continuity of a curve.

   (b) A Bezier curve is to be drawn given the control points $P_1(40,40)$, $P_2(10,40)$, $P_3(60,60)$, $P_4(60,0)$. Calculate the coordinate of the points on the curve corresponding to the parameter t = 0.2 , 0.4 , 0.6 .Draw the rough sketch of the Curve and show the coordinates of various points on it.

3 + (6 + 3) = 12

Group – E

8. (a) What is the attenuation factor of Illumination Model? How local and global illumination model differ?

   (b) How reflection vector can be determined using the illumination model?

(2 + 3) + 7 = 12

9. (a) Explain the illumination model in reference to different light sources?

   (b) Explain how reflection depends upon the surface characteristics.

7 + 5 = 12

Department & Section	Submission Link
MCA	https://classroom.google.com/c/MzcxNzUxOTE1ODkx/a/Mzc0MzkwOTU0NDk2/details