WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 6th Semester Examination, 2023

CMSACOR14T-COMPUTER SCIENCE (CC14)

COMPUTER GRAPHICS

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

GROUP-A

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) What is an image's aspect ratio?

   (b) If we use direct coding of RGB values with 2 bits per primary color, how many possible colors do we have for each pixel?

   (c) What do you mean by horizontal and vertical retrace?

   (d) What is a bit plane?

   (e) What is a pixel?

   (f) What is the job of a display controller?

   (g) What are the three major adverse side effects of scan conversion?

GROUP-B

Answer any *four* questions from the following 8×4 = 32

2. (a) What is scaling of a graphic object? 2+2+4

   (b) Write down the transformation matrices for scaling with respect to the origin by "a units in the x-direction and b units in the y-direction" simultaneously.

   (c) Magnify the triangle A(0, 0), B(1, 1) and C(4, 3) to twice its size while keeping C(4, 3) fixed.

3. (a) Show that in 2D, reflection about x-axis followed by a reflection through the line $y = -x$ is equivalent to a rotation about the origin. 4+4

   (b) Reflect the diamond shaped polygon whose vertices are A(–1, 0), B(0, –2), C(1, 0) and D(0, 2) about (i) horizontal line $y = x + 2$ (ii) vertical line $x = 2$ and (iii) line $y = x + 2$.

4. (a) What is scan conversion? Write about two drawbacks of scan conversion. 2+4+2

   (b) Explain in detail about Bresenham's straight line drawing algorithm.

   (c) Using the algorithm, find out the coordinates of the points on the straight line joining (1, 1) and (10, 7).

5. (a) Explain 4-way symmetry of an ellipse. 2+6

   (b) Explain in detail about Mid-point ellipse drawing algorithm.

6. (a) What is 'clipping'? Compare between line clipping and polygon clipping. 3+5

   (b) Explain in detail about Cohen-Sutherland line clipping algorithm.

7. (a) Compare between convex and concave polygons. 2+3+3

   (b) Consider a convex polygon with n vertices being clipped against a clip rectangle. What is the minimum number of vertices in the resulting clipped polygon?

   (c) Consider the same problem for a concave polygon. How many polygons might result? If a single polygon results, what is the longest number vertices it might have?

8. (a) Compare the basic color models: RGB and CMYK. 4+4

   (b) "We cannot think of today's world without Computer animation." — Do you agree? Justify your answer.

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