Total No. of Questions—12] [Total No. of Printed Pages—4+1

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S.E. (I.T) (II Sem.) EXAMINATION, 2010

COMPUTER GRAPHICS

(2008 COURSE)

Time : Three Hours **Maximum Marks : 100**

N.B. :— (*i*) Answer *three* questions from Section I and *three* questions from Section II.

(*ii*) Answers to the two Sections should be written in separate answer-books.

(*iii*) Neat diagrams must be drawn wherever necessary.

(*iv*) Figures to the right indicate full marks.

(*v*) Use of electronic pocket calculator is allowed.

SECTION I

1. (*a*) Explain display file structure. Why is display file interpreter used ? Which are the commands used in display file interpreter ? [6]

(*b*) Explain the difference between raster scan and random scan displays. [4]

(*c*) Explain any *four* interactive devices with suitable diagrams. [8]

P.T.O.

Or

2. (*a*) Explain DDA line drawing algorithm. Consider a line segment from A(2, 1) to B(7, 8). Use DDA line drawing algorithm to rasterize this line. [8]

(*b*) Explain and derive the expression for the decision parameter in mid-point line drawing algorithm. [8]

(*c*) Define aspect ratio, Resolution. [2]

3. (*a*) Consider a polygon with vertices A(10, 10), B(15, 15) and C(20, 10). Obtain the following rotations of the ploygon about the origin :

(*i*) Counterclockwise by π

(*ii*) Clockwise by $\pi/2$

(*iii*) Counterclockwise by $5\pi/4$

(*iv*) Clockwise by $3\pi/4$ [8]

(*b*) Explain the homogeneous and normalised coordinate system. [4]

(*c*) Explain the method for testing a pixel inside or outside a polygon. (even-odd method) [4]

Or

4. (*a*) (*i*) Prove that two scaling transformations commute, i.e., S1.S2 = S2.S1.

(*ii*) Show that the composition of two rotations is additive.

$R(\theta 1).R(\theta 2) = R(\theta 1 + \theta 2)$

where, $\theta 1$ and $\theta 2$ are angle of rotation. [8]

(*b*) Explain scan-line polygon filling algorithm. [8]

5. (*a*) Which are the different types of projections ? Explain any *one* in detail with mathematical treatment. [8]

(*b*) What is Spline ? Give definitions of spline curve and spline surface. Explain with neat diagrams, which are the different parametric continuity conditions ? [8]

Or

6. (*a*) What is meant by quadric surfaces ? Explain any *two* quadric surfaces with figure, its equation and parametric form. [8]

(*b*) Write short notes on (Attempt any *two*) :

(*i*) Polygon meshes

(*ii*) Polygon equation

(*iii*) Polygon surface. [8]

SECTION II

7. (*a*) Explain the following terms :

(*i*) Complementary colors

(*ii*) Primary colors

(*iii*) Color gamut

about colors with example. [6]

(*b*) Explain Morphing in detail. [6]

(*c*) Explain difference between RGB and CMY (K) color model. [6]

Or

8. (*a*) What are the different ways in which motions of the objects can be specified ? Explain each in brief. [10]

(*b*) What are the different steps in animation sequence ? Explain each step in brief. [5]

(*c*) Explain HSV color model. [3]

9. (*a*) Explain ray tracing with figure for the following :

(*i*) Ray tracing to solve hidden surface problem for every pixel.

(*ii*) Ray tracing to find shadows.

(*iii*) Ray tracing to find reflections. [8]

(*b*) Explain the following illumination models (any *two*) :

(*i*) Ambient Light

(*ii*) Diffuse reflection

(*iii*) Specular reflection. [8]

Or

10. (*a*) Give calculations for the following ray surface intersection :

(*i*) Intersection of a ray with the XY plane

(*ii*) Intersection of a ray with any arbitrary point on the sphere. [8]

(*b*) What is shading ? Enumerate and explain different shading methods in detail. [8]

11. (*a*) State the general equation representing the inter-reflection of light within an enclosure (i.e. Rendering equation). Explain in brief Monte-Carlo method for rendering. [6]

(*b*) Give the set of equations of Bezier curve. Write the algorithm for drawing a bezier curve section using *four* points. [10]

Or

12. (*a*) Explain features of any Graphics tool you have studied. [8]

(*b*) Write short notes on (any *two*) :

(*i*) Hilbert's curve

(*ii*) Antialiasing

(*iii*) GPU. [8]