Exam.Code:0917
Sub. Code: 6402

2123

B.E. (Computer Science and Engineering)

Fifth Semester

CS-502: Computer Graphics

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt <u>five</u> questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

I. Write short answers of the following:

a. What is aspect ratio? Can aspect ratio be equal to 1?
b. What is meant by window and viewport?
c. What is meant by coherence? Name different types of coherence.
d. Write a general transformation matrix for shearing in x-direction.
e. Show that the composition of two rotations is additive by concatenating the matrix representations for $R(\theta_1)$ and $R(\theta_2)$ to obtain $R(\theta_1)$. $R(\theta_2) = R(\theta_1 + \theta_2)$. **(2 marks each)**

Section-A

II.

a. Derive the expressions for decision parameters in mid-point circle drawing algorithm. With the help of midpoint circle drawing algorithm, find the coordinates of points that lie on circle with radius 10 and (15,5) as center.
b. Why computer-generated lines which are not parallel to x-axis or y-axis and which are not inclined at $\pm 45°$ to x- or y-axis appears to be zigzagged? **(8, 2)**

III.

a. Describe in detail Weiler-Atherton polygon clipping algorithm. Is it suitable for clipping concave polygons?
b. Prove that uniform scaling and a rotation form a commutative pair of operations but that, in general, scaling and rotation are not commutative operations. **(5, 5)**

IV.

a. Reflect the diamond-shaped polygon whose vertices are A(-1,0), B(0,-2), C(1,0), and D(0,2) about the line y=2x+1.
b. What is the difference between Boundary-fill and Flood-Fill algorithms? Write 8-boundary fill algorithm. **(5, 5)**

Section-B

V.

a. Find the transformation A_v which aligns a given vector V with the vector K along the positive z-axis.
b. Discuss the need to eliminate hidden surfaces. Explain depth buffer method for hidden surface elimination. **(5, 5)**

VI.

a. The pyramid defined by the coordinates A(0,0,0), B(1,0,0), C(0,1,0) and D(0,0,1) is rotated 45-degree about the line L that has the direction V=J+K and passing through C(0,1,0). Find the coordinates of the rotated figure.
b. Explain Gouraud's method for smooth shading. **(5, 5)**

VII.

a. What are Bezier Curves? How are they generated? Describe properties of Bezier curves.
b. What are orthographic and oblique projection? Give their general transformation matrices. **(5, 5)**

x-x-x