National Institute of Technology Mizoram

Mid – Semester Examination, Even Semester - 2023

Computer Graphics (CSL 1603)

6th Semester (CSE) Full Marks: 30 marks Duration: 1 hour 30 mins

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Answer all 3 (Three) Questions. All Questions carry same Marks

(3 * 10 = 30 Marks)

QUESTION 1

(a) Derive the Brasenham's algorithm for rendering a line having magnitude of the slope greater than 1. [7]

(b) Discuss the importance of homogenous co-ordinate systems in graphics system. [3]

QUESTION 2

(a) Plot a circle whose radius is 4 units by using the midpoint circle drawing algorithm. [7]

(b) Differentiate between raster and random scan display systems. [3]

QUESTION 3

(a) Derive the transformation matrix to rotate by an angle about an arbitrary axis in space. [6]

(b) Magnify the triangle with vertices A(0,0), B(1,1) and C(5,2) to twice its size while keeping C(5,2) fixed. [4]

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National Institute of Technology Mizoram
End – Semester Examination, Even– 2022-23
Computer Graphics (CSL 1603)

B.Tech 6th Sem CSE **Full Marks: 50 marks** **Duration: 2:30 hours**

Answer All Questions
(5x10 = 50 Marks)

1. (a) Discuss the importance of Hidden Surface Removal in 3D graphics pipeline. How is it different from clipping? [5]
(b) Can you use line clipping algorithm for polygon clipping? Justify. [5]

2. What are the different factors that determine the illumination of a pixel? Explain in detail with appropriate diagrams, mathematical models, etc. whenever necessary. [10]

3. (a) Prove that the composition of two rotations is additive by concatenating the matrix representations for $R(\theta_1)$ and $R(\theta_2)$ to obtain $R(\theta_1)\, R(\theta_2) = R(\theta_1 + \theta_2)$ [6]
(b) Explain DDA line drawing algorithm. [4]

4. (a) Modify the 2-D Cohen Sutherland line-clipping algorithm to clip 3-D lines against the normalised symmetric view volume square. [7]
(b) Differentiate between parallel and perspective projection. [3]

5. (a) Write a procedure to set up the matrix that transforms world-coordinate positions to 3-D viewing coordinates. [7]
(b) What are some potential issues with the seed fill algorithm and how can they be addressed? [3]

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Computer Graphics (CSL 1603)

Mid –Semester Examination, Even 2022

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1. Prove that the multiplication of transformation matrices for each of the following sequences is commutative: [3+3]
   a. Two successive rotations.
   b. Two successive translations.

2. Discuss the importance of homogenous co-ordinate systems in graphics system. [3]

3. Derive the Brasenham's algorithm for rendering a line having magnitude of the slope greater than 1. Explain step by step procedure. [6]

Mid – Semester Assignment

Computer Graphics

CSL 1603

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1. Differentiate between raster and random scan display systems. [5]

2. Describe the working principle of Liquid Crystal Display (LCD). Draw diagram whenever necessary. [5]

3. A rectangular parallelepiped has length on the x-axis, y-axis, and z-axis as 3, 2, and 1, respectively. Perform a rotation by an angle –90 degrees about the x-axis and an angle 90 degrees about the y-axis. Find the new coordinates of the parallelepiped. [7]

4. Derive the transformation matrix to rotate a 3D object by an angle about an arbitrary line parallel to but not coincident with the z-axis. [7]

5. Plot a circle whose radius is 10 units by using the midpoint circle drawing algorithm. [6]

End-Semester Assignment

Computer Graphics, Odd 2022

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1. What are the different factors that determine the illumination of a pixel? Explain in detail with appropriate diagrams, mathematical models, etc. whenever necessary. [15]

2. Explain the Gupta-Sproull algorithm for drawing anti-aliased line along with an example. [10]

3. Find the visible portion of the line segment joining the point X(40,80) and Y(120,30) using Cohen Sutherland algorithm. Consider the clipping window A(20,20), B(60,20), C(60,40) and D(20,40). [10]

4. Can you use line clipping algorithm for polygon clipping? Justify. [5]

5. (a) Discuss the importance of hidden surface removal in a 3D graphics pipeline. [5]
   (b) Briefly explain the idea of coherence. Why is it useful in hidden surface removal? [5]