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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – January 2025** |
| **Date:** 04 - 01 - 2025 **Time:** 01:00 pm – 04:00 pm |

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| **School:** SOCSE | **Program:** B. Tech CSE | |
| **Course Code :** CSE2066 | **Course Name :** Computer Graphics | |
| **Semester**: III | **Max Marks**:100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **24** | **24** | **26** | **26** | **-** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 10Q x 2M=20M** | | | | |
| **1** | Define computer graphics. List the various types of computer graphics. | **2 Marks** | **L1** | **CO1** |
| **2** | List the applications of matrix. Mention the properties of circle. | **2 Marks** | **L1** | **CO1** |
| **3** | Define uniform and differential scaling. List the various steps involved in general pivot point rotation. | **2 Marks** | **L1** | **CO2** |
| **4** | Define clipping. List the clipping types. | **2 Marks** | **L1** | **CO2** |
| **5** | Define perspective foreshortening and vanishing point. | **2 Marks** | **L1** | **CO3** |
| **6** | Recall 3D rotation X axis and Y axis matrix. | **2 Marks** | **L1** | **CO3** |
| **7** | Outline synthetic curve and analytical curve. | **2 Marks** | **L2** | **CO4** |
| **8** | Define quadric surfaces. | **2 Marks** | **L1** | **CO4** |
| **9** | Compare clipping window and viewport. | **2 Marks** | **L2** | **CO3** |
| **10** | List the various parametric and geometric continuity of curves. | **2 Marks** | **L1** | **CO4** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** |  | **(i)**Compute the points between the starting point (5, 6) and ending point (13, 10). Apply DDA line drawing algorithm.  **(ii)**Illustrate the basic structure of OpenGL program. Create a window and display a line in that window using OpenGL program. | **20 Marks** | **L2** | **CO1** |
| **or** | | | | | |
| **12.** |  | **(i)**Given the center point coordinates (10, 10) and radius as 10, Compute all the points to form a circle using Bresenham’s circle drawing algorithm.  **(ii)**Demonstrate the points between the starting point (9,18) and ending point (14, 22) using Bresenham’s line drawing algorithm. | **20 Marks** | **L2** | **CO1** |
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| **13.** |  | **(i)**Demonstrate that the composition of two rotations is additive by concatenating the matrix representations for R(θ1) and R(θ2) to obtain R(θ1) · R(θ2) = R(θ1 + θ2).  **(ii)**Demonstrate that two successive translations are additive i.e T1.T2=T2.T1.  **(iii)**Given a circle C with radius 10 and center coordinates (1, 4). Apply the translation with distance 5 towards X axis and 1 towards Y axis. Obtain the new coordinates of C without changing its radius.  **(iv)**Given a square object with coordinate points A(0, 3), B(3, 3), C(3, 0), D(0, 0). Apply the scaling parameter 2 towards X axis and 3 towards Y axis and obtain the new coordinates of the object. | **20 Marks** | **L3** | **CO2** |
| **or** | | | | | |
| **14.** |  | **(i)**Illustrate Liang Barsky line clipping algorithm steps. Identify the clipping coordinates for a line P1P2 where P1 =(50,25) and P2=(80,50) against window with (xwmin,ywmin)=(20,10) and (xwmax,ywmax)=(70,60) using Liang Barsky Line clipping algorithm.  **(ii)**Explain the four cases of Sutherland-Hodgman polygon clipping. For a polygon and clipping window shown in Figure 1, compute the list of vertices after each boundary clipping.    **Figure 1** | **20 Marks** | **L2** | **CO2** |

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| **15.** |  | **(i)**Perform 3D translation transformation on the following Figure 2 where the given translation distances are tx = 2, ty = 4, tz = 6 and obtain the new coordinates of the object.    **Figure 2**  **(ii)**Perform 3D rotation transformation over a cube ‘OABCDEFG’ as shown in Figure 2 and rotate it through 450 in the anticlockwise direction about the y-axis and obtain the new coordinates of the object.  **(iii)**Consider where a cube” OABCDEFG” is given O(0, 0, 0, ), A(0, 4, 0), B(0, 4, 4), C(4, 4, 0), D(4, 4, 4), E(4, 0, 0), F(0, 0, 4), G (4, 0, 4) and Scaling factor Sx,=2 Sy=3, Sz=2. Apply Scaling operation over the cube for the above Figure 2 and obtain the new coordinates of the object. | **20 Marks** | **L3** | **CO3** |
| **Or** | | | | | |
| **16.** |  | **(i)**Define projection. Explain parallel projection and perspective projection along with its various types. Mention its advantages and disadvantages.  **(ii)**Explain composite 3D translations, composite 3D rotation and composite 3D scaling. | **20 Marks** | **L2** | **CO3** |

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| **17.** |  | Illustrate the parametric representation of curve, circle, ellipse, parabola and hyperbola with appropriate diagram. | **20 Marks** | **L2** | **CO4** |
| **Or** | | | | | |
| **18.** |  | **(i)**Define interpolation and approximation spline. Explain Bezier curve with an example. Outline the five properties of Bezier curve.  **(ii)**Define curve. Explain various representation of curves with appropriate example and its limitations. | **20 Marks** | **L2** | **CO4** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***