

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Backlog), May 2019
B. Tech Computer Science Engineering, Semester IV

Roll No.....

CSE404: Foundations of Computer Graphics

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

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|-----|---|----|
| Q.1 | How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of 1280 X 1024 and a refresh rate of 60 frames per second? | 05 |
| Q.2 | Rasterize a line by using Bresenham's algorithm for slope ($m > 1$) having end point coordinates as (2,5) & (6, 10). | 05 |
| Q.3 | Consider the square A(1,0), B(0,0), C(0,1), D(1,1). Rotate the square ABCD by 60° clockwise about A(1,0). Rasterize a line by using DDA algorithm having equation " $y=2x+6$ ". | 10 |
| Q.4 | Find 3 X 3 homogeneous transformation matrix to transform square ABCD into another square A'B'C'D' after rotation by 45 degree. Side of original square =2, coordinates of point A(20,10). Draw the final transformation after performing scaling by factor of '2'. | 10 |
| Q.5 | Fill the closed polygon with the vertices (5, 6), (5, 12), (14, 12), (14, 6). Use scan line seed fill algorithm with (9, 9) as seed. Fill only two scan lines. | 10 |
| Q.6 | Illustrate 2D and 3D rotation matrix. Prove that two 2D rotation about the origin commutative i.e $R_1.R_2=R_2.R_1$. | 10 |
| OR | | |
| Q.7 | Illustrate 2D and 3D scaling matrix. Prove that two scaling transformation are commutative i.e. $S_1.S_2 = S_2.S_1$ | 10 |
| Q.8 | The coordinates of four control points related to the curve are given as
P1 = (2,2,0)
P2 = (2,3,0)
P3 = (3,3,0)
P4 = (3,2,0)
Write the equation of resultant Bezier curve. Also draw the curve by finding coordinates at $u=0$, $u=0.25$, $u=0.5$, $u=0.75$, and $u=1$. | 15 |

- Q.9 Use the Cohen Sutherland algorithm to clip line P1 (80,15) and p2(110,10) against a window lower left hand corner (40,10) and upper right hand corner (90,40). Define Clipping. Explain Polygon clipping in detail by considering suitable example. 15
- Q.10 Describe hidden surface removal. Explain the application of Z-buffer algorithm. 10