Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech
Sub_Code: RCS5D006

5th Semester Back Examination: 2025-26
SUBJECT: Computer Graphics
BRANCH(S): CSE, CSEAIML, CSIT, CST, IT
Time: 3 Hours
Max Marks: 100
Q.Code: U379

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Differentiate between Raster Scan and Random Scan display.
b) Define Resolution and Aspect Ratio.
c) What is 8-connected region in filling?
d) Distinguish between boundary fill and flood fill algorithms.
e) Rotate a polygon with vertices (1,1), (4,1), (4,3) about point (1,1) by 90°. Compute new coordinates.
f) Differentiate between Bezier and B-Spline curves.
g) What is the purpose of parallel projection in graphics?
h) Mention the three types of light sources used in computer graphics.
i) Define specular reflection.
j) Write the formula for depth buffer comparison.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Describe the components of a Graphics System.
b) A display uses 15-inch diagonal CRT monitor with aspect ratio 4:3. Calculate (i) Width & Height of the screen, (ii) Number of pixels per inch if resolution is 1280 × 1024.
c) Discuss midpoint circle drawing algorithm with advantages.
d) Fill an 8-sided polygon using scan line algorithm for the vertices (2,2), (8,2), (11,5), (11,9), (8,12), (2,12), (–1,9), (–1,5). Determine intersection points for scan line y = 6 and y = 9.
e) Explain the window-to-viewport transformation with mathematical formulation.
f) Discuss reflection transformations with respect to x-axis, y-axis, origin, and an arbitrary line.
g) Explain polygon surface representation and its structure using polygon mesh diagrams.
h) Describe 3D rotation about an arbitrary axis with matrix representation.

i) Perform composite transformation on point P(1, 2, 3) using:

i. Translation T(–2, 5, 4)

ii. Scaling S(3, 2, 1)

Determine the resulting coordinate.

j) Describe cubic spline interpolation and derive the cubic spline equation.

k) Describe the back-face detection algorithm with necessary conditions and examples.

l) Explain the Z-buffer method with an example and limitations.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain in detail the working of Bresenham's and DDA line drawing algorithms. Show performance comparison with example outcomes. **(16)**

Q4 Discuss 2D transformations in detail: translation, rotation, scaling, reflection, and shear with matrix representation and examples. **(16)**

Q5 Describe the 3D viewing pipeline and explain view volume, projection reference point, clipping window, viewport transformation. **(16)**

Q6 Explain color models in computer graphics - XYZ, RGB, CMY, YIQ with chromaticity diagrams, component structure, conversion examples & real-time uses. **(16)**