

MCA (Revised)

Term-End Examination

04972

June, 2019

**MCS-053 : COMPUTER GRAPHICS AND
MULTIMEDIA**

Time : 3 hours

Maximum Marks : 100

*Note : Question number 1 is compulsory. Attempt any
three questions from the rest.*

1. (a) What is frame buffer ? Discuss the role of frame buffer in controlling intensity and colour of the display device. 5
- (b) Explain the limitations of DDA algorithm for line generation. Expand the abbreviation DDA. 5
- (c) Define the terms Window and Viewport. Explain the significance of Windowing transformation. 5
- (d) Prove that two successive rotations are additive. 5

- (e) Compare perspective projection with parallel projection. 5
- (f) What are Bezier curves ? Give mathematical expression of Bezier curve, with meaning of each term used in expression. 5
- (g) Write Z-Buffer algorithm for hidden surface detection. Explain, how this algorithm is applied to determine the hidden surface. 5
- (h) What is Animation ? How does computer animation differ from computer graphics ? 5
2. (a) Derive the rotational transformation matrix for anticlockwise rotation. Draw suitable diagram to express the steps of derivation. Use the derived matrix to write the rotational transformation matrix, in 3D homogeneous coordinate system, when anticlockwise rotation is applied across the X-axis, Y-axis and Z-axis respectively. 10
- (b) Write the Pseudo Code for Bresenham Circle generation algorithm. Use this pseudo code to produce an arc of the circle, with radius $r = 4$ units, in the first quadrant from $x = 0$ to $x = y$. 10

3. (a) Determine the perspective projection of a point $P(x, y, z)$ on $z = 0$ plane, provided the centre of projection is at point $Q(0, 0, -d)$. Draw suitable diagram to exhibit your execution. 5
- (b) Determine two points on a cubic Bezier curve, whose control points are $p_0(1, 1)$; $p_1(2, 4)$; $p_2(3, 6)$; $p_3(4, 8)$. 5
- (c) How does ambient reflection, diffused reflection and specular reflection contribute to the intensity pattern of any environment ? Give mathematical expression for the resulting intensity. 5
- (d) What is the requirement of shading in computer graphics ? What is intensity interpolation ? How does intensity interpolation relate to shading ? 5
4. (a) What do you understand by "Simulating acceleration in animation" ? How does simulation of zero acceleration differ from the simulation of non-zero acceleration ? Discuss the formulation of mathematical function, used to exhibit positive acceleration in animation. 10
- (b) Differentiate between Ray tracing and Ray casting. 5
- (c) Explain Scan-line polygon fill algorithm. 5

5. Write short notes on the following :

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- (a) Sutherland-Hodgman Polygon Clipping Algorithm**
 - (b) Authoring tools and their types**
 - (c) Bezier surfaces and their applications**
 - (d) Area subdivision method**
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