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

Total Number of Pages: 02

Course: M.Sc I
Sub_Code: FBEF811

8th Semester Regular Examination: 2024-25
SUBJECT: Computer Graphics
BRANCH(S): M.Sc.I(MC)
Time: 3 Hours
Max Marks: 70
Q.Code: S189

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

Part-I

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

a) Differentiate between a raster-scan display and a random-scan display.
b) What are homogeneous coordinates and why are they used in geometric transformations?
c) A point P (3, 5) is translated by a vector T (2, –1). What are the coordinates of the translated point P'?
d) A line segment has endpoints A (1, 2) and B (4, 6). If it is scaled by a factor of 0.5 with respect to the origin, what are the new coordinates of A and B?
e) Briefly explain the key difference between Bezier and B-Spline curves.
f) What is the purpose of halftone patterns and dithering techniques in displaying light intensities?
g) Differentiate between Gouraud shading and Phong shading techniques in polygon rendering.
h) A Bezier curve is defined by four control points. If the first control point is P0 and the last is P3, what is the curve guaranteed to pass through?
i) In the context of B-Spline curves, what is the effect of increasing the order (degree) of the basis functions on the resulting curve?
j) Differentiate between multimedia and hypermedia.

Part-II

Long Answer Type Questions (Answer Any five)

Q2 **a)** Explain the architecture of a raster-scan graphics system. Describe the function of the frame buffer, video controller, and display processor in generating images on the screen. **(5 + 5)**

b) Compare and contrast at least three different input devices used in computer graphics, discussing their working principles and typical applications.

Q3 **a)** Discuss the differences between orthogonal, oblique parallel, and perspective projections in 3D viewing. Illustrate how parallel lines in the object are projected in each type and describe a typical application for each. **(5 + 5)**

b) Explain the 3D viewing pipeline. How does it extend the 2D viewing pipeline to handle three-dimensional objects and projection onto a 2D viewing plane? Discuss the role of the view volume in 3D clipping.

Q4	**a)**	Describe the scan-line algorithm for visible surface detection. What are the key data structures used in this algorithm, and how does it determine the visible parts of polygons for each scan line?	**(5 + 5)**
	b)	Explain the basic illumination model, including ambient, diffuse, and specular reflection components. Describe how each component contributes to the final color of a surface.	
Q5	**a)**	Explain the concept of spline representations in 3D modeling. Compare and contrast Bezier and B-Spline curves in terms of their control points, local control, and continuity.	**(5 + 5)**
	b)	Explain the steps involved in the depth-buffer algorithm for determining visible surfaces. Discuss how the depth buffer and frame buffer are used, and what happens when processing each polygon.	
Q6	**a)**	Describe the different categories of multimedia software tools. Provide examples of tools within each category and explain their primary functions in multimedia content creation.	**(5 + 5)**
	b)	Discuss the RGB and CMYK color models, explaining how colors are represented in each. What are the primary applications of each color model?	
Q7	**a)**	Explain the basic idea behind Huffman coding (a variable length coding technique). Given the frequencies of symbols A: 0.4, B: 0.3, C: 0.2, D: 0.1, construct a Huffman code for these symbols. (You don't need to calculate the average code length).	**(5 + 5)**
	b)	Describe the basic steps involved in the JPEG image compression standard. Highlight the role of the Discrete Cosine Transform (DCT) and quantization in the lossy compression process.	
Q8	**a)**	Discuss the key elements and considerations involved in multimedia authoring. What are some common features provided by multimedia authoring tools?	**(5 + 5)**
	b)	Compare and contrast the MPEG-1 and MPEG-2 video compression standards. Highlight their key differences in terms of target applications and compression capabilities.	