

B.TECH.**THEORY EXAMINATION (SEM-IV) 2016-17****COMPUTER GRAPHICS****Time : 3 Hours****Max. Marks : 100****Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.****SECTION – A****1. Explain the following:****10 x 2 = 20**

- (a) Why do we need video controller?
- (b) Trace the points for drawing a line from (0,0) to (-6,-6) using simple DDA algorithm.
- (c) Define refresh buffer.
- (d) Give the transformation matrix for rotation about an arbitrary point P in space.
- (e) Prove that the two successive rotations are commutative.
- (f) Write how shear transformation works.
- (g) List the properties of B-spline curves.
- (h) Differentiate between specular reflection and diffuse reflection.
- (i) How a viewport differs from the window?
- (j) What do you mean by aliasing and antialiasing? Give examples

SECTION – B**2. Attempt any five parts of the following questions:****5 x 10 = 50**

- (a) Develop the Bresenham's line drawing to draw lines of any slope. Compare this with the DDA Algorithm.
- (b) Given a 25cm x 20cm display operating in 1024 x 768 x 16 color mode which is refreshed 30 times per second, and for which 10% of the refresh cycle is spent in retrace, calculate
 - (i) the pixel aspect ratio,
 - (ii) the size of the frame buffer, and
 - (iii) the required data transfer rate in kilobytes per second.
- (c) Given a window bordered by (1,2) at the lower left and (16,12) at the upper right, give the screen coordinates of a triangle with vertices (3,2), (10,7.5) and (5,5) when mapped into a viewport with corners (100,100) and (400,200). Provide accurate illustrations of the window, viewport, and the untransformed and transformed triangles with your answer.
- (d) Explain the essential difference between the "Scan-Line" hidden surface removal algorithm and the depth buffer technique.
- (e) Write the way of clipping a line using Cohen Sutherland algorithm.
- (f) Give a detailed explanation about quadratic surfaces and polygon surfaces.
- (g) Write down the detailed description of Warn model.

SECTION – C**Attempt any two parts of the following questions:****2 x 15 = 30**

- 3 The figure ABCD where $A=(-2,0)$, $B=(0,-2)$, $C=(-2,-4)$ and $D=(-4,-2)$ can be transformed into A'B'C'D' where $A'=(1,-1)$, $B'=(3,3)$, $C'=(6,3)$ and $D'=(4,-1)$ by the composition of simple transforms $T_2 * H_1 * S_1 * R_1 * T_1$. Give the matrix form of these five transformations. Then express the composite transform using only one scale, one rotation and one translation.
- 4 Explain Area Subdivision algorithm with suitable figure? List the advantages and disadvantages of Area Subdivision algorithm.
- 5 Discuss in detail about visible surface detection methods.