| **Paper Code: CS-403** | **Roll No.** | | | | | | | | | | |
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# B.Tech.
# (SEM IV) EVEN SEMESTER EXAMINATION, 2015-16
# COMPUTER GRAPHICS

**[Time: 2 hrs.]** **[Max. Marks: 50]**

**Note:-** Attempt All Questions.

**1.** Attempt any four parts of the following:- **[3.5x4 = 14]**

(a) Consider the line from (5,5) to (13,9). Rasterizing the line with the general Bresenham algorithm.

(b) Describe the construction and functioning of Beam Penetration CRT. Discuss its merits and demerits.

(c) Suppose we have a computer with 16 bits per word and a transfer rate of 1 mip(one million instructions per second).How long would it take to fill the frame buffer of a 400 dpi (dot per inch) laser printer with a page size of 8.5 inches by 11 inches?

(d) Differentiate between the Random scan display and Raster scan display. Explain the role of pixel and frame buffer in graphics devices.

(e) Explain incremental algorithm over DDA with suitable example.

(f) Write a procedure for a parallel implementation of circle algorithm.

**2.** Attempt any two parts of the following:- **[6x2 = 12]**

(a) What is window –to-view point coordinate transformation? What are issues related to multiple windowing?

(b) What are homogeneous coordinates? If a line whose end points are (x1,y1) and (x2,y2) exists in 2D space, then write the concatenation of matrices that will rotate the mirror image of the line about mid-point of the line by an angle 600 counterclockwise. Each of the transformations has to be in homogenous coordinate system.

(c) What do you understand by the term "Clipping"? Explain the Cohen- Sutherland algorithm for clipping a line and discuss how the Weiler-Atherton algorithm worked for clipping.

**3.** Attempt any two parts of the following:- **[6x2 = 12]**

(a) Do you think that the line clipping algorithm will do for polygon clipping too? Justify your answer and explain Liang-Barsky algorithm for 3D clipping.

(b) What do you understand by the term Projection? Describe the one principal- vanishing-point perspective, two-principal-vanishing-point perspective and three-principal-vanishing-point perspective.

(c) Prove that the multiplication of the 3D transformation matrices for each of the following sequence of operations is commutative:

(i) Any two successive translations.
(ii) Any two successive scaling operations.
(iii) Any two successive rotations about any one of the coordinate axes.

**4.** Attempt ***any two*** parts of the following: **[6x2 = 12]**

(a) What do you understand by the term "Back-Face Removal"? Compare the Back-Face Removal with A-Buffer method.

(b) Explain the Painter's algorithm. Show how the calculation of the edge with ascan line can be made incremental as opposed to absolute.

(c) Let P0(0,0), P1(1,2), P2(2,1), P3(3,-1), P4(4,10) and P5(5,5)be given data points. If interpolation based on cubic B-splines is used to find a curve interpolating these data points, find a knot set t0,……..,t9 that can be used to define the cubic B-splines. Explain the difference between the Bezier and B-spline curves.