Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 160703 **Date: 25/11/2011**

Subject Name: Computer Graphics

Time: 10.30 am -1.00 pm **Total marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions & draw figures wherever necessary**
3. **Figures to the right indicate full marks.**

Q.1 (a) Briefly explain the any five computer graphics applications. 5

(b) Explain following terms 6

1. Persistence
2. Resolution.
3. Raster-Scan display system.

(c) What is frame buffer? How long would it take to load a 1280 by 1024 frame buffer with 12 bits per pixel if transfer rate is 1Mbps? 3

Q.2 (a) What is aliasing? How to compensate the aliasing? Explain in detail. 6

(b) What are the limitations of DDA line drawing algorithm? Explain Bresenham's line algorithm. 8

OR

(b) Explain the property of circle and calculate the pixel position along circle path with radius r =10 centered on the origin using midpoint circle algorithm up to x=y. 8

Q.3 (a) Prove that the multiplication of 2D transformation matrices for each of the following sequence of operations is commutative 8

1. Two successive rotations.
2. Two successive translations.

(b) What is window and view-port? Retrieve equations for the scaling factors to map the window to view-port in 2D viewing system. 6

OR

Q.3 (a) Explain the Cohen Sutherland line clipping algorithm. 8

(b) What is 2D shear transformation? Covert the unit square to shifted parallelogram using x-direction shear transformation operation where parameter $sh_x = ½$ and $Y_{ref} = -1$ and unit square dimensions are (0, 0), (1, 0), (0, 1) and (1, 1). 6

Q.4 (a) Prove that transformation matrix for the rotation about an arbitrary axis can be expressed as the composition of following seven individual transformations 8

$$R(\theta) = T^{-1}.R_x^{-1}.(\alpha).R_y^{-1}(\beta).R_z(\theta).R_y(\beta).R_x(\alpha).T$$

(b) List the advantages of the B-splines over the Bezier splines and explain the B-spline curves properties. 6

OR