



04 JUN 2010
Eastern University, Sri Lanka.

EASTERN UNIVERSITY, SRILANKA
DEPARTMENT OF MATHEMATICS
THIRD EXAMINATION IN SCIENCE -2008/2009
FIRST SEMESTER (Feb. /Mar. 2010)
CS 301 – COMPUTER GRAPHICS
(PROPER & REPEAT)

Answer all questions

Time allowed: 02 hours

1.

- a) Briefly describe the following :
 - i. Raster-Scan Displays,
 - ii. Random-Scan Displays.
- b) Briefly describe the two basic techniques for producing color displays with a CRT.
- c) Draw the Architecture of a **raster-graphics system** with a display processor.
- d) Various devices are available for data input on graphics workstations. Describe any three input devices.
- e) Define the following terms:
 - i. Modeling Coordinates,
 - ii. World Coordinates,
 - iii. Normalized Coordinates,
 - iv. Device Coordinates.

2.

- a) Define the term “**Output Primitives**”.
- b) Explain **DDA** (Digital Differential Analyzer) algorithm to generate straight lines.
- c) Briefly explain the Advantages and Disadvantages of the above algorithm.
- d) Explain **Breshenham’s** line drawing algorithm to generate straight lines with the slope less than one.
- e) The end points of a given line are (0, 0) and (6, 18). Compute each value of y as x step from 0 to 6 using DDA and Bresenhaus algorithms and plot the resultant line. [Hint: Use Line equation as $y = mx + b$].

3.

- a) Prove that the multiplication matrix for each of the following sequence of operations is commutative:
 - i. Two successive rotations,
 - ii. Two successive translations,
 - iii. Two successive scaling.
- b) Show that the transformation matrix with suitable figure, for a reflection about the line $y = -x$ is equivalent to a reflection relative to the y-axis followed by a counter clockwise rotation of 45° .
- c) Show that the transformation matrix with suitable figure, for the following:
 - i. x- direction Shear,
 - ii. y- direction Shear.
- d) Convert a **unit square** which is transformed to a shifted parallelogram with $sh_x = 1/2$ and $y_{ref} = -1$ in the x-direction using shearing transformation.

- e) Convert a **unit square** which is turned into a shifted parallelogram with parameter values $sh_y = 1/2$ and $x_{ref} = -1$ in the y-direction using shearing transformation.

4.

- a) Briefly describe two dimensional **viewing transformation pipelines**.
- b) What are the basic transformation techniques used in Window-to-Viewport transformation? Derive the viewing transformation matrix.
- c) What is meant by clipping in computer graphics and briefly explain the 3 clipping Primitive types.
- d) Explain the four cases for *Sutherland-Hodgeman polygon clipping algorithm*?
- e) Use the *Sutherland-Hodgeman polygon clipping algorithm* to clip the polygon given below.

