

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MID SEMESTER EXAMINATION-2015

B.Tech. VI Semester (CSE/IT)

COURSE CODE: 11B1WCI611

MAX. MARKS: 30

COURSE NAME: Computer Graphics

COURSE CREDITS: 04

MAX. TIME: 2 HRS

Note: All questions are compulsory.

Section A

(Marks: 6)

Question-1: How much time is spent scanning across each row of pixels during screen refresh on a raster system with a resolution of 1280 by 1024 and a refresh rate of 60 frames per second?

Question-2: Consider two raster systems with resolutions of 640 by 480 and 1280 by 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel in each system?

Question-3: Explain the difference between a general graphics system designed for a programmer and one designed for a specific application, such as architectural design.

Question-4: List the OpenGL statements needed to draw a line segment from the upper-right corner of a display window of width 150 and height 250 to the lower-left corner of the window.

Question-5: Write the transformation matrices for two successive scaling operations in 2-D.

Question-6: Justify the learning of Computer Graphics as undergraduate course by you.

Section B

(Marks: 9)

Question-1: Draw the step by step pictorial representation when an object is to be rotated about an axis that is not parallel to one of the coordinate axis.

Question-2: Consider the following matrix for pixel array $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \\ 10 & 11 & 12 \end{bmatrix}$ and rearrange it for

90-degree rotation counterclockwise and 180-degree rotation counterclockwise.

Question-3: Write a code to construct the 4 x 4 identity matrix for 3D uniform scaling.

Section C

(Marks: 15)

Question-1: Determine the form of the 2-Dimensional transformation matrix for a reflection about any line: $y = mx + b$.

Question-2: Show that transformation matrix, for a reflection about the line $y = -x$, is equivalent to a reflection relative to the y axis followed by a counterclockwise rotation of 90 degree.

Question-3: Using the midpoint method, and taking symmetry into account, develop an efficient algorithm for scan conversion of the following curve over the interval $-10 \leq x \leq 10$.

$$y = \frac{1}{12}x^3$$

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