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Total No. of Questions : 8] [Total No. of Printed Pages : 3

MCA–403(O)

M. C. A. (Fourth Semester) EXAMINATION, June, 2007

(Old Course)

COMPUTER GRAPHICS

[MCA–403(O)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What are interactive input devices ? What are their functions ? Describe with neat diagram the working of one locator device. 2, 2, 6

   (b) Describe with neat diagram the working of DVST. Write its advantages and disadvantages over refresh CRT. 6, 4

2. (a) What do you mean by rasterization ? Write general Bresenham's line drawing algorithm and use it to find the points to be rasterised when line is drawn from $(-3, -3)$ to $(1, 2)$. 1, 4, 5

   (b) Derive matrix of transformation which performs scaling of magnitude S_1 and S_2 in two arbitrary directions T_1 and T_2, given T_1 and T_2 are

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perpendicular to each other and make angle 45 degree with co-ordinate axes. 10

3. (a) Write mid-point circle generation algorithm and use it to find the points which would be put ON for generating the arc of circle with centre origin and radius 6 from 0 degree to 45 degree. 5, 5

   (b) Suppose that a window has its lower left corner at $(-2, -1)$ and upper right corner at (3, 2). Use Cohen-Sutherland line clipping algorithm to find the visible portion, if any, of the line segment joining the points $(-3, 1)$ and $(1, -2)$. 10

4. (a) What is the need to normalized device co-ordinate system ? Derive window to viewport transformation. 2, 8

   (b) What is the role of Bezier curve in designing curves and surfaces ? Write advantages and disadvantages of Bezier curve over B-spline curves. 5, 5

5. (a) Given a unit cube with one corner at (0, 0, 0) and opposite corner (1, 1, 1). It is rotated about *y*-axis in anticlockwise direction by an angle 45° and then scaled in *x* and *y* direction by 2 units. Find the new location of cube. 10

   (b) Develop the specular reflection model for shading. Point out, how the choice of power of cosine term is related to the surface property ? 7, 3

6. (a) Distinguish between parallel and perspective projections. A rectangular field is described in 3-D co-ordinate system as follows :

A $(-20, -20, 0)$, B $(20, -20, 0)$, C $(20, -20, -40)$, D $(-20, -20, -40)$.

Find its perspective view on YZ plane when centre of projection is $(-15, 0, 0)$. 3, 7

   (b) List area filling algorithms with the advantages and disadvantages of one over the other. 10

7. (a) List the algorithms for the removal of hidden surfaces. Write advantages of *one* algorithm over the other. 10

   (b) Discuss any *two* useful applications of Computer Graphics. 10

8. Discuss any *four* of the following in brief : 5 each

   (a) Polygon clipping algorithm
   (b) Gaurond shading
   (c) Character generation
   (d) Attributes of output primitives
   (e) Parallel projections
   (f) 3-D clipping