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# END TERM EXAMINATION

SECOND SEMESTER [MCA] MAY-2010

Paper Code: MCA 108  
Subject: Computer Graphics  
Paper ID:44108

Time: 3 Hours  
Maximum Marks: 60

Note: Question 1 is Compulsory. Attempt one question from each unit.

Q-1 Answer the following questions:

(2X10=20)

- (a) List and explain the applications of computer graphics.
- (b) Consider the raster system with the resolution of 1280 by 1024. What size frame buffer (in bytes) is needed for the system to store if 24 bits pixels are to be stored?
- (c) Define clipping. What is polygon clipping?
- (d) Explain Octrees.
- (e) Why hidden surfaces algorithms needed?
- (f) Explain Bezier Surface.
- (g) What is scan conversion?
- (h) What do you mean by Illumination model?
- (i) Explain the purpose of BSP-Tree.
- (j) What do you mean by Constructive Solid Geometry?

## UNIT-1

Q2 (a) Explain Bresenham's line drawing algorithm. Give the advantages of this algorithm over DD algorithm.(5)

(b) Compute the intermediate points on the line drawn from (0, 0) to (5, 10) using Bresenham's algorithm.(5)

Q3 (a) Define window to viewport transformation.(5)

(b) Compute 2D transformation matrix for rotating a point (12, 6) about the point (3,2) by the angle 30 in the clockwise direction.(5)

## UNIT-2

Q4 (a) Give the properties and limitations of a Bezier curves.(5)

(b)Construct equations for a Bezier curve with two, three, four control points using casteljau's algorithm.(5)

Q5 (a) Prove that the open uniform B-Spline curve for  $n=3$ ,  $k=4$  is the cubic Bezier curve.(2)

(b)4 control points  $P_0(a, b)$ ,  $P_1(2,5)$ ,  $P_2(4,4)$  and  $P_3(7,c)$  are on the uniform quadratic B-Spline. Determine the values of  $a$ ,  $b$ ,  $c$  if the curve starts from the points  $(1, 4)$  and terminates with the slopes  $(-0.5)$ .(8)

### UNIT-3

Q-6(a) Give the properties of a good representation of solids.(4)

(b)Describe spatial occupancy enumeration method for spatial partitioning representation of solids. What are the advantages of Octrees?(6)

Q-7(a) what do you mean by parallel projection and perspective projection?(4)

(b)Derive a matrix for the projection of a point  $p(x, y, z)$  onto a projection plane at a distance  $Z_p$  from the origin and perpendicular to  $z$ -axis.(6)

### UNIT-4

Q8(a) Describe Gourand Shading. What are mach bands?(4)

(b) What are the two main approaches used for hidden surface removal? Explain briefly the methods used in each approach.(6)

Q9(a)Describe how the  $z$  buffer hidden surface removal algorithm works.(4)

(b)Write the empirical model for calculating specular reflection range given in the Phong Model.(6)