

ALCCS – (OLD SCHEME)

Code: CS40
Time: 3 Hours

Subject: COMPUTER GRAPHICS
Max. Marks: 100

MARCH 2011

NOTE:

- Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.
- Parts of a question should be answered at the same place.
- All calculations should be up to three places of decimals.

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- Q.1**
- Name four hidden-surface algorithms.
 - Consider a rectangle A(30, 10), B(60, 10), C(60, 30), D(30, 30). Work out a transformation to rotate the rectangle about point B by 60° anti clockwise. What will be the new coordinate of point D?
 - Differentiate between raster and random displays.
 - Define the terms window and view port.
 - Write a short note on morphing.
 - Work out the transformations needed to obtain top view of an object on the XY screen ($z = 0$ screen).
 - Indicate with an example how a surface can be generated using sweep method. (7 × 4)
- Q.2**
- Describe Floating horizon algorithm for hidden surface removal. What are the advantages & disadvantages of Floating horizon algorithm. (9)
 - Fill the closed polygon with the vertices (5, 6), (5, 12), (14, 12), (14, 6). Use scan line seed fill algorithm with (9, 9) as seed. Fill only two scan lines. (9)
- Q.3**
- For a cubic Bezier curve with the given 4 control points, show that the curve must pass through the first and last control points. (8)
 - Find the coordinates of the mid point of a Bezier curve given the points P1(10, 10), P2(20, 40), P3(60, 60), P4(80, 20). (6)
 - Draw the convex hull of the above curve. (4)
- Q.4**
- Describe briefly the constructive solid-geometry method for generating solids using different techniques. (8)

- b. Consider a unit cube with vertices $(0, 0, 0)$, $(0, 0, 1)$, $(1, 0, 0)$, $(0, 1, 0)$, $(1, 1, 0)$, $(0, 1, 1)$, $(1, 0, 1)$ and $(1, 1, 1)$. Perform perspective projection with centre of projection at $P(0.5, 0, 5)$ and projection done onto plane $z = 0$. Work out the projected coordinates of the points $(1,0,1)$ and $(1,1,1)$. (10)
- Q.5** a. Describe DDA line drawing algorithm. Draw a line from $(0,0)$ to $(6,7)$ using DDA algorithm. (6)
- b. Using Cohen-Sutherland algorithm find the co-ordinates of the line joining $(-1, 2)$ and $(9, 7)$ which is visible in the rectangle $(0, 0)$, $(0, 5)$ and $(10,5)$, $(10, 0)$. (6)
- c. Explain Phong specular-reflection model. (6)
- Q.6** a. What do you understand by diffuse reflections? Briefly explain the significance of diffuse reflection coefficient and ambient-reflection coefficient in computations of diffuse reflections. (10)
- b. How are colors generated on a CRT screen? (8)
- Q.7** a. What are the main characteristics of a fractal? Derive the formula for the dimension of a fractal. (6)
- b. Describe briefly the self-squaring transformations, which can generate fractals. (6)
- c. Describe briefly how can we simulate zero acceleration, positive acceleration and deceleration between two key frames in an animation. (6)