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Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



V SEMESTER B.TECH (COMPUTER SCIENCE AND ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: COMPUTER GRAPHICS [CSE 307]

REVISED CREDIT SYSTEM 02/12/2015

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- ✤ Missing data, if any, may be suitably assumed.
- 1A. What is the necessary condition to shift from region1 to region2 in midpoint ellipse method? Derive the decision parameters in the second region of ellipse where, tangent at any point on the curve is almost vertical.4M
- 1B. With a neat diagram explain the different components of monochrome CRT. 4M
- 1C. With proper justification give any four differences between raster graphics and vector graphics system. 2M
- 2A. What are the initial tests performed in Cohen-Sutherland line clipping method? A clipping window PQRS has lower left corner at (3, 4) and upper right corner at (10, 9). Find the section of the clipped line AB whose coordinates are A(2, 11) and B(9, 2).
 4M
- 2B. A window is defined by an ellipse with 5 units semi-major axis and 3 units semi-minor axis with center at (1, 1). A circle of radius 1/2 and center (1/2, 1/2) is used as a viewport. Find the window to viewport transformation matrix. 2M
- With an example, explain the data structures used for filling the polygon using scan fill method. Also describe different coherences used in the method.
- 3A. A triangle A(4,0), B(4,4), C(2,2) and a fixed circle of radius 8 units and center (10,10) are defined in XY plane.
 - i) Obtain the composite 2D transformation matrix to fit the triangle ABC inside the circle such that, edge AB is horizontal and passing through the center of the circle and the vertices A, B and C touches the edge of a circle.
 - ii) Also obtain the final transformed co-ordinates of the triangle ABC. 4M
- 3B. Given a unit cube with one corner at (0, 0, 0) and opposite corner at (1, 1, 1). Derive the composite transformation necessary to rotate cube by 30 degrees about main

diagonal [from (0, 0, 0) to (1, 1, 1)] in the clockwise direction when looking along diagonal toward origin. 4M

3C. A unit square is transformed by 2 x 2 transformation matrix. The resulting position vectors are given below. Find the 2D transformation matrix.



4A. Classify different types of projections and explain each one of them. 3M 4B. Derive the Hermite basis matrix. Consider the four equally spaced Bezier control points P1(0, 0), P2(1, 0), P3(2, 0) and P4(4, 0). Show that, for the parametric curve Q(t) to have constant velocity from P1 to P4, the coefficient **b** that relates Hermite curve to Bezier curve must be equal to 3. 5M 4C. Derive the Oblique transformation matrix. 2M5A. What are the tests performed to avoid polygon splitting in depth sort technique? Explain with an example. 5M 5B. How is image space VSD methods different from object space methods? List out at least one application that use these methods. 3M 5C. List out different properties of parametric curves. 2M 6A. Explain different types of light sources, attenuation factors and reflections. 4M6B. Briefly explain different sequences involved in design of animation. 3M 6C. A CRT is capable of generating 6 intensities in the range [I0, 1]. If the initial intensity, I_0 is 0.25, find the other intensities. Also explain gamma correction. 3M

2M