

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

VI SEMESTER B.TECH. (COMPUTER SCIENCE & ENGINEERING) END SEMESTER EXAMINATIONS, APRIL/MAY 2017

SUBJECT: ELECTIVE – II – COMPUTER GRAPHICS [CSE 4001]

REVISED CREDIT SYSTEM (27/04/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Missing data may be suitable assumed.

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- 1A. With a neat block diagram explain the working of video controller in raster display. 3M How long would it take to load a 640×480 frame buffer with 12 bit per pixel, if 10⁵ bits can be transferred per second? Also how many pixels could be accessed per second by video controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel?
- 1B. Mention any two advantages and disadvantages of DDA line method. Apply 2M Bresenham's algorithm to draw a line from (4, 4) to (-3, 0).
- 1C. Derive the necessary decision parameters to draw an ellipse centred at origin using midpoint method in region 2. Give the necessity condition to change from region 1 to region 2 while drawing ellipse using the same method.
- 2A. Give the steps to fill a polygon using scan fill method. Consider a polygon with vertices at A(4, 5), B(5, 3), C(8, 5), D(8, 1), E(1, 1) and F(1, 2). Construct global edge and show the contents of active edge table for scan line 2.
- 2B. Discuss parametric line clipping algorithm using potential entry and exit intersection 3M points. Provide the different cases for clipping a line using the same.
- 2C. Develop a general form of scaling matrix about a fixed point (x, y). Also prove that 3M two successive rotations are additive.
- 3A. A mirror is placed vertically such that it passes through the points (10, 0) and (0, 10).
 2M Find the reflected view of a triangle ABC with coordinates A(5, 50), B(20, 40) and C(10, 70) in the mirror.
- 3B. Given a unit cube with one corner at (0, 0, 0) and opposite corner at (1, 1, 1).
 4M 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 towards origin.

- 3C How perspective projections are categorized? Derive the necessary matrix for 4M standard perspective projection. A unit cube is projected onto xy plane. Find the projected points using standard perspective projection transformation with d = 10, where d is the distance from the view plane.
- 4A. What are the tests of Depth sort algorithm for visible surface determination? How it 5M is different from BSP tree method? Give an example for BSP tree considering five polygons.
- 4B. Prove that parametric cubic curves are generalization of straight approximation. 5M5M Derive the basis matrices for Hermite and Bezier curves.
- **5A.** Explain the process of selecting intensities in a monochromatic display. How to **3M** generate more intensities using Half toning?
- **5B.** What are the different types of reflections? Derive the intensity calculations for **4M** each type of reflection.
- **5C.** Explain different traditional animation techniques.

3M