

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular/Backlog), April-May. 2016

B. Tech in Computer Science Engineering, Semester IV

Roll No.....

CSE404: Foundations of Computer Graphics

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A' Objective type multiple choice questions (10 questions @ 1 mark)

10

- i. Which among the following is not a component of graphical user interface:
 - a) Button
 - b) Check box
 - c) Data Grid
 - d) Radio Button
- ii. In Plasma Panels picture definition is stored in
 - a) Memory
 - b) Gas Discharge
 - c) Refresh Buffer
 - d) None of the above
- iii. Graphics Tablet is a type of
 - a) Digitizer
 - b) Data Glove
 - c) Scanner
 - d) Display System
- iv. Example of application specific touchscreen GUIs
 - a) Automatic Teller Machines
 - b) Information kiosks
 - c) Airline self-ticketing
 - d) All of the above
- v. Seed-fill algorithms using a stack, use the principle of
 - a) LIFO
 - b) FIFO
 - c) FILO
 - d) None of the above
- vi. Pick out the correct statement —
 - a) Midpoint algorithm can be implemented in hardware.
 - b) Midpoint algorithm takes less time compared to sutherland cohen clipping algorithm.
 - c) The clipping window must always be rectangular in shape.
 - d) Lines parallel to the window edge cannot be clipped.



- vii. For carrying out sutherland-cohen clipping the end-point codes of 4 lines are given below. Find out which one will be totally invisible from clipping window.
 - a) 0000, 0000
 - b) 0100, 1000
 - c) 0001, 1000
 - d) 0110, 1010
- viii. A rectangle has been drawn on the screen and it is desired to carry out a zoom in process to double the size of the rectangle. This process would involve
 - a) Only scaling
 - b) Scaling and translation
 - c) Scaling and rotation
 - d) Translation scaling and translation back
- ix. A drawback of depth-buffer (z-buffer) is that it can only find one visible surface at each pixel position i.e.,
 - a) It deals with only opaque surfaces.
 - b) It deals with only transparent surfaces.
 - c) Both of the above.
 - d) None of the above.
- x. Curve passes through all the points in
 - a. Interpolation
 - b. Approximation
 - c. Both of the above
 - d. None of the above

Q.2

10

- A Differentiate between Gouraud and Phong shading.
- B What is the rate of a 1024 X 1024 frame buffer with an average access rate per pixel of 200 nanoseconds on a simple color display?
- C Explain the concept of eight way symmetry in Circle drawing algorithm.
- D Mention 5 file formats used for textual documents.

Q.3A Differentiate between plasma panels and flat panels and how do they work? 05

Q.3B How can the light pen differentiate between two points on the screen when both have the same color / intensity ? 05

Q.4A Draw a line using Bresenham's algorithm having coordinates (-1, 7) and (5, 9) ? 05

Q.4B Draw a circle in first quadrant having center (0, 0) and radius 5 using Mid-point Circle Algorithm. 05

Q.5A Describe boundary fill algorithm with the help of a suitable example. 05

Q.5B Explain the Sutherland Cohen line clipping algorithm. Is this applicable to any type of window ? Justify your answer. 05

Q.6A Explain Depth Buffer Algorithm with detailed description. 05

Q.6B A unit cube is located at the origin such that 3 of its edges are parallel to x, y and z-axis. Imagine a person located at (10, 6, 8) looking at the centre of the cube. Find out which faces of the cube would be visible to him. 05

OR

Q.6B In 2D graphics the following transformation matrix would reflect a point about the diagonal line passing through the origin and (10, 10) line. Show that this is same as the coordination of matrix for 450 clockwise rotation, followed by reflection about the x-axis and finally by rotation of 450 anticlockwise (about origin)? 05

Q.7A Find the transformation matrix for scaling, shearing and rotation? 05

Q.7B Describe briefly the steps carried out in rendering an object using Phong shading. 05

OR

Q.7B Mention the name of algorithm used for Polygon clipping. Describe Polygon clipping algorithm with suitable example. 05

Q.8 Make a comparison detail of color models. Explain the conversion of color models:- 10

- a) RGB to CMY
- b) CMY to RGB
- c) RGB to YIQ
- d) YIQ to RGB

Q.9A Explain Cohen Sutherland algorithm. Clip the line with the boundaries (0, 0) and (15, 15) and the points are (2, -5) and (2, 18). 10

Q.9B Find the transformation that scales (with respect to the origin) by 10

- a) 'a' units in x-direction
- b) 'b' units in y-direction
- c) simultaneously 'a' units in x-direction and 'b' units in y-direction

OR

Q.9B Describe Mid-Point Circle Algorithm approach considering diagrammatical representation. Prove it with detailed derivations:- 10

if $p_i < 0$ then

$$p_{i+1} = p_i + 2x_{i+1} + 1$$

$$\text{else } p_{i+1} = p_i + 2x_{i+1} + 1 - 2y_{i+1}$$

