

[3 hours]

80 marks

- N.B. : (1) Q1. Is compulsory
 (2) Attempt any 4 questions out of remaining six questions
 (3) Figures to the right indicate full marks
 (4) Use of scientific calculator is allowed

- Q1 a) Derive the Liang Barsky's line clipping algorithm and use it to clip a line (10)
 P1-P2 with P1(-75,-100), P2(175,50) against the window with
 (Xwmin, Ywmin) \equiv (0,0) and (Xwmax, Ywmax) \equiv (150,100)
- b) How is image sampling and quantization done, Explain in detail. (05)
- c) What are Octrees? How can they be used to represent Three-Dimensional Objects (05)
- Q2 a) Explain the Z-Buffer algorithm for hidden surface removal and compare it (08)
 with A-buffer algorithm.
- b) Apply the following transformations on the following 3BPP image (07)
- 1) Image Negative
 - 2) Gray-level slicing with background range of interest (r1=3, r2=5)
 - 3) Thresholding with threshold value =4

3	0	6	3	7	6
1	7	1	3	0	7
7	3	3	5	0	2
5	3	0	5	6	2
6	1	2	1	4	2

- Q3 a) Equalize the following histogram and draw the original and equalized (08)
 histogram.

Intensity	0	1	2	3	4	5	6	7
No. Of Pixels	15	28	5	7	24	5	6	10

- b) What is a fractal? What are its different types? How is a fractal dimension (07)
 measured?
- Q4 a) Use Bresenham's line drawing algorithm to rasterize the line P1-P2 with (08)
 endpoints P1(10,10), P2(20,16)
- Q4 b) Write the properties of B-Spline curves. How are they different from Bezier (07)
 curves?

[TURN OVER]

- Q5 a) A rectangle has lower left corner at (20,20), and upper right corner at (60,40) (08)
Perform the following transformations one after another on the rectangle and obtain its coordinates after every transformation.
- 1) Rotation by 90 degrees in anticlockwise direction, about its center
 - 2) Scale the rectangle about origin so that it reduces to half of its size
 - 3) Reflection in Y axis.
- b) Explain with examples i) Inside - Outside test. ii) Winding number rule test (07)
- Q6 a) Derive the Scanline polygon filling algorithm (08)
- b) Explain in detail Halftoning and Dithering techniques. (07)
- Q7 a) Derive the Sutherland Hodgeman Polygon clipping algorithm (08)
- b) How is a parallel projection taken? What are its different types? How is it different from perspective projection? (07)