APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Scheme for Valuation/Answer Key

Scheme of evaluation (marks in brackets) and answers of problems/key

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: CS401

Course Name: COMPUTER GRAPHICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks. Marks

1 Aspect ratio – 2 marks, Resolution – 2 marks. (4)

2 Flood fill algorithm – 4 marks (4)

3 Compute the end points of dashes and plot it using line drawing algorithm (4)
Another method is to display the line segment and then change at regular interval to background colour.-*(Give marks accordingly if the question is attempted by students to write any line drawing method)*

4 (a) Reflection about the line x=y is x' =y and y'=x - 1marks (4)
(b) Translate A to origin, Rotate about origin, Retranslate to original A - 3marks

5 Vertex Table (1 mark) , Edge Table (1 mark), Polygon Surface Table (1 mark), Illustration (1 mark) (4)

6 All-or-none string clipping – 1 mark, all-or-none character clipping – 1 mark, Clip the components of individual chars (line clipping, individual pixel clipping) – 2 marks. Illustration – 2 marks- (4)

7 Parallel projections – (4)
orthographic(multiview, axonometric (isometric, dimetric, trimetric)) – 2,
oblique (cavalier, cabinet). Main point only. - 2marks

8 Correlation operations – 2 marks (4)
Convolution operations – 2 marks

9 Z-buffer algorithm for hidden surface removal – 4 marks (4)

10 Neighbours – 1, Adjacency -1, Connectivity – 2 marks. (4)

PART B

Answer any two full questions, each carries 9 marks.

11 a) Random scan system block diagram – 2 mark (6)
Explanation – 4 marks

b) Beam penetration CRT- 3 marks. (3)

12 a) midpoint circle drawing algorithm (4 marks) (4)

b) Finding points in an octant w.r.t. origin - (4 marks) (5)

The points w.r.t. center (50, 30) are : - (1 mark)

(No need to find all points using 8-way symmetry)

13 a) No – (1 mark). Justification – (1 mark) (2)

b) Working of light pen(3 marks) (3)

c) Scan line algorithm for filling polygon – 4 marks (4)

PART C

Answer any two full questions, each carries 9 marks.

14 a) Drawing Line Segment with window-1 mark (6)

Cohen Sutherland algorithm illustration-3 marks

End points of visible segment -2 mark

b) Equation for window to viewport transformation -3 marks (3)

15 a) Steps – 6 marks (9)

Deriving the composite matrix – 3 marks

16 a) Sutherland Hodgeman polygon clipping algorithm– 5 marks (5)

b) Draw the filgure. (1) Translate the intersection point B(0,b) to origin -T1(2) Rotate by (-theta) degree sothat line L aligns with x axis -R1(3) Mirror reflect about the x-axis.-M1 (4) Rotate back theta degree -R2 (5) Translate B' back to (0,b)-T2. Transformation Matrix M = T2.R2.M1.R1.T1 (4)

PART D

Answer any two full questions, each carries 12 marks.

17 a) Scan line algorithm – 5 marks (7)

Different data structures used – 2 marks

b) By subdividing the surfaces into two distinct surfaces. (2)

c) Data for each surface includes – RGB intensity components, percentage of transparency, depth, percentage of area coverage, surface identifier, other surface rendering parameters, pointer to next surface. (3)

18 a) Fundamental steps in image processing – Image acquisition, image enhancement, image restoration, colour image processing, wavelets and multi-resolution processing, compression, morphological processing, segmentation, object recognition, representation and description – 6 marks (8)

Diagram – 2 mark

b) - Subtract a from each gray level to make the range become 0 to b-a (4)

- Multiply the result by (d-c)/(b-a) to make the range 0 to d-c
- Add c to the result from step 2 to obtain the range c to d.

g2(x,y) = (d-c)/(b-a)*(g1(x,y) – a) + c [1 mark for each step + 1 mark for final expression]

19	a)	Robert's – 2 marks, Prewitt's – 2 marks, Sobel's – 2 marks	(6)
	b)	Derivation of transformation equtions – 3marks, Transformation matrix in homogeneous co-ordinates – 1mark. Equation when view plane is uv plane - 1mark Equation when projection reference point is viewing co-ordinate origin-1mark	(6)

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