VIMAL JYOTHI ENGINEERING COLLEGE

JYOTHI NAGAR, CHEMPERI – 670632, KANNUR D.T., KERALA

An ISO 9001:2008 Certified Institution

Assignment Cover Page

Name of the student :- DARSHITHA K.

PRN VVL19CS047 | Admission No 6695

Subject Name :- COMPUTER GRAPHICS AND IMAGE PROCESSING | Subject Code:- CST304

Assignment Title/No : 1

Name of the faculty: Asha Miss

Assignment Submitted on 25/05/2022

Late submission rules : Max mark will reduced to 50% for 1-5 working day's delay, no mark will be awarded thereafter.

I am hereby confirming that this assignment is my own and I haven't adopted any unfair means in any steps of its preparation to enhance my performance in this assignment.

Darshitha K.
Sign with Name

Date : 25/05/2022

Assignment subdivision	Maximum Mark	Marks awarded	Remarks
A	10	10	Good
B	5	5	Good
C			

Feed back/suggestions :

Asha Baby
Name and sign of the faculty

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DARSHITHA.K.
S6 CSE A 24
VMLIOXS047

ASSIGNMENT-1.

Q.No:5

Describe the DDA line drawing algorithm? Use the algorithm to find the coordinate along the line joining the pixel positions (10,10) and (25,20)

DDA - Digital Differential Analyser.

⇒ It is the simplest line drawing algorithm.

Given the starting and ending coordinates of a line, DDA algorithm attempts to generate points between starting and ending coordinates

Algorithm:

Step 1: Start

Step 2. Enter starting (x_1, y_1) and ending (x_2, y_2) points of line.

Step 3: Calculate $dx = (x_2 - x_1)$, $dy = (y_2 - y_1)$ declare variables step, X_{inc}, Y_{inc} and initialize $x = x_1$ and $y = y_1$ and plot (x, y)

Step 4: Check $abs(dx) > abs(dy)$, if it is true.
calculate step = abs(dx)
else step = abs(dy)
assign $x = x_1$ and assign $y = y_1$.

Step 5: $X_{inc} = dx/step$, $Y_{inc} = dy/step$

Step 6: Setpixel (x, y)

Step 7: for(k=0, k<step, k++)
$x = x + x_{inc}$
$y = y + y_{inc}$
plot points (x, y) until k=step, plot nearest integer value.

Step 8: Stop

⇒ DDA algorithm allows us to detect the change in the value of x and y, so plotting of same point twice is not possible

→ (10,10) ⇒ (25,20)
$(x_1, y_1) \Rightarrow (x_2, y_2)$.

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$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{20-10}{25-10} = \frac{10}{15} = 0.6$$

$$abs(dx) > abs(dy)$$

$$15 > 10$$

$$\therefore step = 15$$

$$x_{inc} = \frac{dx}{step} = \frac{15}{15} = 1$$

$$y_{inc} = \frac{dy}{step} = \frac{10}{15} = 0.6$$

$$x = x + x_{inc} = 10 + 1 = 11$$

$$y = y + y_{inc} = 10 + 0.6 = 10.6$$

k	x,y	plot
0	(11, 10.6)	(11, 11)
1	(12, 11.2)	(12, 11)
2	(13, 11.8)	(13, 12)
3	(14, 17.4)	(14, 12)
4	(15, 13)	(15, 13)
5	(16, 13.6)	(16, 14)
6	(17, 14.2)	(17, 14)
7	(18, 14.8)	(18, 15)
8	(19, 15.4)	(19, 15)
9	(20, 16)	(20, 16)
10	(21, 16.6)	(21, 17)
11	(22, 17.2)	(22, 17)
12	(25, 17.8)	(23, 18)
13	(24, 18.4)	(24, 18)
14	(25, 19)	(25, 19)

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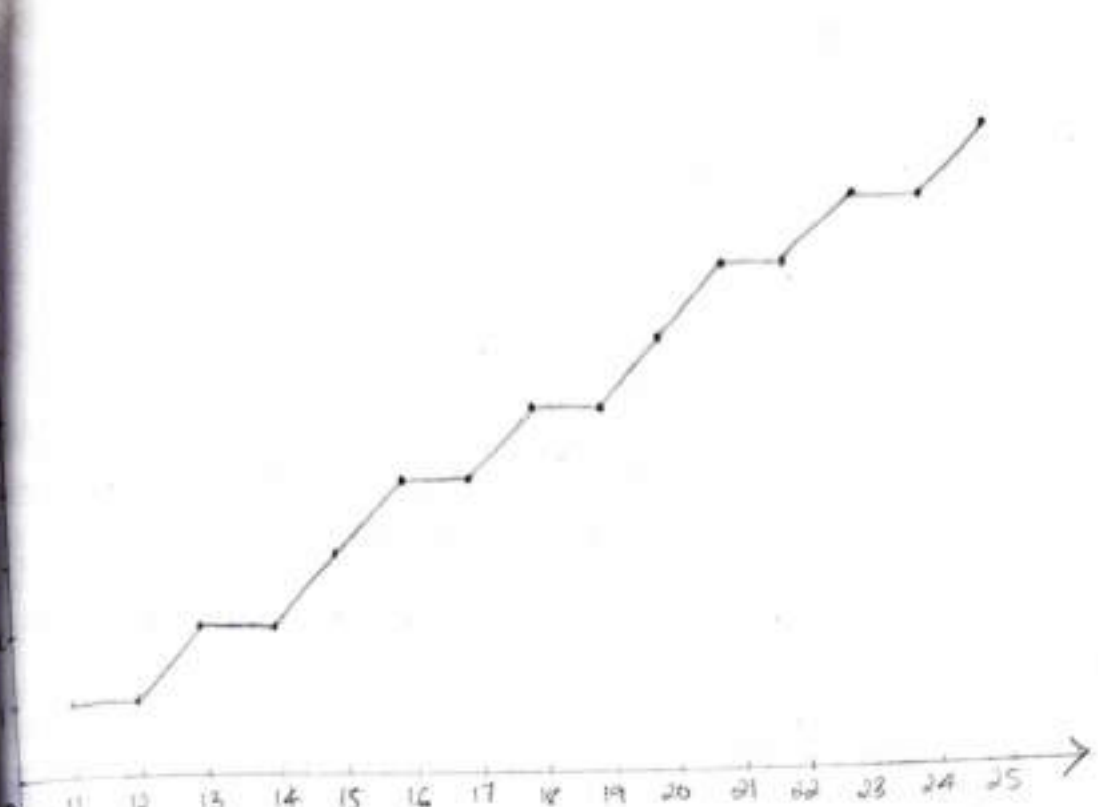
Princi



Explain how 4-connected area filling approach differs from 8connected area filling in the boundary filling algorithm.

4 connected

→ After painting a pixel, the function is called for 4 neighbouring points. These are the pixel positions that are right, left, above and below the current pixel. Areas filled by this method are called 4-connected.

Algorithm.

```
void boundaryfill4 (int x, int y, int fillcolor, int boundary_color)
{
  if (getpixel(x,y) != boundary_color &&
      getpixel(x,y) != fill_color)
  {
    putpixel (x,y, fill_color);
    boundaryfill4 (x+1, y, fill_color, boundary_color);
    boundaryfill4 (x, y+1, fill_color, boundary_color);
    boundaryfill4 (x-1, y, fill_color, boundary_color);
    boundaryfill4 (x, y-1, fill_color, boundary_color);
  }
}
```

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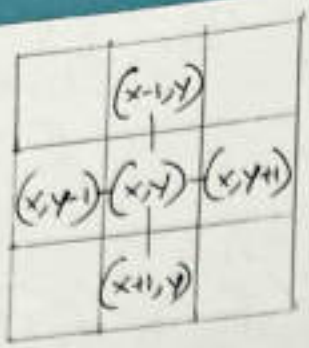


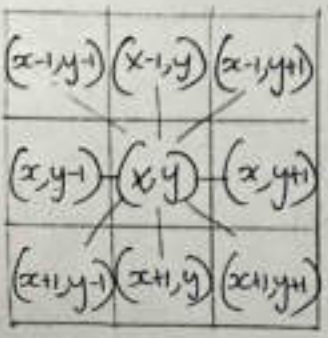
8 connected

Most complex figures are completed / filled using this approach. The pixels to be tested are the 8 neighbouring pixels, the pixel on the right, left, above, below and 4 diagonal pixels. Areas filled by this method are called 8 connected.

Algorithm

```
void boundaryfill8(int x, int y, int fill_color, int boundary_color)
{
  if(getpixel(x,y) != boundary_color && getpixel(x,y) != fill_color)
  {
    putpixel(x,y,fill_color);
    boundaryfill8(x+1, y, fill_color, boundary_color);
    boundaryfill8(x, y+1, fill_color, boundary_color);
    boundaryfill8(x-1, y, fill_color, boundary_color);
    boundaryfill8(x, y-1, fill_color, boundary_color);
    boundaryfill8(x-1, y-1, fill_color, boundary_color);
    boundaryfill8(x-1, y+1, fill_color, boundary_color);
    boundaryfill8(x+1, y-1, fill_color, boundary_color);
    boundaryfill8(x+1, y+1, fill_color, boundary_color);
  }
}
```

3.



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Assignment Cover Page

Name of the student :- DIYA S

PRN NM19CS058 | Admission No. 6392

Subject Name :- COMPUTER GRAPHICS AND IMAGE PROCESSING | Subject Code:-

Assignment Title/No : ASSIGNMENT - 1

Name of the faculty: Asha Baby

Assignment Submitted on 26/05/22

Late submission rules : Max mark will reduced to 50% for 1-5 working day's delay, no mark will be awarded thereafter.

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Diya S

Sign with Name

Date : 26/05/22

Assignment subdivision	Maximum Mark	Marks awarded	Remarks
A	10	10	Good
B	5	5	Good
C			

Feed back/suggestions :

Asha Baby 27/5/22

Name and sign of the faculty

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ASSIGNMENT-1

DIYA.S
Roll no.27
VHL19CS053
S6 CSEA

Question.

Using the midpoint circle drawing algorithm, find out the first quadrant point of a circle from $x=0$ to $x=y$ where $r=9$ and also draw the complete circle using the same.

with a suitable figure, describe the shadow masking technique in CRT.

Answers.

The initial value of the decision parameter is $P_0 = 1-r = -8$ //

initial point is: $(x_0, y_0) = (0, 9)$

Successive midpoint decision parameter values and the corresponding coordinate positions along the circle path are listed in the following table

K	P_K	(x_{K+1}, y_{K+1})	$2x_{K+1}$	$2y_{K+1}$
		(1,9)	2	18
0	-8	(2,9)	4	18
1	-5	(3,8)	6	16
2	0	(4,8)	8	16
3	-9	(5,7)	10	14
4	0	(6,7)	12	14
5	-3	(7,6)	14	12
6	10			

$P_1 = -8+2+1 = -5$.

$P_2 = -5+4+1 = 0$

$P_3 = 0+6+1-16 = -9$

$P_4 = -9+8+1 = 0$

$P_5 = 0+10+1-14 = -3$

$P_6 = -3+12+1 = 10$.

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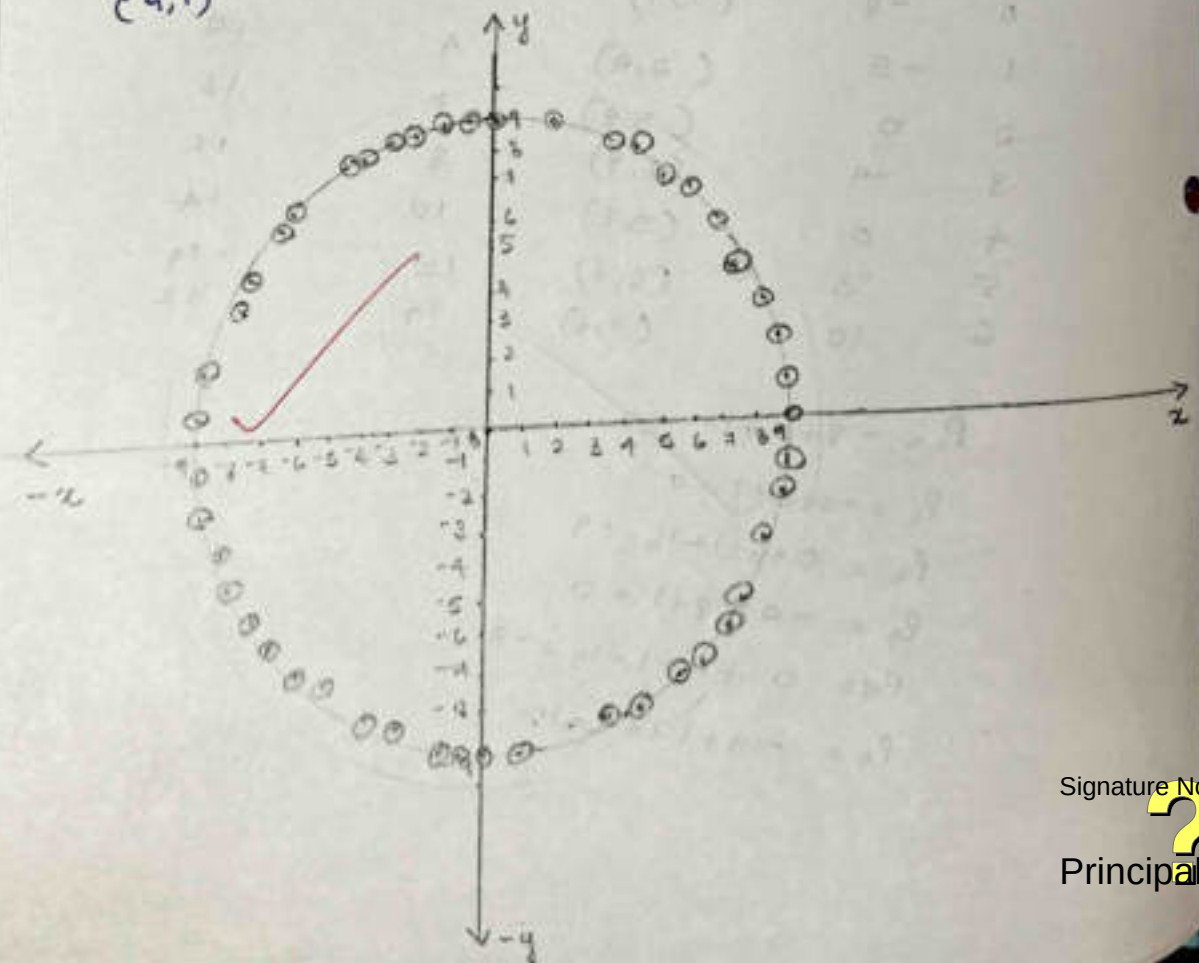
Rest of the quadrants

(x, y)	(x, -y)	(-x, -y)	(-x, y)
(1, 9)	(1, -9)	(-1, -9)	(-1, 9)
(2, 9)	(2, -9)	(-2, -9)	(-2, 9)
(3, 8)	(3, -8)	(-3, -8)	(-3, 8)
(4, 8)	(4, -8)	(-4, -8)	(-4, 8)
(5, 7)	(5, -7)	(-5, -7)	(-6, 7)
(6, 7)	(6, -7)	(-6, -7)	(-6, 7)
(7, 6)	(7, -6)	(-7, -6)	(-7, 6)
(7, 5)	(7, -5)	(-7, -5)	(-7, 5)
(8, 4)	(8, -4)	(-8, -4)	(-8, 4)
(8, 3)	(8, -3)	(-8, -3)	(-8, 3)
(9, 2)	(9, -2)	(-9, -2)	(-9, 2)
(9, 1)	(9, -1)	(-9, -1)	(-9, 1)



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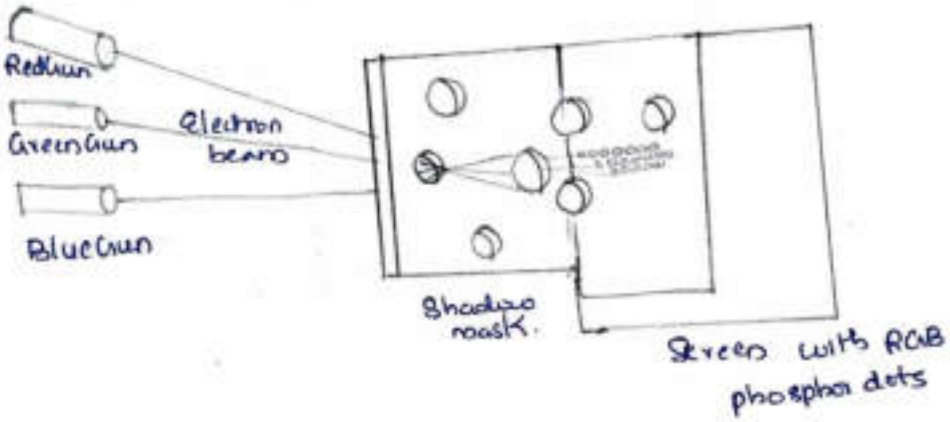
Shadow masking techniques in CRT

→ It is commonly used in raster scan systems (including color TV) because they produce a much wider range of colors than the beam penetration method.

→ A shadow mask CRT has 3 phosphor color dots at each pixel position

→ One phosphor dot emits a red light, another emits a green light; and the 3rd emit a blue light.

→ Delta-delta shadow mask method



→ Commonly used in color CRT systems

→ The 3 $\bar{e}$ beams are deflected and focussed as a group on to the shadow mask, which contains a series of holes aligned with the phosphor dot patterns.

→ When the 3 beams pass through a hole in the shadow mask, they activate a dot triangle, which appears as a small color spot on the screen

→ The phosphor dot in the triangle are arranged so that each $\bar{e}$ beam can activate only its corresponding color dot when it passes through the shadow mask.

→ We obtain color variations in a shadow mask CRT by varying the intensity levels of the 3 $\bar{e}$ beams.

→ By turning off the red and green guns, we get only the color coming from the blue phosphor.

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→ Other combinations of beams intensities produce a small light spot for each pixel position. Since our eyes tends to merge the 3 colors into one composite.

→ The color we see depends on the amount of excitations of the red, green, and blue phosphors

→ A white area is the result of activating all 3 dots in equal intensity

→ Yellow is produced with the green and red dots only, magenta is produced with the blue and red dots, and cyan shows up when blue and green are activated equally.

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Assignment Cover Page

Name of the student :- Alenkrena Sebastian	
PRN ....VNL19CS028....	Admission No..6700....
Subject Name :- GGIP	Subject Code:-
Assignment Title/No : Assignment No : 1	
Name of the faculty: Asha Baby	
Assignment Submitted on ....26/05/22.	

Late submission rules : Max mark will reduced to 50% for 1-5 working day's delay, no mark will be awarded thereafter.

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Alenkrena Sebastian

Sign with Name

Date :....26/05/22

Assignment subdivision	Maximum Mark	Marks awarded	Remarks
A	10	10	Good
B	5	5	Good
C			

Feed back/suggestions :

Asha Baby

Name and sign of the faculty

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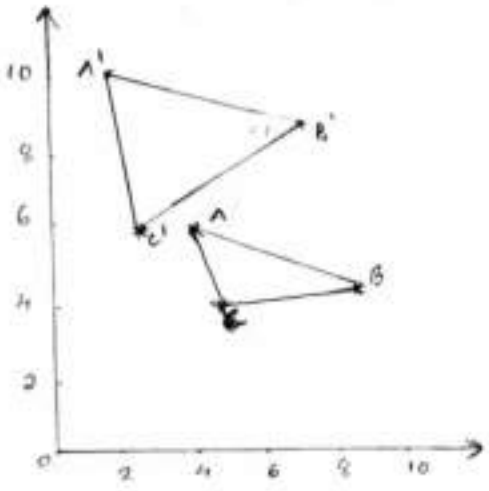
ASSIGNMENT-1

Alenkeena Sebastian
Roll No: 12
VMI MCA 2022

Perform the following transformations on a triangle ABC with points A(4,6), B(9,5) and C(5,5)

1) Translate by $t_x = -2$ and $t_y = 4$
2) Scale by $S_x = 2$ and $S_y = 1$
3) Rotate by 90° in a clockwise direction. Determine the final coordinates of the transformed point.

1) $t_x = -2$
$t_y = 4$
$A' = (2, 10)$
$B' = (7, 9)$
$C' = (3, 6)$



2) $S_x = 2$
$S_y = 1$

$x' = x S_x$
$y' = y \cdot S_y$

$A' = (8, 6)$
$B' = (18, 5)$
$C' = (10, 5)$

3) $x' = x\cos\theta + y\sin\theta$
$y' = -x\sin\theta + y\cos\theta$

$A' = (4\cos 90 + 6\sin 90,\ -4\sin 90 + 6\cos 90) = (6, -4)$
$B' = (9\cos 90 + 5\sin 90,\ -9\sin 90 + 5\cos 90) = (5, -9)$
$C' = (5\cos 90 + 5\sin 90,\ -5\sin 90 + 5\cos 90) = (5, -5)$

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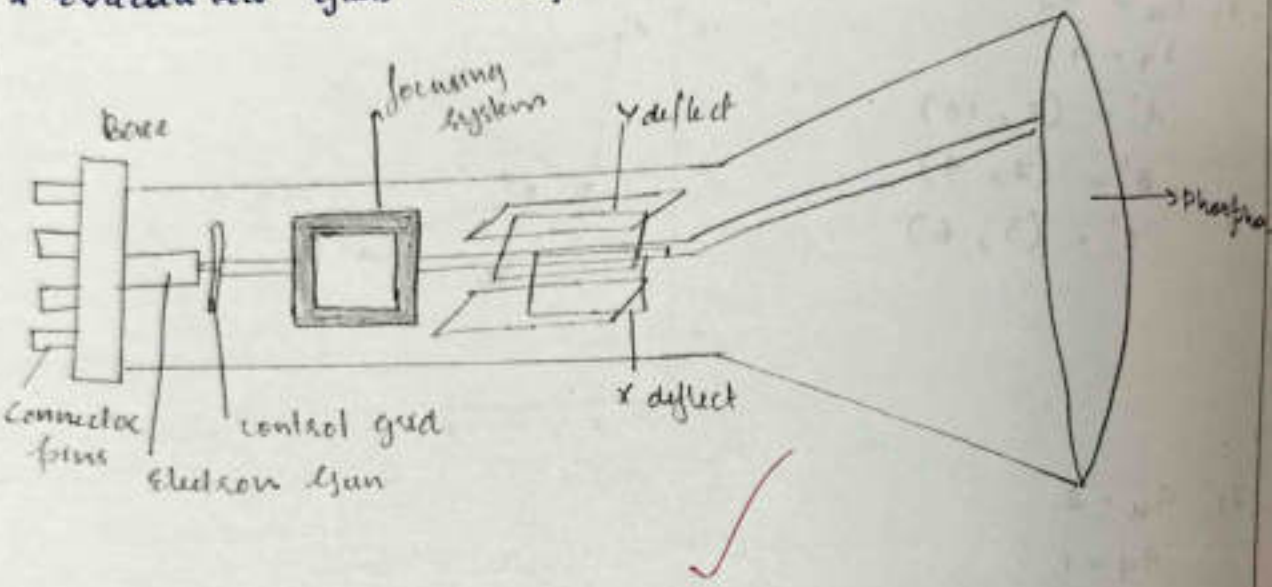
b) Explain the working of cathode Ray Tube. In detail.

The basic CRT consists of 4 major components.

* Electron gun
* Focusing & accelerating mode
* Horizontal and deflection plates
* Evacuated glass envelop.



* A beam of ~~light~~ electrons, emitted by an electron gun, passes through focusing and deflection systems that direct the beam towards specified positions on the phosphor coated screen.
* The phosphor then emits a small spot of light at each position contacted by the electron beam.
* Because the light emitted by the phosphor fades very rapidly, some method is needed for maintaining the screen picture
* One way to keep the phosphor glowing is to redraw the picture repeatedly by quickly directing the electron beam back over the same points.
* This type of ~~error~~ display is called a refresh

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* The primary components of an electron gun in a CRT are the heated metal cathode and a control grid.
* Heat is supplied to the cathode by directing a current through a coil of wire, called the filament, inside the cylindrical cathode structure.
* This causes the electrons to be "boiled off" the hot cathode surface.
* In the vacuum inside the CRT envelope, the free, negatively charged electrons are then accelerated towards the phosphor coating by a high positive voltage.
* The accelerating voltage can be generated with a positively charged metal coating on the inside of the CRT envelop near the phosphor screen, or an accelerating anode can be used.
* Sometimes the electron gun is build to contain the accelerating anode and focusing system within the same unit.
* The Intensity of the electron beam is controlled by setting voltage levels on the control grid, which is a metal cylinder that fits over the cathode

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CHEMPERI, KANNUR

ANSWER BOOKLET

Internal Test / ~~Assignment~~ No. .....1.....

Name of Student ..Berly Xavier.. PRN No..VJL19CS045..

Roll No..23.. Batch/ Class :..CSE A..

Course (Subject) Computer graphics and Image processCode..CS.T.304..Slot.....

Max Marks..60..Date of Examination : ..11-05-2022..FN/AN

Academic Year: ..2021-2022.. Semester ..S6..

Name of the Faculty hanlding the Subject :..Ms. Asha Baby..

Dr.S. Christopher
Name & Signature of Invigilator

Signature of Student:

Question No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
a	3	3	2	3	3	3	0	7	2	6	5	4		7
b												1		
c														
Total marks									51					

Asha Baby
Name & Signature of Examiner

Date of Valuation: 15/05/22

For Instructions to candidate please refer back page

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4

1) Education and Training :- Use to make teaching tools that for taking classes

2) Flitter traing :- Used for pilot raining.

3) Entertainment :- Used for purpose of creating vidios or other entertainment vicleos

4) Educational software :- Used for making education software used for teaching.

5) ~~Comput~~ Presentation :- Used for making presentations used for promotions and other uses

6) Biology :- Used in biology to study the molecular structures

buffer size = ?

Memory per pixel: 8 bits

buffer size = 8 x 1024 x 2048 = 16,777,216 bits
= 2,097,152 bytes
= 2048 KB
= 2MB

If memory per pixel : 12 bits

buffer size = 12 x 1024 x 2048 = 25,165,824 bits
= 3,145,728 bytes
= 3,072 KB
= 3 MB

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3 Raster scan display

- low resolution
- low cost
- The entire screen is projected
- Used in television

Random scan display

- high resolution
- higher cost
- Only pixels that found through the command are projected
- Used for scientific purpose

4)

$x_1 = 10 \quad y_1 = 20$

$x_2 = 20 \quad y_2 = 30$

$\Delta x = 20 - 10 = 10$

$\Delta y = 30 - 20 = 10$

$step = 10$

$x_{inc} = \frac{dx}{step} = \frac{10}{10} = 1$

$y_{inc} = \frac{dy}{step} = \frac{10}{10} = 1$

	x, y
0	11, 21
1	12, 22
2	13, 23
3	14, 24
4	15, 25
5	16, 26
6	17, 27
7	18, 28
8	19, 29
9	20, 30

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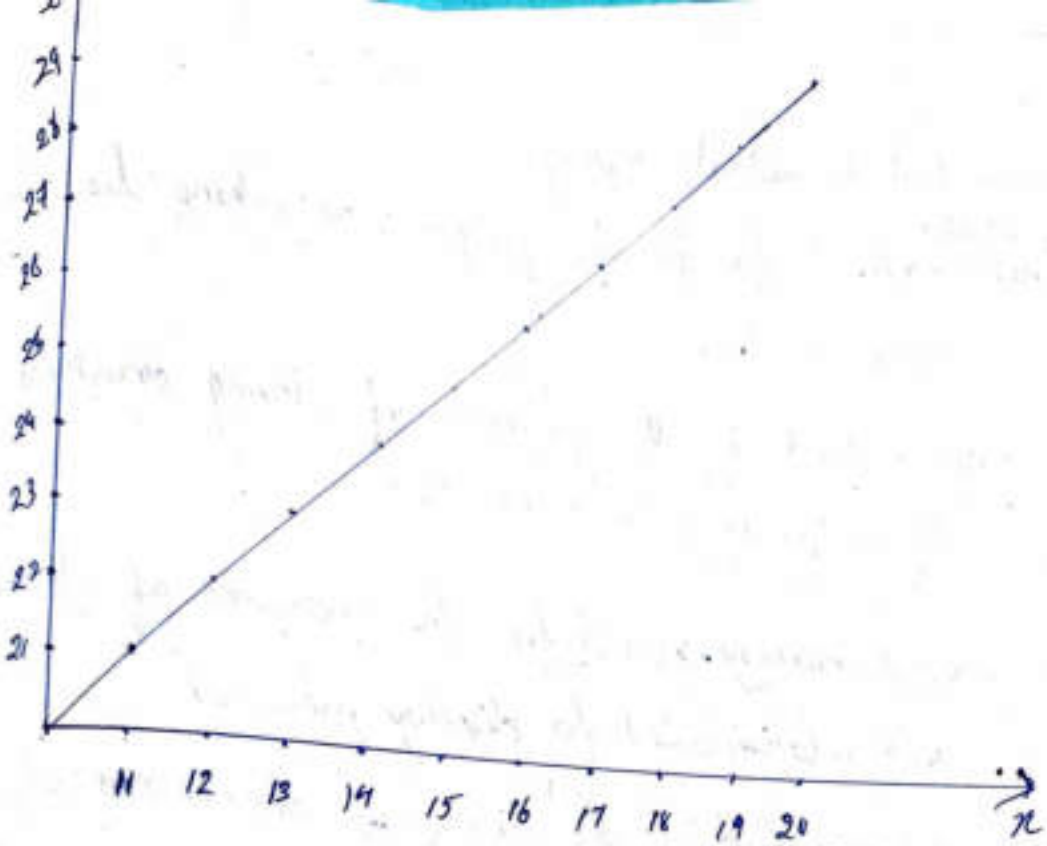

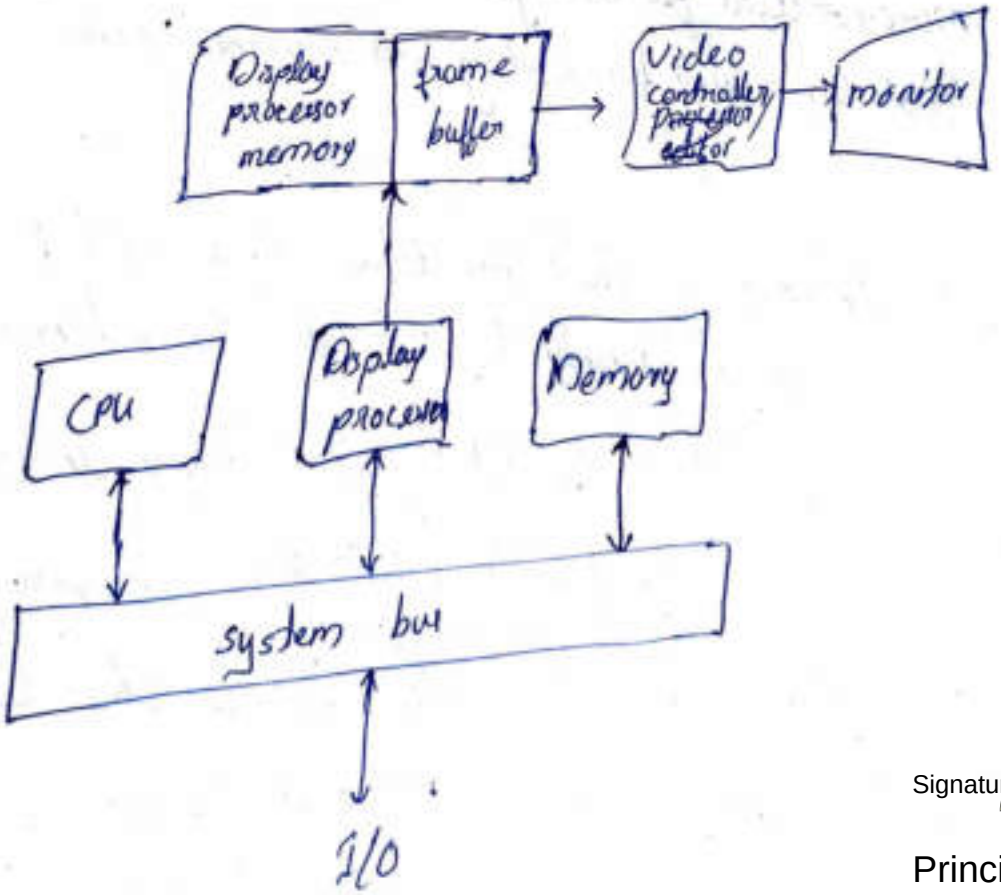

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Monitor → Used for adput display

Video ~~editor~~ controller → Used for for the purpose refreshing the raster graphic system

frame buffer → Used for the purpose of storing directives of image for video-controller

Display processor memory → Used for the purpose of storing ~~data related~~ needed for display processor

Display processor → Used for the purpose ~~of storing~~ reducing the load of cpu and improving graphic performance

cpu → Used for the purpose of executing various command

memory → Used for storage

Data bus → used for sending and receiving data

6)

Persistance :- It the time taken by a pixel from its max intensity to 10th of the interval

Resolution :- It is the total no. of pixels in a screen

R = no. of pixels in light x no. of pixels in length

Aspect ratio - It is the ratio between the length and width of the image or screen

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1) Bresenham's line drawing algorithm

$P_0 = 2\Delta y - \Delta x$

if $P_k < 0$

$P_{k+1} = P_k + 2\Delta y$

else

$P_{k+1} = P_k + 2\Delta y - 2\Delta x$

line (1,1) and (12,14)

$\Delta x = 12 - 1 = 11 = 22$

$\Delta y = 14 - 1 = 13 = 26$

$P_0 = 2 \times 13 - 11$

$= 26 - 11 = 15$

$P_{k+1} = 19$

k	P_k	(x_{k+1}, y_{k+1})
0	15	2, 2
1	19	

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8) $P_0 = 1 - 2r$

$r = 10$

$(x_0, y_0) = (30, 15)$

$P_0 = 1 - 10 = -9$

if $P_k < 0$

$P_{k+1} = P_k + 2x_{k+1} + 1$

else

$P_{k+1} = P_k + 2x_{k+1} + 1 - 2y_{k+1}$

$P_{k+1} = -9 + 2 + 1 = -6$

$\rightarrow = -6 + 4 + 1 = -1$

$\rightarrow = -1 + 6 + 1 = 6$

$\rightarrow = 6 + 8 + 1 - 18 = -3$

$\rightarrow = -3 + 10 + 1 = 8$

$= 8 + 12 + 1 - 16 = 5$

	P_k	x_{k+1}, y_{k+1}	$2x_{k+1}$	$2y_{k+1}$
0	+9	(1, 10)	2	20
1	-6	(2, 10)	4	20
2	-1	(3, 10)	6	20
3	6	(4, 9)	8	18
4	-3	(5, 9)	10	18
5	8	(6, 8)	12	16
6	5	(7, 7)	14	14

(x, y)

(31, 25)
(32, 25)
(33, 25)
(34, 24)
(35, 24)
(36, 23)
(37, 22)

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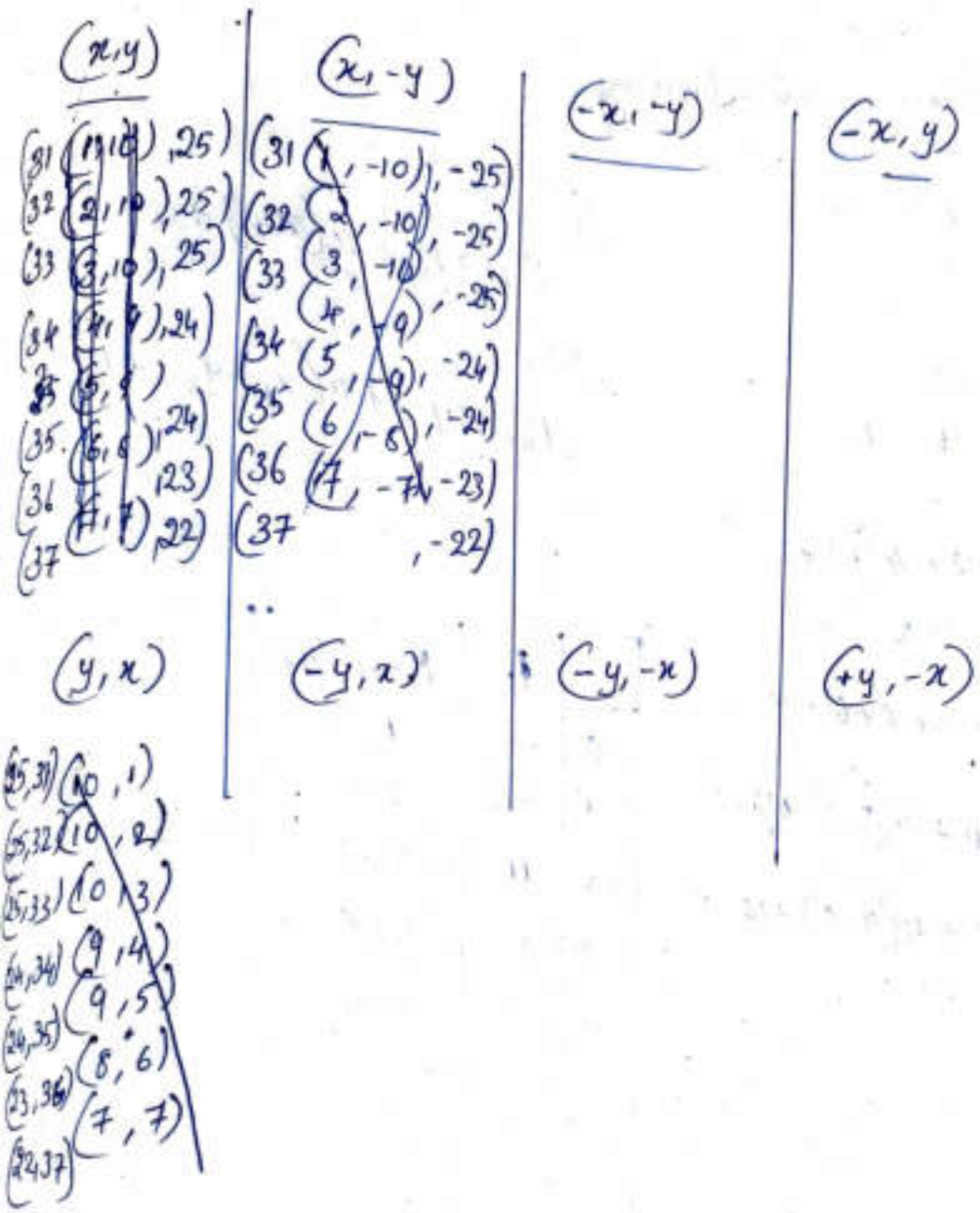

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14) Bresenham's circle drawing

$x = 0$ to $x = y$

$r = 8$

$P_0 = 3 - 2r$

$= 3 - 16 = -13$

if $(P_k < 0)$

$P_{k+1} = P_k + 4(x_k) + 6$

else

$P_{k+1} = P_k + 4(x_k - y_k) + 16$

$P_{k+1} = -13 + 4(1) + 6$

$= -13 + 10 = -3$

→ $= -3 + 8 + 6 = 11$

→ $= 11 + 4(3-7) + 10 = 5$

$= 5 + 4(4-6) + 10 = 7$

	P_k	$P_k x_{k+1}, y_{k+1}$
0	-13	1, 8
1	-3	2, 8
2	11	3, 7
3	5	4, 6
4	7	5, 5

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(x, y)	(x, -y)
(1, 8)	(1, -8)
(2, 8)	(2, -8)
(3, 7)	(3, -7)
(4, 6)	(4, -6)
(5, 5)	(5, -5)

(y, x)	(y, x)
(8, 1)	
(8, 2)	
(7, 3)	
(6, 4)	
(5, 5)	

10) The two technique used in the CRT are

→ Base penetration CRT

→ Shadow mask CRT

Base penetration CRT -

→ In this CRT two types of phosphorus is used

→ The phosphorus inside the produce red colour when penetrated by the beam

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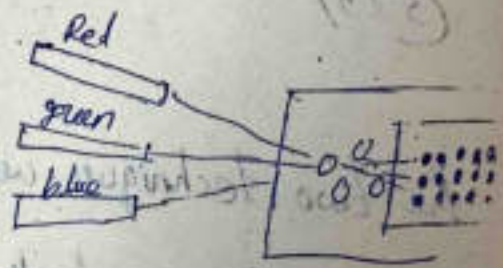
→ The phosphors ~~in the~~ are coated in the outside part produce green colour on penetration

→ In this method only 4 colours are produced.

→ An yellow and ~~green~~ orange colour is produced on ~~par~~ semi Intermediate penetration between the the two phosphors

Shadow mask CRT

→ In this method many various colours can be produced



→ Three beams of ~~for~~ red, green and blue colour are used for the purpose of producing light

→ Three dots of various phosphors ~~are~~ type are for producing colour are used here.

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→ Different colours are obtained by the adjusting the intensity of beam on the dot

→ This method is used in television to get a colour picture.

13)

~~The circle has a~~

12)

a) Advantages

- It is easier two use the equation are much more simple
- The time taken to find the result is less

→ Disadvantages

- The result will not be accurate if there is fractional part.
- The line ~~xxxx~~ may not be a straight line if there are fraction in it when doing finding the solution

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b) Direct View Storage tube

→ In this method the CRT will store the image in itself to inorder to avoid repeatedly refreshing repeatedly.

- It helps to save time and complexity of the problem, by which the CRT is more at ease.

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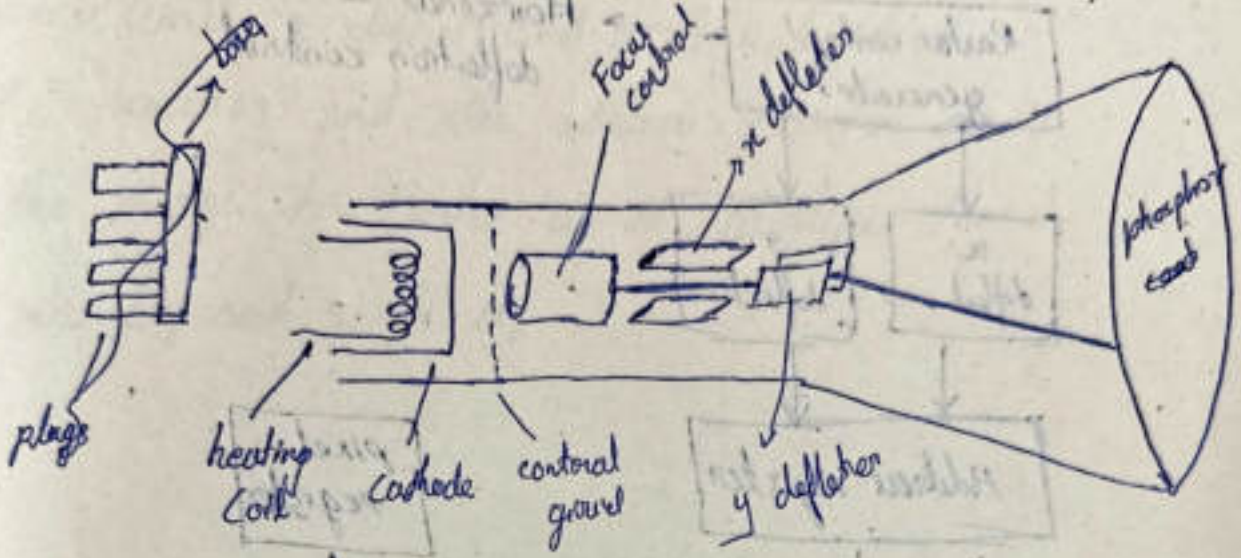
CRT



The heating coil generate heats so that the cathode can use it to produce a beam

The intensity of the produced beam is controlled by the control grid. The beam that head its intensity adjusted as per the requirement is then later focused by focus control and the path of the beam is further controlled by x deflect and y deflect and later it is made to fall on the required pixel producing light

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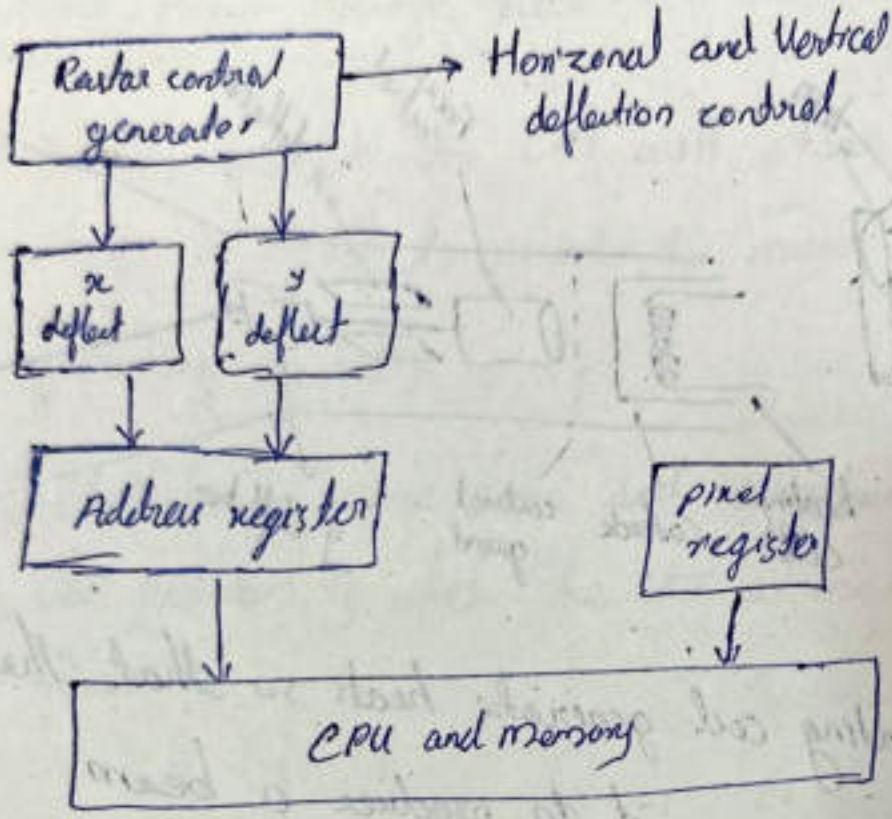
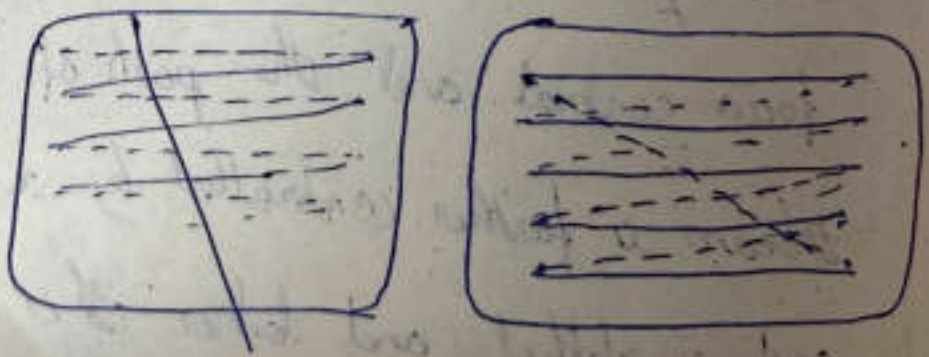
10)



The raster scan display produce beams in a zig-zag manner that is



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to here pixel register sends the location of pixels and x deflect and y deflect adjust the direction and the address register sends the image to Reader ar it identifies the intensity and sends it.

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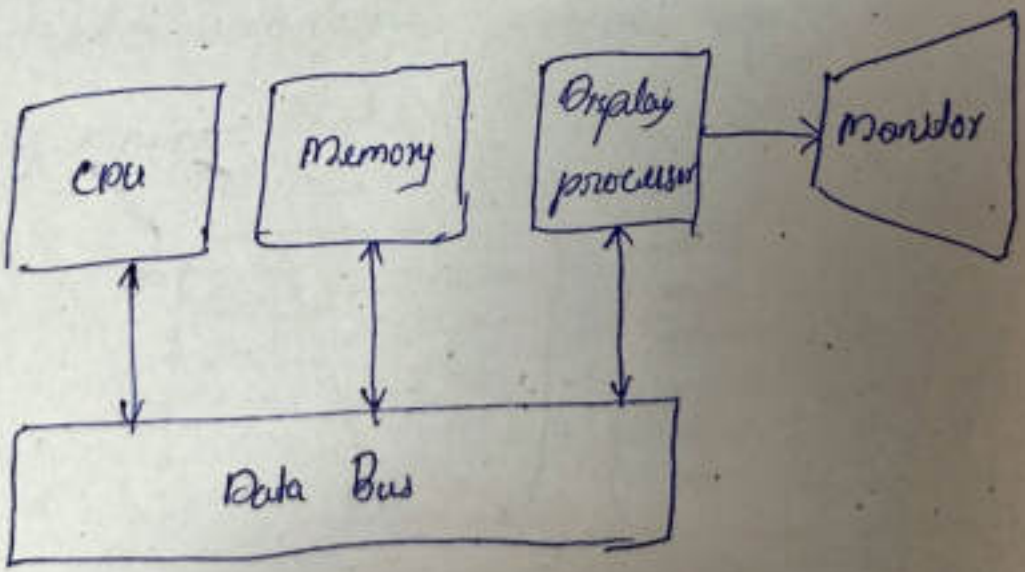
13)

a)

b) Random Scan display



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In the random scan display the picture is produced by only ~~out~~ going through the pixels that requires the to lighted. The display processer analyses the command for the line to be displayed and sends CRT to only go through the given pixels

The picture is formed by the beaming going through the pixels only which saves time. The persistance of these pictures are longer.

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