End Semester Online Examination 2021 Date.....

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UNIVERSITY ROLLNO :- 11210164

SUBJECT CODE :- PBC-602

SUBJECT :- Computer Graphics and Animation

DATE :- 26/06/2021

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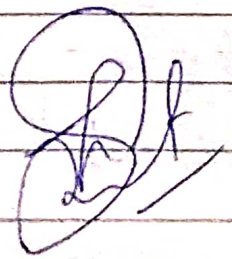
COURSE :- BCA

SEMESTER :- '6'



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Ans:- Mid Point Circle Drawing Algorithm

Procedure:-

given -

- Centre point of Circle = (X_0, Y_0)
- Radius of Circle = R

The points generation using Mid Point Circle Drawing Algorithm involves the following steps.

Step-01:

Assign the starting point co-ordinates (X_0, Y_0) as -

- $X_0 = 0$
- $Y_0 = R$

Step-02:-

Calculate the value of initial decision parameter P_0 as.

$$P_0 = 1 - R$$

Step-03

Suppose the current point is (X_k, Y_k) and the next point is (X_{k+1}, Y_{k+1}).

Finding the next point of the first octant depending on the value of decision parameter P_k

Two Cases:-

Case-01 $P_k < 0$ →

$$X_{k+1} = X_{k+1}$$
$$Y_{k+1} = Y_k$$
$$P_{k+1} = P_k + 2X X_{k+1} + 1$$

Case-02 $P_k >= 0$ →

$$X_{k+1} = X_k + 1$$
$$Y_{k+1} = Y_k - 1$$
$$P_{k+1} = P_k - 2X Y_{k+1} + 2X X_{k+1} + 1$$

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Step4:

If the given centre point (x_0, y_0) is not (0,0), then do the following and plot the point.

- $x_{plot} = x_c + y_0$
- $y_{plot} = y_c + y_0$

Here (x_c, y_c) denotes the current value of x and y Coordinates.

Step-05:

Keep repeating step-03 and step-04 until $x_{plot} >= y_{plot}$.

Step-06:

Step: Steps generates all the points for one octant. To find the points for other seven octants, follow the eight symmetry property of circle.

Program

```
#include <stdio.h>
#include <graphics.h>
Void drawcircle (int x0, int y0, int radius)
{
  int x = radius;
  int y = 0;
  int err = 0;
  while (x >= y)
{
putpixel (x0+x, y0+y, 7);
putpixel (x0+y, y0+x, 7);
```

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```
putpixel(x0-y, y0+x, 7);
putpixel(x0-x, y0+y, 7);
putpixel(x0-x, y0-y, 7);
putpixel(x0-y, y0-y, 7);
putpixel(x0+y, y0-x, 7);
putpixel(x0, x, y0-y, 7);
  if (err<=0)
    {
      y+=1;
      err+=2*y+1;
    }
if (err>0)
  {
    x-=1;
    err-=2*x+1;
  }
 }
}
int main()
{ int gdrive=DETECT, gmode, error, x, y, r;
  initgraph(&gdriver, &gmode, "C:\\turboc3\\bgi");

printf("Enter radius of circle:");
scanf("%d", &r);

printf("Enter co-ordinates of center(x and y):");
scanf("%d %d", &x, &y);
drawcircle(x, y, r);
return 0;
}
```

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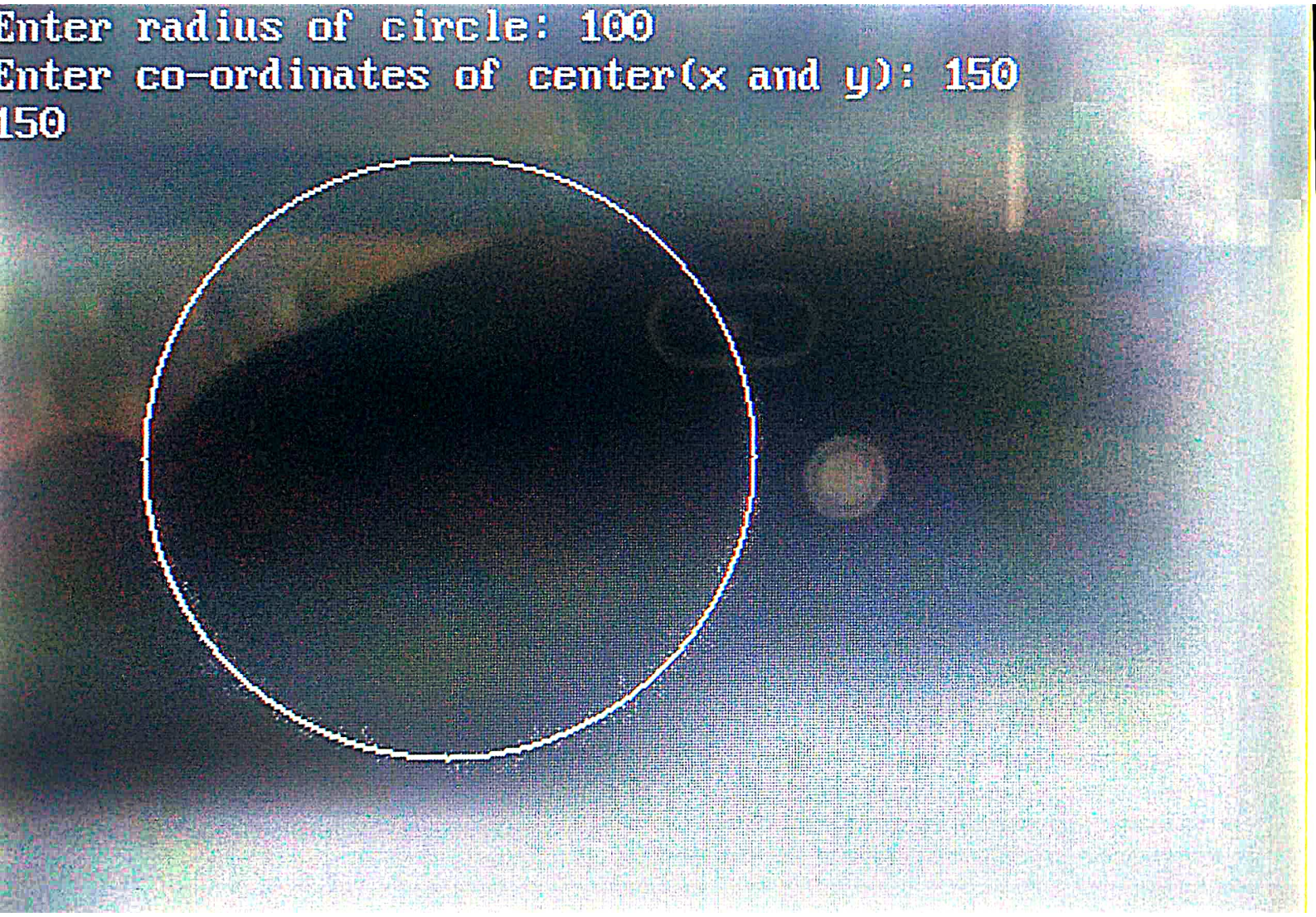
Enter radius of circle: 100
Enter co-ordinates of center(x and y): 150
150