**Lab 2: NUMERICAL METHODS PRACTICAL**

| FACULTY: BCT/BEI | FACULTY: BCE |
|---|---|
| YEAR:2079 | YEAR:2080 |

1. Using the algorithm of **Secant Method,** write a program to find out the root and number of iterations for the following equations.

**a. $x^2$- 4x – 10 = 0** **b. 4sinx = $e^x$**

2.Using the algorithm of **Newton Rapshon Method**, write a program to find out the root and number of iterations of the following equations.

**a. $x^2$-4x-10= 0** **b. xtanx-1=0**

**3.** Using the algorithm of Fixed- Point Method, write a program to find out the root and number of iterations of the following equations.

a. x2 + x – 2 = 0 b. x2 - 5 = 0

**ALGORITHMS:**

**Secant Method:**

1. Take two initial points x0 and x1, and stopping criteria E.
2. Compute **x2 =x1-((x1-x0)/(f(x1)-f(x0)))*f(x1)**
   **Set x0=x1**
   **Set x1=x2**
3. Test for accuracy of x2,
   If $\left|\frac{x2-x1}{x2}\right| > E, then$
   Display x2 as the root

Otherwise go to step 2.

4. Stop

**Newton- Rapshon Method:**

1. Assign an initial value to x, say $\mathbf{x_0}$and stopping criteria**, E**
2. Evaluate**($x_0$)** and **f'($x_0$)**
3. Find the improved estimate of $\mathbf{x_0}$

$$x1 = x0 - \frac{f(x0)}{f'(x0)}$$

4. Check for accuracy of the latest estimate.
   - Compare relative error to a predefined value E. if $\left|\frac{x1-x0}{x1}\right| > E$ and print root as x1 and stop
5. Otherwise, Replace $x_0$ by $x_1$ and repeat steps 3 and 4.

**3. Fixed Point Method:**

1. Decide the initial value of x0 and error E
2. Calculate x1= g(x0)
3. If absolute value of (x1-x0) < = E
   Solution obtained
   goto 4

otherwise,

   set,
   x0 = x1
   goto 2

4. Write the value of x1 i.e. root
5. Stop