

Government Engineering College, Bhuj

Subject: NMEE (BE03000191)

Term work Assignment-2

CO-2: Numerical Solution of Algebraic and Transcendental Equation

Q-1. Solve all the following questions.

1. Bisection Method

1. Using the Bisection Method, determine the root of the equation $f(x) = x^3 - x - 2$ in the interval $[1, 2]$.
2. Apply the Bisection Method to find the root of the transcendental equation $f(x) = \cos x - x$ in the interval $[0, 1]$.
3. Find the root of the equation $f(x) = x^2 - 4$ using the Bisection Method in the interval $[1, 3]$.

2. False Position Method (Regula Falsi)

4. Use the False Position Method to solve $f(x) = x^3 - x - 2$ in the interval $[1, 2]$.
5. Determine the root of $f(x) = e^x - 3x$ using the False Position Method in the interval $[0, 1]$.
6. Apply the False Position Method to solve $f(x) = \ln x + x^2 - 3$ in the interval $[1, 2]$.

3. Secant Method

7. Using the Secant Method, find the root of $f(x) = x^3 - x - 2$ with initial guesses $x_0 = 1$ and $x_1 = 2$.
8. Solve $f(x) = \tan x - x$ using the Secant Method with initial guesses $x_0 = 4.5$, $x_1 = 4.7$.
9. Find the root of $f(x) = xe^x - 1$ using the Secant Method with initial guesses $x_0 = 0$, $x_1 = 1$.

4. Newton-Raphson Method

10. Apply the Newton-Raphson Method to solve $f(x) = x^3 - x - 2$ with initial guess $x_0 = 1.5$.

11. Use the Newton-Raphson Method to find the root of $f(x) = \cos x - x$ with initial guess $x_0 = 0.5$.
12. Solve $f(x) = e^x - 3x$ using Newton-Raphson Method with initial guess $x_0 = 0.5$.

5. Fixed Point Iteration Method

13. Solve the equation $x^3 - x - 2 = 0$ using Fixed Point Iteration by rewriting it as $x = \sqrt[3]{x+2}$.
14. Use Fixed Point Iteration to solve $x = \cos x$ with initial guess $x_0 = 0.5$.
15. Solve $x = \sqrt{3-x}$ using Fixed Point Iteration with initial guess $x_0 = 1$.

Answer Key:

1. $x = 1.521$
2. $x = 0.739$
3. $x = 2.000$
4. $x = 1.521$
5. $x = 0.619$
6. $x = 1.295$
7. $x = 1.521$
8. $x = 4.493$
9. $x = 0.567$
10. $x = 1.521$
11. $x = 0.739$
12. $x = 0.619$
13. $x = 1.521$
14. $x = 0.739$
15. $x = 1.302$