



TOPIC : 1 - INTRODUCTION AND APPLICATIONS OF EQUATIONS AND EIGEN VALUE PROBLEM

UNIT - I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS :

Solution of equation - Fixed point iteration : $x = g(x)$ method -
Newton's method - Solution of linear system by Gaussian
elimination and Gauss - Jordan method - iterative method -
Gauss-Seidel method - Inverse of a matrix by Gauss Jordan
method - Eigen value of a matrix by power method and
by Jacobi method for symmetric matrix.

Fixed point iteration : $x = g(x)$ method : (or) Iteration method :

Let $f(x) = 0$ be the given equation whose roots are
to be determined.

In this iteration method, first we write the given
equation in the form $x = \phi(x)$.

Let $x = x_0$ be an initial approximation of the
required root α , then the first approximation x_1 is given
by $x_1 = \phi(x_0)$

The second, third, etc approximation are given by

$$x_2 = \phi(x_1)$$
$$x_3 = \phi(x_2)$$
$$x_4 = \phi(x_3)$$
$$\dots$$
$$x_n = \phi(x_{n-1})$$



Here x_n is the n^{th} iteration and the value of x_n gives the root of the given equation at the n^{th} iteration.

Condition for the convergence of the iteration method for solving $x = \phi(x)$ is $|\phi'(x)| < 1$ in the range.

Order of convergence for fixed point iteration is 1.

The convergence is linear.