Valterra linear Integral Equation →

The linear integral Equation of the form

$$g(x)\, y(x) = f(x) + \lambda \int_a^x K(x,t)\, y(t)\, dt \quad \rightarrow (1)$$

where a, ~~b~~ are both Constants. $f(x)$, $g(x)$ and $K(x,t)$ are Known functions while $y(x)$ is unKnown function; λ is a non zero real or complex parameter is called Valterra integral Equation of third Kind. The function $K(x,t)$ is Known as the Kernel of the integral Equation.

(i) Valterra Integral Equation of the first Kind

A linear integral Equation of the form by putting $g(x) = 0$ in (1)

$$f(x) + \lambda \int_a^x K(x,t)\, y(t)\, dt = 0 \rightarrow (2)$$

is Known as Valterra integral equation of the first Kind

(ii) Valterra Integral Equation of the Second Kind

A linear integral Equation of the form by setting $g(x) = 1$ in (1)

$$y(x) = f(x) + \lambda \int_a^x K(x,t)\, y(t)\, dt \rightarrow (3)$$

is Known as Valterra integral equation of second Kind.

(iii) Homogeneous Volterra integral Equation of the Second Kind

A linear integral Equation of the form by setting $f(x) = 0$ in Eq ③

$$y(x) = \lambda \int_a^x K(x,t)\, y(t)\, dt$$

is known as the homogenous Volterra integral Equation of the second Kind.

<u>Note</u> → The equation in which one of the limits of integration is a Variable is called Volterra linear integral Equation.