www.iarfconferences.com ICRESMH - 2025

INTERNATIONAL CONFERENCE ON RESEARCHES IN ENGINEERING, SCIENCE, MANAGEMENT AND HUMANITIES (ICRESMH – 2025)

Delhi, India on 27th April, 2025

CERTIFICATE NO : ICRESMH /2025/C0425417

A Study of Numerical Solutions of Integral and Differential Equations Using Different Methods

Roohi Tarannum

Research Scholar, Ph.D. in Mathematics, Mansarovar Global University,
Sehore, M.P, India.

ABSTRACT

The numerical solution of integral and differential equations is a fundamental area of applied mathematics, as many real-world problems in science, engineering, economics, and physics cannot be solved analytically. This study focuses on the use of different numerical methods to obtain approximate solutions to integral and differential equations with acceptable accuracy and computational efficiency. For differential equations, commonly used methods include Euler's method, Runge–Kutta methods, finite difference methods, and finite element methods, each offering varying levels of accuracy and stability depending on the nature of the problem. Higher-order methods such as the Runge–Kutta family are especially valued for their balance between precision and computational cost. In the case of integral equations, numerical techniques such as the trapezoidal rule, Simpson's rule, quadrature methods, and iterative approaches like the Nyström and collocation methods are widely applied. These methods transform integral equations into systems of algebraic equations that can be solved numerically. The choice of method depends on factors such as the type of equation, boundary conditions, smoothness of the solution, and computational constraints.