JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

Ph.D (Mathematics)

COURSE CODE (CREDITS): 17P1WMA113(3) MAX. MARKS: 35

COURSE NAME: Advanced Numerical Analysis

COURSE INSTRUCTORS: NKT MAX. TIME: 2 Hours

Note: (a)*All questions are compulsory.*

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

---

Q1. Find the order of convergence of Newton Raphson method. [5]

Q2. Find the general formula for finding cube root of a number using Newton Raphson method. [5]

Q3.Solve the following system of equations

$$10x_1 + 4x_2 - x_3 = 0$$

$$4x_1 + 2x_2 + 3x_3 = 0$$

$$-x_1 + 3x_2 + x_3 = 0$$

For the largest Eigen value and its associated Eigen vector. [5]

Q4.Solve the system of equations using Jacobi's iteration method

$10\,x + 2y + z = 9, 2x + 20y - 2z = -44\ and - 2x + 3y + 10z = 22$ [5]

Q5.Use Crank-Nicolson method to solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the conditions

$u(x,0)\sin\pi x\ ,0 \le x \le 1\ , u(0,t) = u(1,t) = 0$.Take $k = \frac{1}{16}\ and\ h = \frac{1}{4}$ [5]

Q6. Explain Haar-Wavelet method for solving differential equations. [5]

Q7.Solve the P.D.E $\frac{\partial u}{\partial t} = 4\frac{\partial^2 u}{\partial x^2}$ using Haar-Wavelet method subjected to initial and boundary conditions $u(x,0) = f(x), u(0,t) = 10\ and\ u(x,t) = 50, 0 \le x \le 1$ [5]