

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

Ph.D(Mathematics)

COURSE CODE (CREDITS): 17P1WMA113 (3)

MAX. MARKS: 25

COURSE NAME: Advanced Numerical Analysis

COURSE INSTRUCTORS: NKT

MAX. TIME: 1 Hour 30 Minutes

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*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*

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Q1. Find the root of the equation  $x^3 - 5x + 3 = 0$  correct to four decimal places using Newton-Raphson method. The root of the equation lies between  $[0,1]$ . [5]

Q2. Solve the system of linear equations using Gauss-Jordan method.

$$10x + y + z = 12, x + 10y + z = 12 \text{ and } x + y + 10z = 12 \quad [5]$$

Q3. Solve the system of linear equations using Gauss-Seidel method and taking the first iteration as  $(0,0,0)$

$$54x + y + z = 110, 2x + 15y + 6z = 72 \text{ and } -x + 6y + 27z = 85 \quad [5]$$

Q4. Solve the system of linear equations using factorization method (LU decomposition)

$$x + 3y + 8z = 4, x + 4y + 3z = -2 \text{ and } x + 3y + 4z = 1 \quad [5]$$

Q5. Solve the heat equation  $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ ,  $u(x, 0) = 0$ ,  $u(0, t) = 0$  and  $u(1, t) = t$

for  $t = 1/8$  and dividing  $x$  axis in four equal parts. [5]