

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2023

B.Tech-III Semester (CE)

COURSE CODE (CREDITS): 18B11MA311 (3)

MAX. MARKS: 35

COURSE NAME: NUMERICAL METHODS

COURSE INSTRUCTOR: Pradeep Kumar Pandey

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

1. Use Newton Raphson method to obtain a root of $f(x) = x^3 + 2x^2 + 10x - 20 = 0$. Write answer up to third iteration, and correct to three decimal places. Take $x_0 = 1.2$. [CO1] [5]

2. Solve the following system of linear equations by Gauss elimination method:
 $2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$ [CO2] [5]

3. Use Jacobi method to find eigenvalues and corresponding eigenvectors of following matrix:

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$$
 [CO2] [5]

4. Using Newton's forward interpolation formula obtain $f'(1)$ from following data: [CO4] [5]

x	1.0	1.2	1.4	1.6	1.8	2.0
$f(x)$	0	0.128	0.544	1.296	2.432	4.000

5. A river is 80 feet wide. The depth y in feet at a distance x feet from one bank is given in table. Find the area of cross section $\int_0^{80} y dx$ of the river using Simpson's one third rule. [CO5] [5]

x	0	10	20	30	40	50	60	70	80
y	0	4	7	9	12	15	14	8	4

6. Using Picard's method solve (up to second iteration) the Initial value problem $y' = x^2 + y^2$, $y(0) = 1$. Also, compute $y(1)$. [CO6] [5]

7. Using Euler's method approximate the solution of $y' = xy + x + y$, $y(0) = 1$ at $x = 0.1$ by taking step size 0.025. [CO6] [5]
