

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2023

B.Tech-III Semester (CE)

COURSE CODE (CREDITS): 18B11MA311 (3)

MAX. MARKS: 25

COURSE NAME: NUMERICAL METHODS

COURSE INSTRUCTOR: Pradeep Kumar Pandey

MAX. TIME: 1 Hour 30 Minutes

**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. Using power method, obtain the dominant eigenvalue of the following matrix:

$$\begin{bmatrix} 4 & 2 & -2 \\ -2 & 8 & 1 \\ 2 & 4 & -4 \end{bmatrix}$$

Take initial eigenvector  $X_0 = [1 \ 1 \ 1]^T$ . Write your answer correct to 3 decimal places and up to 4<sup>th</sup> iteration.

[CO2] [5M]

2. Solve the following system of equations by Doolittle's (LU decomposition) method:

$$x + 5y + z = 14, \quad 2x + y + 3z = 13, \quad 3x + y + 4z = 17.$$

[CO2] [5M]

3. Obtain the Lagrange's interpolating polynomial for the following data:

$x_i$	-1	0	1
$y_i$	3	8	11

and, using so-obtained Lagrange's interpolating polynomial, find approximate value of the function at  $x = 0.4$ .

[CO3] [5M]

4. Construct the divided difference table, and using Newton's divided difference formula, obtain the interpolating polynomial for the following data:

[CO3] [5M]

$x_i$	0	1	3	4
$f_i$	-5	1	25	55

5. Use the method of least squares to fit a straight line to the data given below:

[CO4] [5M]

$x_i$	5	10	15	20	25
$y_i$	15	19	23	26	30

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