

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-2 EXAMINATION- October 2018

B. Tech. III Semester (CE)

COURSE CODE: 10B11MA312

MAX. MARKS: 25

COURSE NAME: NUMERICAL METHODS

COURSE CREDITS: 4

MAX. TIME: $1\frac{1}{2}$ Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. Using power method (up to 10^{th} iteration) obtain the dominant eigenvector and the magnitude of associated dominant eigenvalue of the matrix $A = \begin{bmatrix} -15 & 4 & 3 \\ 10 & -12 & 6 \\ 20 & -4 & 2 \end{bmatrix}$.
Take $X_0 = [1 \ 1 \ 1]^T$. [5 Marks], [CO2]

2. Write the *Lagrange* interpolation (polynomial) formula for three distinct data points $(x_0, y_0), (x_1, y_1), (x_2, y_2)$. Obtain the *Lagrange* interpolating polynomial for

x_i	2	2.75	4
f_i	1/2	1/2.75	1/4

and hence find the approximate value of the function at $x = 3$. [5 Marks], [CO3]

3. Using Newton's divided difference formula, obtain the interpolating polynomial for the data given in table below:

x_i	3	7	9	10
f_i	168	120	72	63

and hence estimate the value of the function at $x = 5$. [5 Marks], [CO3]

4. Using *Hermite* interpolation estimate $f(x)$ at $x = 0.7$ for the following data:

x	0.5	1
$f(x)$	4	1
$f'(x)$	-16	-2

[5 Marks], [CO4]

5. By method of least squares fit a straight line to the data given below. Also estimate the value of y at $x = 3.5$:

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

[5 Marks] [CO4]
