

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- MAY-2023

COURSE CODE(CREDITS): L-22M1WCI231

MAX. MARKS: 25

COURSE NAME: Advanced Computation Techniques in Engineering

COURSE INSTRUCTORS:

MAX. TIME: 1 Hour 30 Minutes

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

Q1. What are sparse matrices? What are different storage formats to store sparse-matrices? How do you calculate cost of factorizing in a banded linear system? [2+1+2 marks] [CO-1]

Q2. Explain the following terms:

1. Approximate minimum degree ordering.
2. Nested dissection ordering
3. Sparse gaussian elimination
4. Non-singularity of Perturbed Matrix

[1 \* 4 marks] [CO-2]

Q3. Explain need of floating-point representation for real numbers with a suitable example. Convert number 85.125 to double precision IEEE 754 floating-point standard.

[2 + 2 marks] [CO-2]

Q4. Explain in detail accuracy and stability of an algorithm. Provide proof of accuracy of backward stable algorithm. [CO-3]

[2 + 2 marks]

Q5. In how many ways can a linear system  $Ax = B$  be rescaled. Also, discuss stability of Cholesky factorization.

[1 + 2 marks] [CO-4]