

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST-2 EXAMINATION Mar- Apr 2018

M.Tech(CSE) IV Semester

COURSE CODE: 15M1WCI432

MAX. MARKS: 25

COURSE NAME: Advanced Computational Techniques in Engineering

COURSE CREDITS: 3

MAX. TIME: 90Min

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

Q.1. [10 Marks. Each part is 2 marks]

- What do you understand from sensitivity of the solution of a linear system?
- Discuss the importance of condition number in perturbed systems.
- Define the problem of least squares.
- Describe properties of an orthogonal matrix.
- Describe the solution of a linear system $Ax=b$, using $A=QR$ decomposition?

Q.2. [5 marks] Describe the process for SVD decomposition of the matrix A and explain properties of each component in the decomposition.

Q.3. [5 marks]

(a) Solve the overdetermined system given below.

$$x_1 - x_2 = 2$$

$$x_1 + x_2 = 4$$

$$2x_1 + x_2 = 8$$

(b) For the above solution, find the residue with the method of least squares.

Q.4. [5 marks] Prove that for any vector q the sequence $A^j \cdot q$ for $j=1,2,3,\dots,n$, converges to the dominant eigenvector of matrix A as n tends to infinity.