Prof SP Ghrera

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -2 EXAMINATION- Oct 2019
B.Tech(CSE/IT) VII Semester

COURSE CODE: 18B1WCI733 **MAX. MARKS: 25**
COURSE NAME: Computational Techniques and Algorithms
COURSE CREDITS: 3 **MAX. TIME: 90 Min**

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

Q.1. [5 Marks. Each part is 1 mark]

a) What is the characteristic equation of a *nxn* matrix A?
b) Define linear convergence.
c) State the properties of orthogonal matrices.
d) What is an ill conditioned system?
e) Define Max Norm.

Q.2. [7 marks]

(a) Define SVD decomposition of a matrix and explain the algorithmic steps used in its computation.

(b) Explain important properties of SVD and their likely applications.

Q.3. [7 marks]

(a) Find the dominant eigenvector and corresponding eigenvalue of the following matrix using power series method.

$$A = \begin{bmatrix} 0.8 & 0.3 \\ 0.2 & 0.7 \end{bmatrix}$$

(b) Explain methods to reduce the number of iterations for convergence of solution to (a) above.

Q.4. [6 marks] For the linear system Ax=b given below, find the least squares solution. Also compute the residual error, $||\mathrm{r}|| = ||\mathrm{b} - \mathrm{Ax}||$.

$$\mathrm{A} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \\ 1 & 2 \end{bmatrix} \qquad \mathrm{x} = \begin{bmatrix} x1 \\ x2 \end{bmatrix} \qquad \mathrm{b} = \begin{bmatrix} 6 \\ 0 \\ 0 \end{bmatrix}$$