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JAYPEE UNIVERSITY OF INFORMATRION TECHNOLOGY, WAKNAGHAT
TEST-2 EXAMINATION- Apr 2016
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: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

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

a) What is an ill conditioned system?
b) Define linear convergence .
c) Differentiate between direct and inverse iteration methods for finding eigenvalues and eigenvectors.
d) Define a nonhomogeneous system of linear differential equations?
e) Define Max Norm.

Q.2. [5 marks]

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

$$A = \begin{bmatrix} 1 & 3 \\ 0 & 3.7 \end{bmatrix}$$

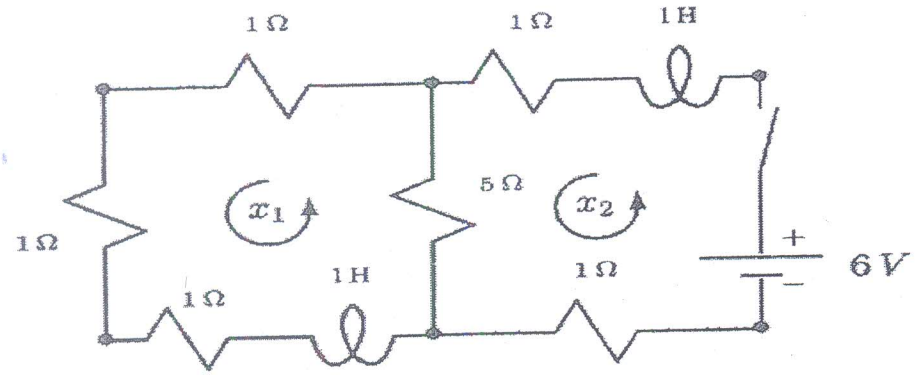
(b) Explain methods to reduce the number of iterations for convergence of solution to (a) above.

Q.3. [5 marks]

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

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

Q.4. [5 marks] For the electrical circuit below, set up system of linear differential equations for currents x1 and x2 and solve for x1 and x2.



Q5. [5 marks]

The matrix $M = \begin{bmatrix} 1 & -1 & 1 \\ 3 & -3 & 1 \\ 3 & -5 & 3 \end{bmatrix}$

(a) Given that $u = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$ and $v = \begin{bmatrix} 0 \\ 1 \\ 1 \end{bmatrix}$ are eigenvectors of M find the eigenvalues corresponding to u and v.

(b) Given also that the third eigenvalue of M is 1, find a corresponding eigenvector.