## CE 601 NUMERICAL METHODS

## TUTORIAL - 1

Marks - 40
Date: 02-August-2012

The responses to the tutorial questions are to be submitted by 03-August-2012. Each question carries 10 marks

1. What is meant by symmetric matrix? Write an example of $4 \times 4$ symmetric matrix.
2. Find the determinant of the matrix $A=\left[\begin{array}{cccc}1 & 0 & 4 & 1 \\ -2 & 1 & -3 & 2 \\ 0 & 0 & 0 & 2 \\ 3 & 2 & 1 & -1\end{array}\right]$
3. The economy of a region consists of various expenditures (input) and production (output) in following four sectors - agriculture ( $x_{1}$ ), energy ( $x_{2}$ ), manufacturing ( $x_{3}$ ), and labor $\left(x_{4}\right)$. The output in one sector requires input from all the four sectors. The relationships between various sectors are given by the input-output matrix
$A=\left[\begin{array}{llll}0.05 & 0.09 & 0.09 & 0.19 \\ 0.16 & 0.15 & 0.28 & 0.21 \\ 0.19 & 0.21 & 0.22 & 0.27 \\ 0.27 & 0.04 & 0.35 & 0.02\end{array}\right]$, where the element $a_{i j}$ represents the input required from sector $i$ to produce one unit of output from sector $j$. If the total output in billion rupees is for agriculture 25 , for energy 48, for manufacturing 40 , and for labor 15 . Use Gausselimination method with appropriate algorithm to solve and determine the input vector $\{x\}$.
4. Use Gauss-Jordan algorithm taught in the class to solve the following linear system

$$
\begin{gathered}
8 x_{1}+x_{2}+2 x_{3}-x_{4}=3 \\
x_{1}+2 x_{2}-2 x_{3}+x_{4}=3 \\
-2 x_{1}-x_{2}+5 x_{3}+3 x_{4}=0 \\
2 x_{1}+3 x_{2}-2 x_{3}-6 x_{4}=-11
\end{gathered}
$$

