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 4×4 symmetric matrix.

2. Find the determinant of the matrix
$$A = \begin{bmatrix} 1 & 0 & 4 & 1 \\ -2 & 1 & -3 & 2 \\ 0 & 0 & 0 & 2 \\ 3 & 2 & 1 & -1 \end{bmatrix}$$

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 (x_4) . The output in one sector requires input from all the four sectors. The relationships between various sectors are given by the input-output matrix

$$A = \begin{bmatrix} 0.05 & 0.09 & 0.09 & 0.19 \\ 0.16 & 0.15 & 0.28 & 0.21 \\ 0.19 & 0.21 & 0.22 & 0.27 \\ 0.27 & 0.04 & 0.35 & 0.02 \end{bmatrix}, \text{ where the element } a_{ij} \text{ represents the input required from}$$

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 Gauss-elimination 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

 $8x_1 + x_2 + 2x_3 - x_4 = 3$ $x_1 + 2x_2 - 2x_3 + x_4 = 3$ $-2x_1 - x_2 + 5x_3 + 3x_4 = 0$ $2x_1 + 3x_2 - 2x_3 - 6x_4 = -11$