Department of Mathematics

16B1NMA533 **Matrix Computations**

Tutorial Sheet 9 [C301-3.5] **B.Tech. Elective**

(Jacobi Method, Given Method, Householder Method)

1. Using Jacobi's method, find all the eigenvalues and the eigenvectors of the matrices:

$(i)\begin{bmatrix} 4 & 1 & 2 \\ 1 & 2 & 0 \\ 2 & 0 & 0 \end{bmatrix}$ $(ii)\begin{bmatrix} 2 & 3 & 1 \\ 3 & 2 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ $(iii)\begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$

2. Reduce the following matrices to the tri-diagonal form using Given's method:

$(i)\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ $(ii)\begin{bmatrix} 2 & 3 & 1 \\ 3 & 2 & 2 \\ 1 & 2 & 1 \end{bmatrix}$ $(iii)\begin{bmatrix} 2 & 3 & 1 & 2 \\ 3 & -1 & 5 & 4 \\ 1 & 5 & 3 & 1 \\ 2 & 4 & 1 & 4 \end{bmatrix}$

3. Reduce the following matrices to the tri-diagonal form using Householder's method:

$(i)\begin{bmatrix} 1 & 1 & 0.5 \\ 1 & 1 & 0.25 \\ 0.5 & 0.25 & 2 \end{bmatrix}$ $(ii)\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix}$