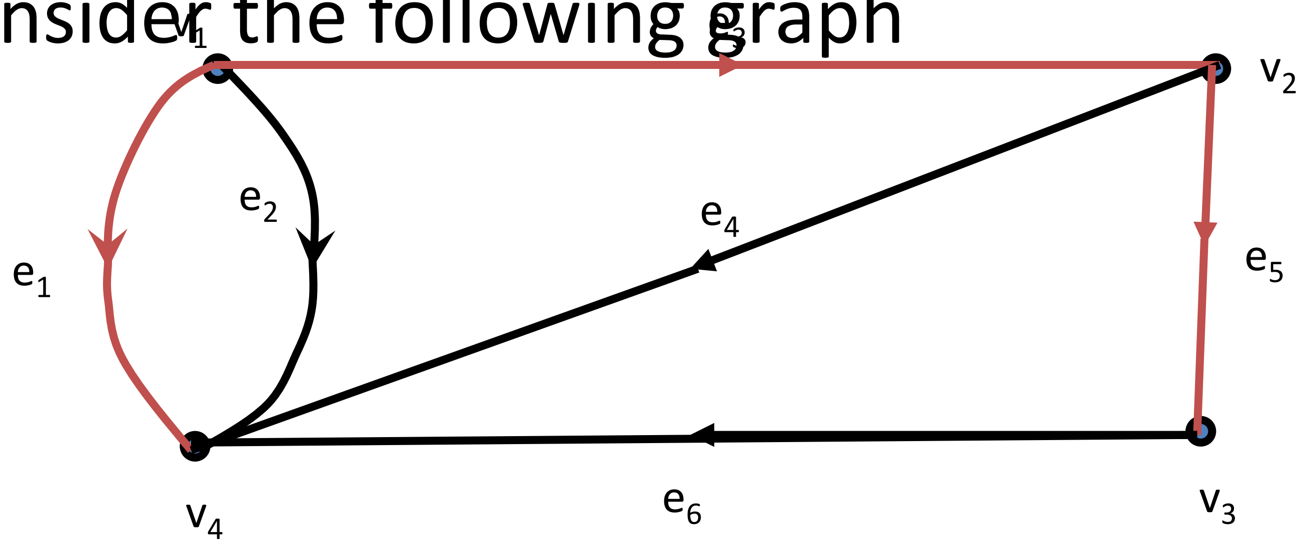
NETWORK ANALYSIS AND SYNTHESIS

Unit 1

Graph Theory

Matrices of Oriented Graphs

- Consider the following graph



$$\mathbf{B_f} = \left[\begin{array}{ccc|ccc} e_1 & e_3 & e_5 & e_2 & e_4 & e_6 \\ -1 & 0 & 0 & 1 & 0 & 0 \\ -1 & 1 & 0 & 0 & 1 & 0 \\ -1 & 1 & 1 & 0 & 0 & 1 \end{array}\right] \begin{array}{c} \\ (e_2) \\ (e_4) \\ (e_6) \end{array}$$

$$\mathbf{B_f} = \left[\mathbf{B} \quad \mathbf{U}\right]$$

Matrices of Oriented Graphs

– THEOREM: If the column orderings of the circuit and incident matrices are identical then

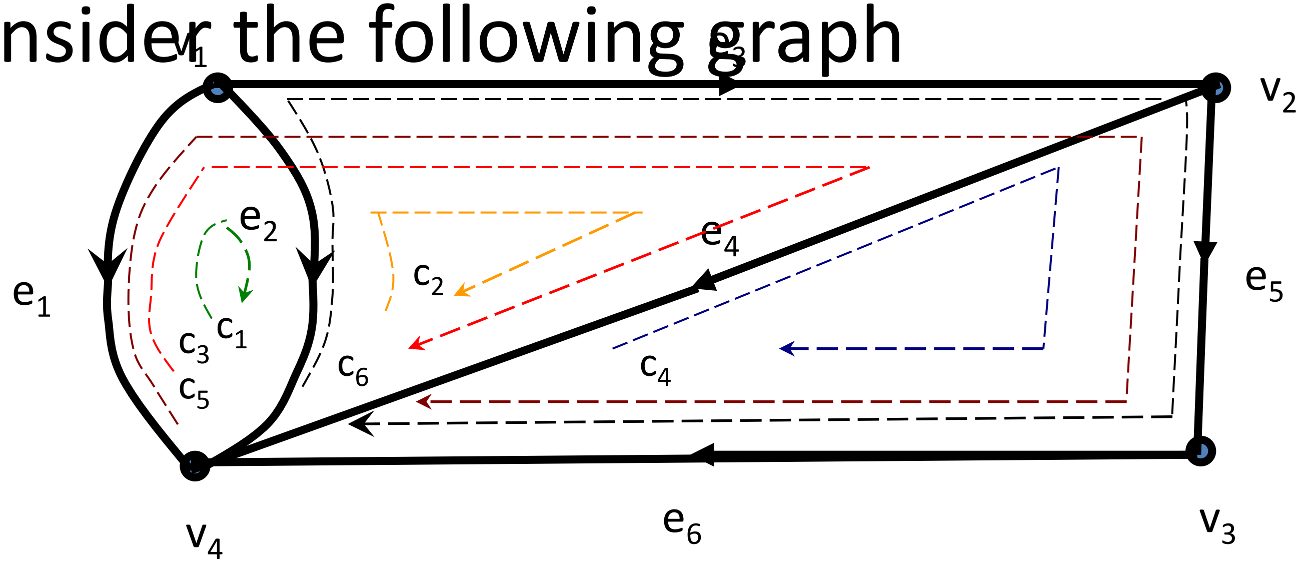
$$\mathbf{B}\prod^{T}=\mathbf{0}$$

or

$$\prod\mathbf{B}^{T}=\mathbf{0}$$

Matrices of Oriented Graphs

- Consider the following graph



$$\mathbf{B} = \left[\begin{array}{cccccc|c} e_1 & e_2 & e_3 & e_4 & e_5 & e_6 & \\ \hline -1 & 1 & 0 & 0 & 0 & 0 & c_1 \\ 0 & -1 & 1 & 1 & 0 & 0 & c_2 \\ -1 & 0 & 1 & 1 & 0 & 0 & c_3 \\ 0 & 0 & 0 & -1 & 1 & 1 & c_4 \\ -1 & 0 & 1 & 0 & 1 & 1 & c_5 \\ 0 & -1 & 1 & 0 & 1 & 1 & c_6 \end{array}\right]$$

$$\Pi = \left[\begin{array}{cccccc} \overset{e_1}{1} & \overset{e_2}{1} & \overset{e_3}{1} & \overset{e_4}{0} & \overset{e_5}{0} & \overset{e_6}{0} \\ 0 & 0 & -1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & -1 & 1 \\ -1 & -1 & 0 & -1 & 0 & -1 \end{array}\right]\begin{array}{c} v_1 \\ v_2 \\ v_3 \\ v_4 \end{array}$$

THANKS….

Queries Please…