

NETWORK ANALYSIS AND SYNTHESIS

Unit 1

Graph Theory

- Tree, Co tree, Link,
- basic loop and basic cut set,
- Incidence matrix, Cut set matrix,
- Tie set matrix, Duality,
- Loop and Nodal methods of analyses.

Basic Concepts of the Graph Theory

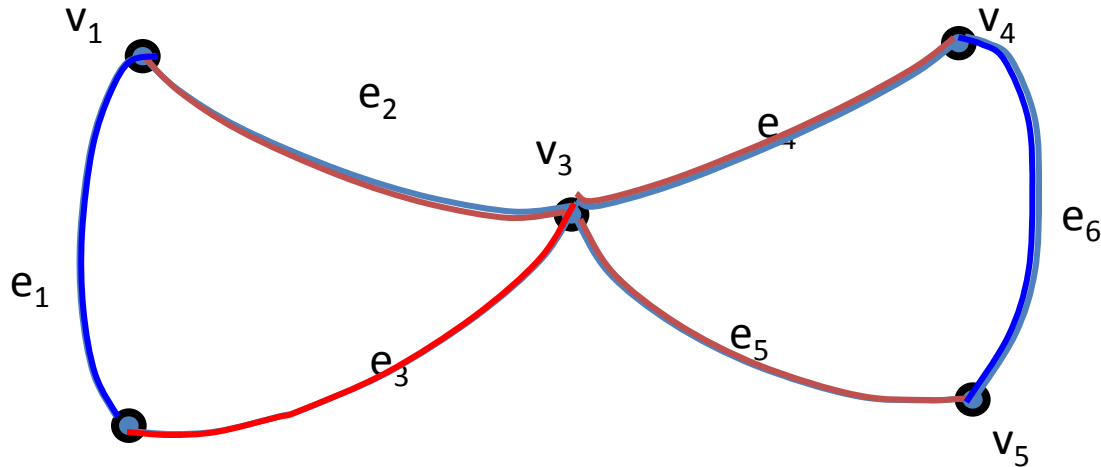
- **Definition:** In a connected graph G of v vertices the subgraph T that satisfies the following properties is called a **tree**.
 - T is connected
 - T contains all the vertices of G
 - T contains no circuit,
 - T contains exactly $v-1$ number of edges.

In every connected graph G there exists at least one tree.

Basic Concepts of the Graph Theory

- Let G have p separated parts G_1, G_2, \dots, G_p , that is $G = G_1 \cup G_2 \cup \dots \cup G_p$, and let T_i be a tree in G_i , $i = 1, 2, \dots, p$, then, $T = T_1 \cup T_2 \dots \cup T_p$ is called a **forest of G** .
- **DEFINITION:** The complement of a tree is called a **co-tree** and the complement of a forest is called a **co-forest**. The edges of a tree or a forest are called **branches** and the edges of a co-tree or co-forest are called **chords (links)**.

Basic Concepts of the Graph Theory



v_2 9 possible trees and corresponding co-trees:

$T_1 = \{e_2, e_3, e_4, e_5\}$	$T_4 = \{e_1, e_2, e_5, e_6\}$	$T_7 = \{e_2, e_3, e_5, e_6\}$
$T'_1 = \{e_1, e_6\}$	$T'_4 = \{e_3, e_4\}$	$T'_7 = \{e_1, e_4\}$
$T_2 = \{e_1, e_2, e_4, e_6\}$	$T_5 = \{e_1, e_3, e_4, e_6\}$	$T_8 = \{e_1, e_2, e_4, e_5\}$
$T'_2 = \{e_3, e_5\}$	$T'_5 = \{e_2, e_5\}$	$T'_8 = \{e_3, e_6\}$
$T_3 = \{e_1, e_3, e_5, e_6\}$	$T_6 = \{e_2, e_3, e_4, e_6\}$	$T_9 = \{e_1, e_3, e_4, e_5\}$
$T'_4 = \{e_2, e_4\}$	$T'_6 = \{e_1, e_5\}$	$T'_9 = \{e_2, e_6\}$

THANKS....

Queries Please...