NETWORK ANALYSIS AND SYNTHESIS

Unit 1

Graph Theory

Basic Concepts of the Graph Theory

- DEFINITION: Let G be a graph and let r and μ be respectively the number of branches and chords of G, then r and μ are called respectively the rank and the nullity of the graph.
- THEOREM: Let G have v vertices, e edges and p connected parts, then its rank and nullity are given respectively by

$$r=v - p$$

and

$$\mu=e - v + p$$

Basic Concepts of the Graph Theory

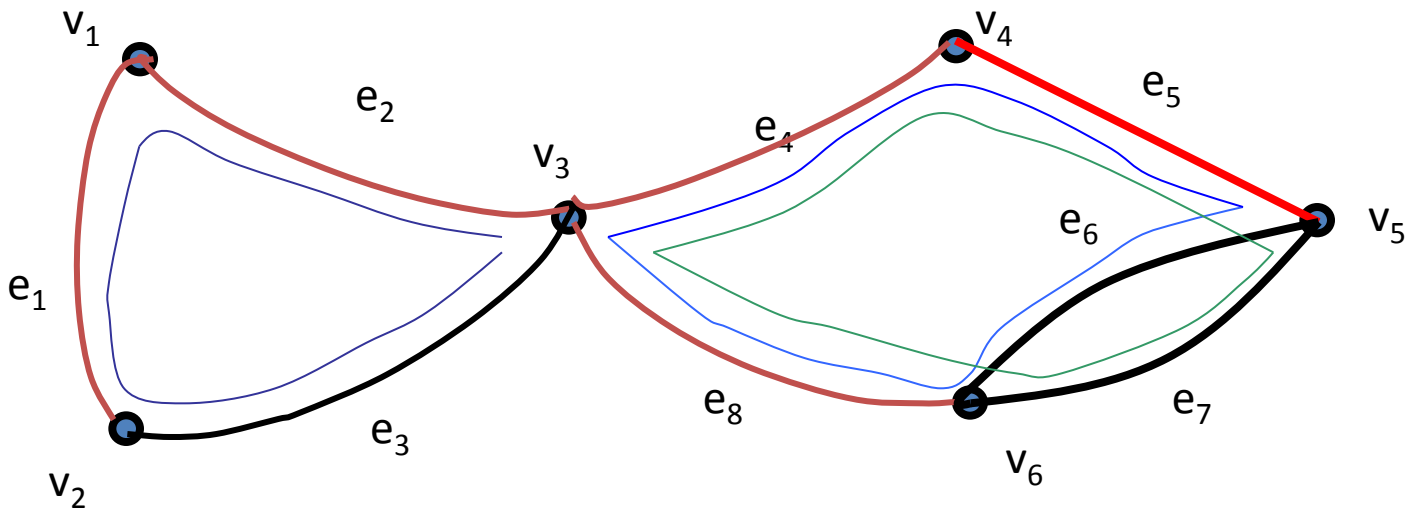
- DEFINITION: Let G be a connected graph and let T and T’ be tree and co-tree respectively, that is $G=T \cup T'$. Let a chord $e' \subseteq T'$ and its unique tree path (a path which is formed by the branches of T) define a circuit. This circuit is called the fundamental circuit (f-circuit) of G. All such circuits defined by all the chords of T’ are called the fundamental circuits (f-circuits) of G. If G is not connected, then the f-circuits are defined with respect to a forest.

Basic Concepts of the Graph Theory

- Note that the number of f-circuits is given by the nullity of G and that, with respect to a chosen tree T of G, each f-circuit contains one and only one chord.

Basic Concepts of the Graph Theory

Consider the following graph



f-circuits:

$c_{f1}=\{e_3,e_1,e_2\}$

$c_{f2}=\{e_6,e_8,e_4,e_5\}$

$c_{f3}=\{e_7,e_8,e_4,e_5\}$

Nullity of G

$\mu=e-v+p=8-6+1=3$

THANKS….

Queries Please…