

## UNIT 1

# Graph Theory

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## Network:

A combination of two or more network elements is called a network.

## Topology:

Topology is a branch of geometry which is concerned with the properties of a geometrical figure, which are not changed when the figure is physically distorted, provided that, no parts of the figure are cut open or joined together.

The geometrical properties of a network are independent of the types of elements and their values.

Every element of the network is represented by a line segment with dots at the ends irrespective of its nature and value.

## **Circuit:**

If the network has at least one closed path it is a circuit.

Note that every circuit is a network but every network is not a circuit.

## **Branch:**

Representation of each element (component) of a electric network by a line segment is a branch.

## **Node:**

A point at which two or more elements are joined is a node. End points of the branches are called nodes.

## Graph:

It is collection of branches and nodes in which each branch connects two nodes.

## Graph of a Network:

The diagram that gives network geometry and uses lines with dots at the ends to represent network element is usually called a graph of a given network. For example,

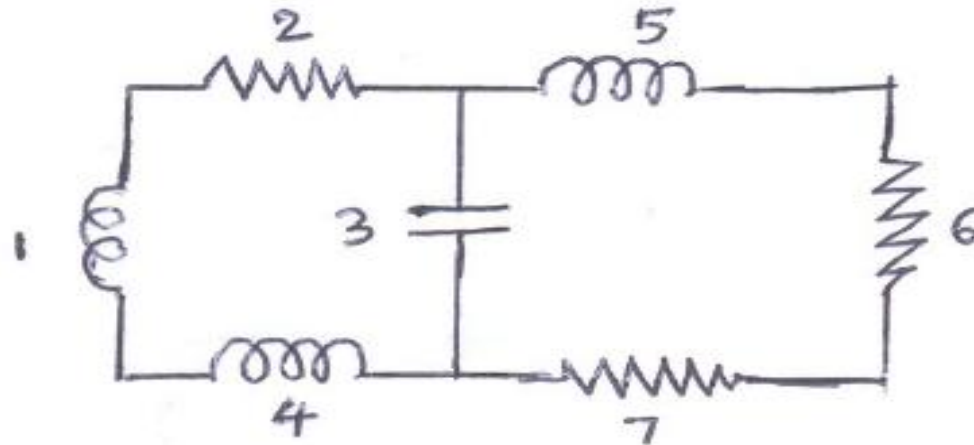


Fig.1 Network

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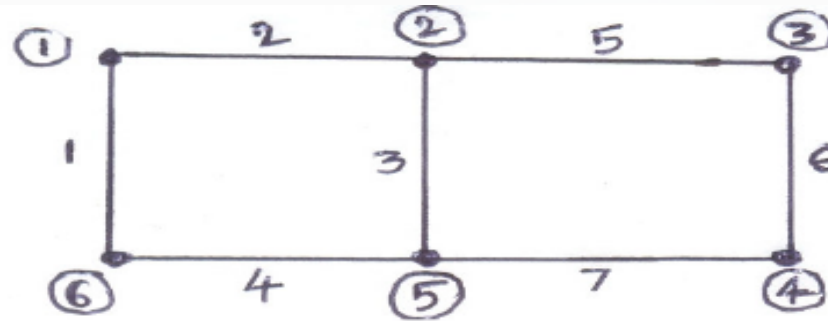


Fig.2 Graph

## Sub-graph:

A sub-graph is a subset of branches and nodes of a graph for example branches 1, 2, 3 & 4 forms a sub-graph. The sub-graph may be connected or unconnected. The sub-graph of graph shown in figure 2 is shown in figure 3.

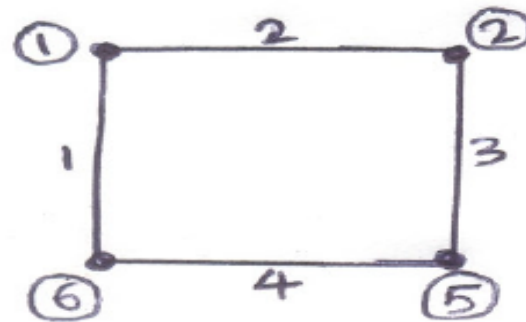


Fig.3 Sub-graph

## Connected Graph:

If there exists at least one path from each node to every other node, then graph is said to be connected. Example,

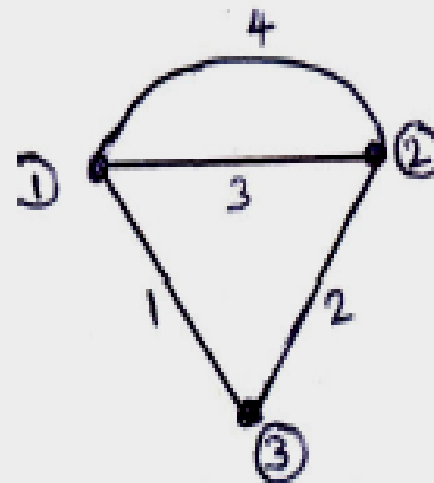


Fig.4 Connected Graph

## Un-connected Graph:

If there exists no path from each node to every other node, the graph is said to be un-connected graph. For example, the network containing a transformer (inductively coupled parts) its graph could be un-connected.

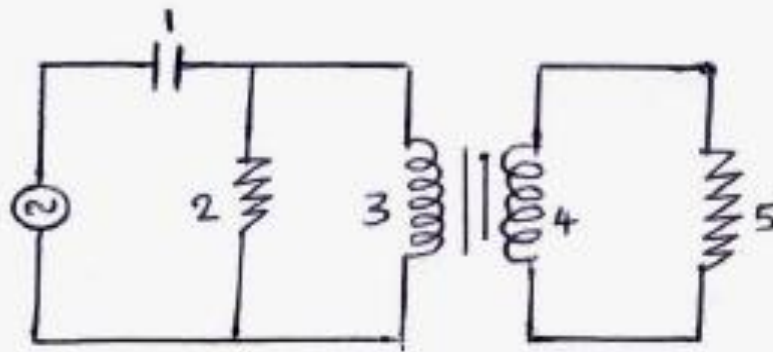


Fig.5 Network

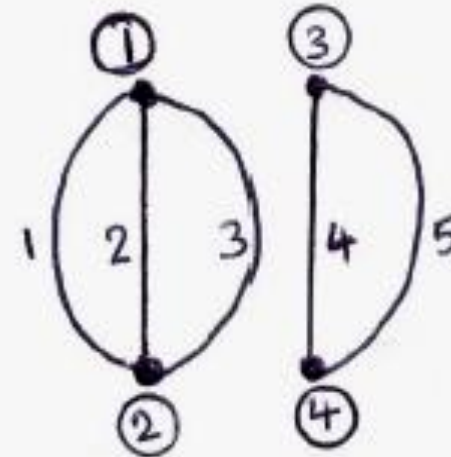


Fig.6 Un-connected Graph



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