N.F.T.L
(Network Filter & Transmission Line)

1- NETWORK

- Network is an interconnection of number of electrical components like resistors , inductors , capacitor , diodes , transistor etc and energy sources.
- There are many types of Network are as follows :
  - Symmetrical Network.
  - Asymmetrical Network.
  - Lumped Network.
  - Distributive Network.
  - Recurrent or cascaded Network.
  - Reciprocal Network.
  - Ladder network.
  - T-Nework.
  - Pi-NetworK.

- **Iterative Impedance :** it is defined as the input impedance measured at one pair of terminals is terminated with the other pair of terminals is terminated with the impedance of same value . Each a symmetrical network has two iterative impedances.

- **Image impedance :** in a two port network if the inpedance at input port is zi1 , when when it is terminated with impedance zi2 at output port and simultaneously the impedance measured from output port is zi2. when it is terminated with impedance zi1 at the input port.

- **Image transfer constant : I**n case of a symmetrical network if the network is terminated into image impedance the factor affecting the propagation of energy are defined in terms of image transfer constant it is a complex quantity having real and imaginary parts.

- **iterative transfer constant :** if an asymmetrical network is terminated with iterative impedance the factor affecting the energy propagation are defined in terms of iterative transfer constant:ive transfer constant if an asymmetrical network is terminated with attractive impedance the factor affecting the energy propagation are defined in terms of iterative transfer constant

2- Attentuators

- **Attenuators** is defined as a network whuch is capable of producing a desired reduction in signal level when used between source and load.

- **Attenuation :** Power loss in any Network gives attenuation. It expressed in terms of neper & decibel (dB).

- **Types of attenuators :**
  - Symmetrical T-Attenuators.
  - Asymmetrical Attentuators.

- **Symmetrical T-attenuator :** It is a resistive network which is inserted between source and load and having equal input and output resistance.

- **Asymmetrical attenuator :** It is a resistive network inserted between source and load having an unequal Input resistance when looked into from input and output terminals separately.

- **Units For attenuation :** Attenuation is measured in Decibels or Nepers.

- **Variable Attenuators :** In which elements are varied to obtain variable attenuation are called variabe attenuators. A variable attenuators has constant input and output impedance .

3- Filters

- **Filter:** A filter is network which suppress certain range of frequencies and pass other frequencies without any loss of signal .

- **Different types of filter bases on components used ;**
  - Active Filter.
  - Passive filter

- **Different types of Fikter based on frequncy characteratics ;**
  - Low pass filter.
  - High pass filter.
  - Band pass filter.
  - Band stop filter.

  Low pass filter (LPF) : a filter that allows all the frequncies up to cutt off frequency to pass through it without attenuation is called LPF. A LPF attenuates all the frequencies avove the cutt off frequency.

  High pass filter (HPF) : a filter which attenuates all the frequencies below a specified Frequency (fc) and passes all the frequencies above fc is called high pass filter.

  Band Pass Filter (BPF) : A filter which allows all the frequencies below a specified cut off frequencies to padd and attentuates all the other frequencies is called Band Pass Filter (BPF).

- **Band Stop Filter (BSF) :** a filter which allows all the frequencies between two specified cutt off frequencies and pass all other frequencies is called band stop filter (BSP).

- **Frequency Response :** Variation of signal with frequency is called frequency response.

- **Uses of Filters ;**

  - Filter are wisely used in communication system to separatevarious voice channels in carrier frequency telephone circuits.
  - Filters are widely used in Radio , T.V etc.
  - Filter is used in communication transmitters , receivers , multi channel communication etc.

4- Transimission Lines.

- **Transmission line :** It is a conductive medium consisting of two or more conductors through which electrical energy is transmitted grom one place to another. These lubes act as a channel or medium through whuch electrical energy is sent from one place to another place.

- **Different types of transimmison lines ;**
  - **Parallel wires lines.**
  - **Co-axial lines.**
  - **Twin wire feeder.**
  - **Wave guides.**
  - **Optical fibre.**

- **Co-axial cable :** it consist of a central conductor surrounded by an out side conductor with dielectric in between inner and outer conductor .

- **Wave Guide :** A hollow conducting metallic tube of uniform Cross-section used for transmitting electromagnetic waves by successive reflections from inner walls tube. These are used in transmission of UHF and microwave signals.

- **Optical Fibre :** It consist of very thin hollow glass fibre through which light wave is transmitted.

- **Application of Transmission line ;**
  - To transmit electrical energy from one place to another place.
  - To transmit communication signals from a transmitter to receiver.
  - To work as circuit elements like capacitor , resistor , inductor , filter etc
  - For Impedance matching purpose.