NETWORK ANALYSIS AND SYNTHESIS

Unit – IV

Network Functions

Network Functions

- Concept of complex frequency,
- Transform impedances network functions of one port and two port networks,
- Concept of poles and zeros,
- Properties of driving point and transfer functions

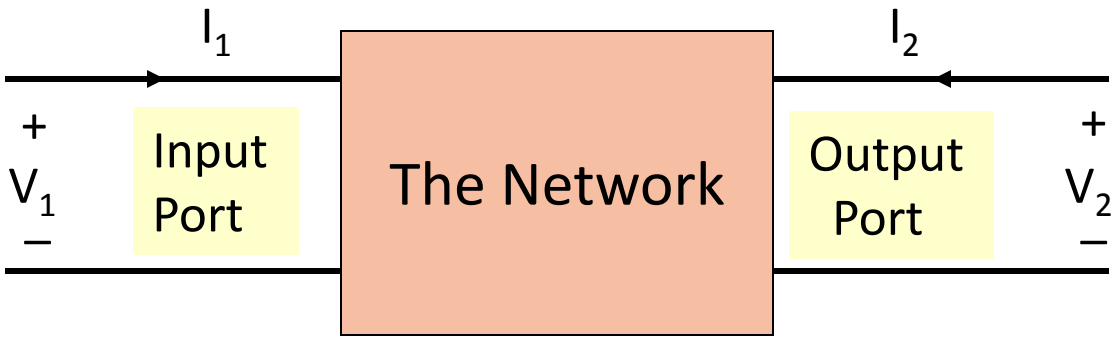
Two Port Networks-

- Characterization of LTI two port networks;
- Z, Y, ABCD, A’B’C’D’, g and h parameters,
- Reciprocity and symmetry,
- Inter-relationships between the parameters, Interconnections of two port networks,
- Ladder and Lattice networks: T & Π representation.

Two Port Networks

Generalities:

The standard configuration of a two port:



The network ?

The voltage and current convention ?

* notes

Two Port Networks

Network Equations:

Impedance
Z parameters

$$V_1 = z_{11}I_1 + z_{12}I_2$$

$$V_2 = z_{21}I_1 + z_{22}I_2$$

$$V_2 = b_{11}V_1 - b_{12}I_1$$

$$I_2 = b_{21}V_1 - b_{22}I_1$$

Admittance
Y parameters

$$I_1 = y_{11}V_1 + y_{12}V_2$$

$$I_2 = y_{21}V_1 + y_{22}V_2$$

Hybrid
H parameters

$$V_1 = h_{11}I_1 + h_{12}V_2$$

$$I_2 = h_{21}I_1 + h_{22}V_2$$

Transmission
A, B, C, D
parameters

$$V_1 = AV_2 - BI_2$$

$$I_1 = CV_2 - DI_2$$

$$I_1 = g_{11}V_1 + g_{12}I_2$$

$$V_2 = g_{21}V_1 + g_{22}I_2$$

* notes

Two Port Networks

Z parameters:

$$z_{11} = \left.\frac{V_1}{I_1}\right|_{I_2=0}$$

z_{11} is the impedance seen looking into port 1 when port 2 is open.

$$z_{12} = \left.\frac{V_1}{I_2}\right|_{I_1=0}$$

z_{12} is a transfer impedance. It is the ratio of the voltage at port 1 to the current at port 2 when port 1 is open.

$$z_{21} = \left.\frac{V_2}{I_1}\right|_{I_2=0}$$

z_{21} is a transfer impedance. It is the ratio of the voltage at port 2 to the current at port 1 when port 2 is open.

$$z_{22} = \left.\frac{V_2}{I_2}\right|_{I_1=0}$$

z_{22} is the impedance seen looking into port 2 when port 1 is open.

* notes

THANKS….

Queries Please…