# UNIT-2

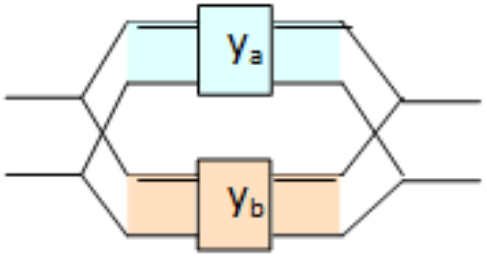
# (Lecture-9)

## Interconnection of Two Ports Parameter

# Interconnection Of Two Port Networks

**Three ways that two ports are interconnected:**

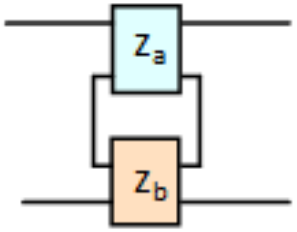
* Parallel




*Y parameters*

$$[y]=[y_a]+[y_b]$$

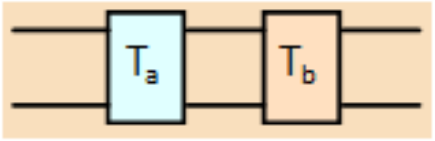
* Series




*Z parameters*

$$[z]=[z_a]+[z_b]$$

* Cascade



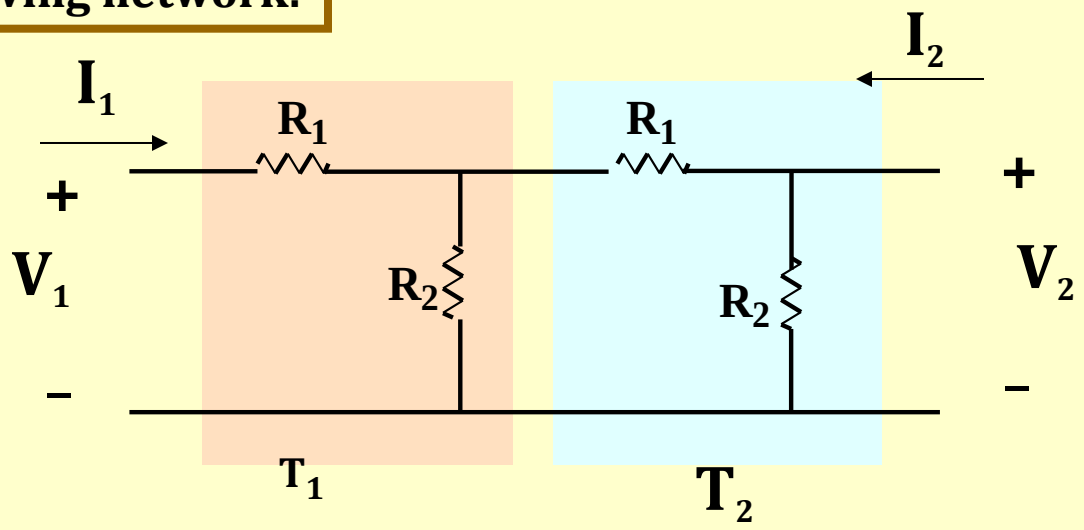

*ABCD parameters*

$$[T]=[T_a]\,[T_b]$$

# Interconnection Of Two Port Networks

**Consider the following network:**

*Find* $\frac{V_2}{V_1}$




$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} \frac{R_1 + R_2}{R_2} & R_1 \\ \frac{1}{R_2} & 1 \end{bmatrix} \begin{bmatrix} \frac{R_1 + R_2}{R_2} & R_1 \\ \frac{1}{R_2} & 1 \end{bmatrix} \begin{bmatrix} V_2 \\ -I_2 \end{bmatrix}$$

# Interconnection Of Two Port Networks

$$\begin{bmatrix} V_1 \\ I_1 \end{bmatrix} = \begin{bmatrix} \frac{R_1 + R_2}{R_2} & R_1 \\ \frac{1}{R_2} & 1 \end{bmatrix} \begin{bmatrix} \frac{R_1 + R_2}{R_2} & R_1 \\ \frac{1}{R_2} & 1 \end{bmatrix} \begin{bmatrix} V_2 \\ -I_2 \end{bmatrix}$$

**Multiply out the first row:**

$$V_1 = \left[\left[\left(\frac{R_1 + R_2}{R_2}\right)^2 + \frac{R_1}{R_2}\right] V_2 + \left[\left(\frac{R_1 + R_2}{R_2}\right) R_1 + R_1\right](-I_2)\right]$$

**Set $I_2$ = 0 ( as in the diagram)**

$$\frac{V_2}{V_1} = \frac{R_2^{\,2}}{R_1^{\,2} + 3R_1R_2\ R_2^{\,2}}$$

**Can be verified directly by solving the circuit**