Experiment No: 3

TRANSMISSION (ABCD) PARAMETERS

4.1 Aim 4.2 Apparatus required 4.3 Connection diagram 4.4 Theory 4.5 Procedure 4.6 Observation table 4.7 Result 4.8 Precautions

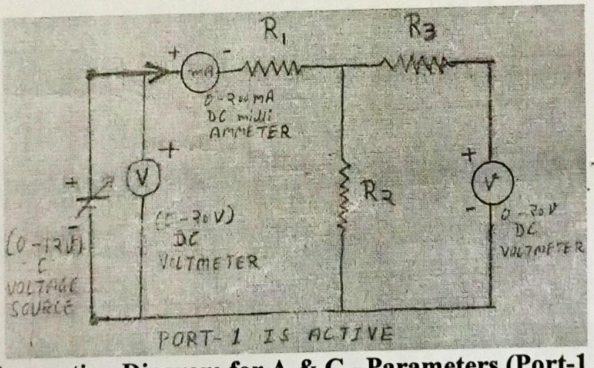
1.17 AIM:

To determine the Transmission (ABCD) Parameters of given Two Port Resistive Network.

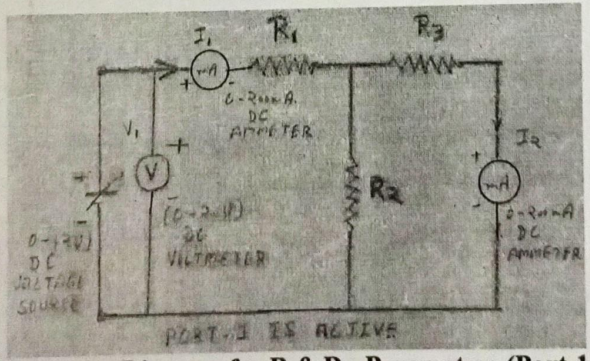
1.18 APPARATUS REQUIRED:

Sr. No.	Name of the Equipment	Range	Type	Quantity
01	DC Voltage Source	0-12V, 1A	DC - Variable	02
02	Resistances	100Ω / 200Ω / 500 Ω	Carbon Resistor	05
03	Bread Board			01
04	Connecting Leads / Wire		Single-Conductor	As Req.
05	Digital Multimeter	2Amps, 20Volts	A-V-O	04

1.19 CONNECTION DIAGRAM:



Circuit Diagram-1: Connection Diagram for A & C - Parameters (Port-1 active, Output Open)



Circuit Diagram-2: Connection Diagram for B & D - Parameters (Port-1 active, Output Short)

1.20 THEORY:

A two-port network is a special case of multi-port network. Each port consists of two terminals, one for entry and other for exit. From the definition of a port, the current at entry is equal to that at exit terminal of the port.

In the two port network there are four variables. These are the voltages and the currents at the input and the output ports. Here only two of the four variables V_1, I_1, V_2, I_2 are independent.

Therefore:

A = Reverse Voltage Ratio with the Receiving port open Circuited ($I_2 = 0$)

$$A = \left.\frac{V_1}{V_2}\right|_{I_2=0}$$

B = Reverse Transfer Impedance with the receiving port short circuited ($V_2 = 0$)

$$B = \left.\frac{V_1}{-I_2}\right|_{V_2=0}$$

C = Reverse Transfer Admittance Receiving port open Circuited ($I_2 = 0$)

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

D = Reverse Current Ratio Output with the receiving port short circuited ($V_2 = 0$)

$$D = \left.\frac{I_1}{-I_2}\right|_{V_2=0}$$

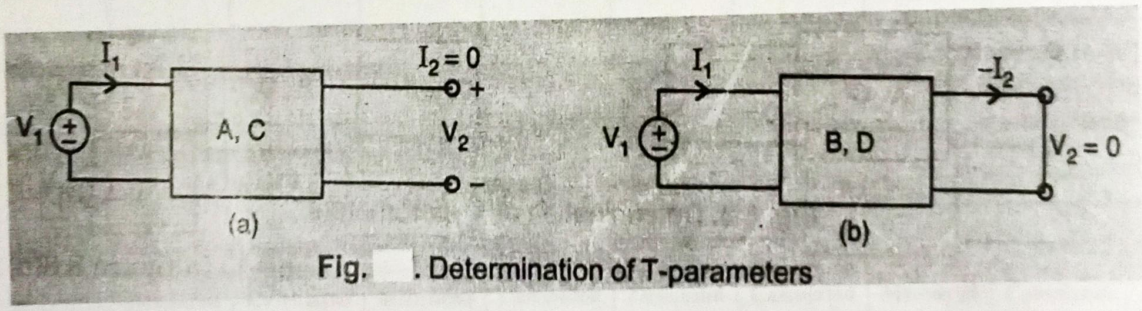


Fig. . Determination of T-parameters

ABCD parameter are known as Transmission (T) & Chain Parameters. The equivalent circuit of a two-port network is not possible in terms of T-parameters.

1.21 PROCEDURE:

(Draw labeled circuit diagram on paper and Arrange all the Equipments & material required for the practical.)

19. For the circuit diagram-1, calculate the values of current, I_1 & voltage, V_2 for different values of source voltage and record them in the observation table.
20. Connect the circuit as shown in the circuit diagram-1. Keep all the switches in off position.
21. Open the output port (Port-2) and excite input port (Port-1) with the known voltage source.
22. Measure the values of current, I_1 & voltage, V_2 for source voltage of same values as in step-1 and record them in the observation table.
23. For the circuit diagram-2, calculate the values of current, I_1 & short circuit current, I_2 for different values of source voltage (same values as in step-1) and record them in the observation table.
24. Connect the circuit as shown in the circuit diagram-2. Keep all the switches in off position.
25. Short the input port (Port-2) and excite output port (Port-1) with the known voltage source.
26. Measure the values of current, I_1 & short circuit current, I_2 for source voltage (same values as in step-1) and record them in the observation table.
27. After note down the observations, switch OFF the power supply. And remove the components safely.

(Get the connections checked by the lab Faculty/Technician before switch on the supply.)

1.22 OBSERVATION TABLE:

For Circuit: 1

S. N.	Applied Voltage V_1 (Source Voltage)	Current Drawn (A/mA) I_1		Open Circuit Voltage (V) V_2		A = Reverse Voltage Ratio $A = V_1 / V_2$		C = Reverse Transfer Admittance $C = I_1 / V_2$	
		Measured	Calculated	Measured	Calculated	Measured	Calculated	Measured	Calculated
1									
2									
3									
4									

For Circuit: 2

S. N.	Applied Voltage V_1 (Source Voltage)	Current Drawn (A/mA) I_1		Short Circuit Current (V) I_2		B = Reverse Transfer Impedance $B = V_1 / -I_2$		D = Reverse Current Ratio $D = I_1 / -I_2$	
		Measured	Calculated	Measured	Calculated	Measured	Calculated	Measured	Calculated
1									
2									
3									
4									

1.23 RESULT:

Since, from the observation table, the values of ABCD Parameters are as follows:

Mean Values:	Experimental:	Theoretical:
A		
B		
C		
D		

1.24 PRECAUTIONS:

- Before switching on the Main supply, connections should be checked by the lab staff/Faculty.
- Use only proper current & voltage rating Equipments.
- Use multimeter or any other instrument with least error.
- Set the proper range & type of quantity to be measured on Digital Multimeter.
- Never short circuit the voltage source.
- Do not touch any live wire. Do not keep any joint short.

NOTE: For two port passive network, B & D are always negative, since I_2 is negative, when output port is short circuited.