Sekolah Pendidikan Profesional dan Pendidikan Berterusan (SPACE)

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

JABATAN KEJURUTERAAN ELEKTRIK
PUSAT PENGAJIAN DIPLOMA (PPD), SPACE
UNIVERSITI TEKNOLOGI MALAYSIA
KUALA LUMPUR

ELECTRICAL ENGINEERING LABORATORY 2

(DDWE 2701)

CIRCUIT THEORY 2

EXPERIMENT 4
TWO PORT NETWORK

Group members	1.
	2.
	3.
	4.
	5.
Lecturer	:
Date	:

No.	PO	CO	Student Marks	Marks
1	PO1	CO1		40%
2	PO2	CO4		40%
3	PO8	CO5		10%
Total Marks				/90%

EXPERIMENT 4 : TWO PORT NETWORK

OBJECTIVES

After doing this experiment, students will be able to:

1. understand the concept of two port network.
2. verify experimentally the values of network variables under open and short circuit condition.
3. identify a suitable parameter for a particular two port network.

APPARATUS

1. DC Power Supply
2. Ammeter
3. Voltmeter

COMPONENTS

1. Resistors (3.9 kΩ, 5.6 kΩ, 6.8 kΩ)

PROCEDURE

PART 1 : T-NETWORK

Terminals 2 and 2' opened, $1_2 = 0$

1. Construct the T-network as shown in Figure 1.

Figure 1

2. Set the de power supply to 5 V.
3. Record the reading of I_1 and V_2 in Table 1. (V_2 is the open circuit voltage across terminal 2 and 2').
4. Repeat step (3) for power supply voltages of 10 V and 15 V.

Terminals 1 and 1' opened, I_1 = 0

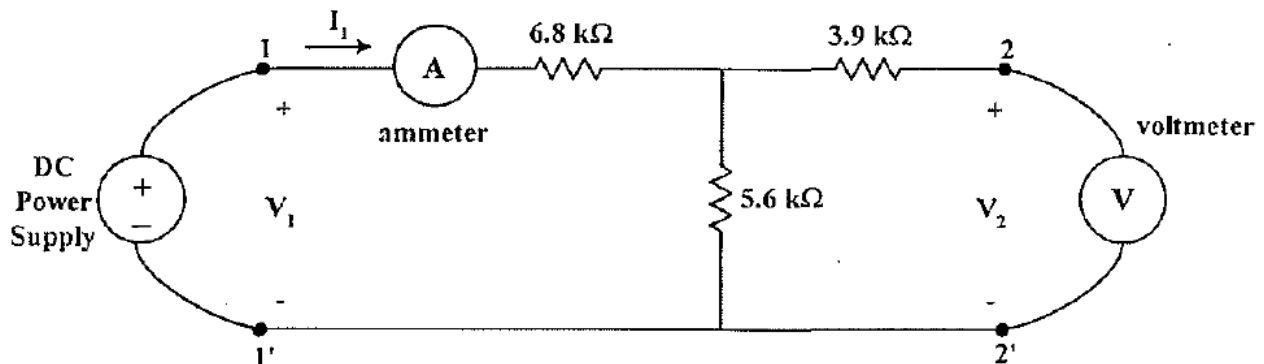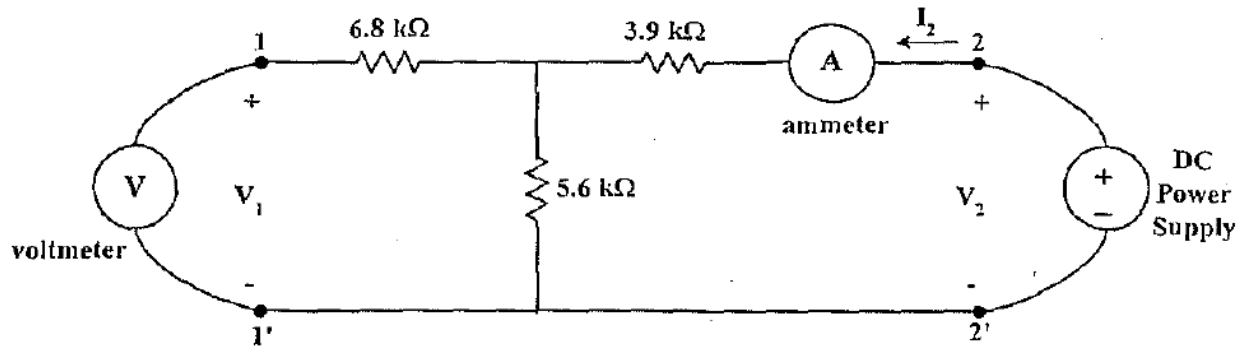1. Construct the T-network as shown in Figure 2.

Figure 2

2. Set the de power supply to 5 V.

3. Record the reading of V_1 and 1_2 in Table 2. (V_1 is the open circuit voltage across terminal I and 1').

4. Repeat step (3) for power supply voltages of 10 V and 15 V.

PART 2 : π-NETWORK

Terminals 2 and 2' shorted, V_2 = 0

1. Construct the T-network as shown in Figure 3.

Figure 3

2. Set the de power supply to 5 V.

3. Record the reading of I_1 and 1_2 in Table 3. (h is the short circuit current through terminal 2 and 2').

4. Repeat step (3) for power supply voltages of 10 V and 15 V.

Terminals 1 and 1' shorted, V₁ = 0

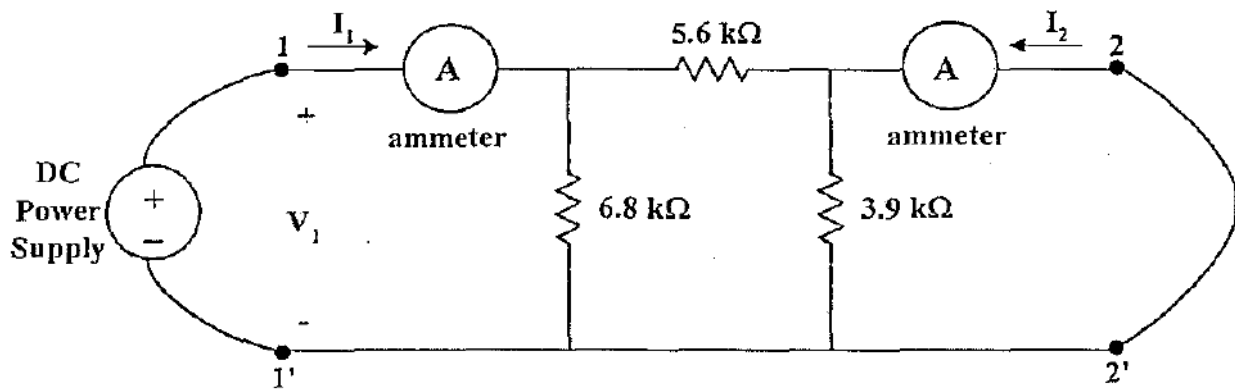1. Construct the T-network as shown in Figure 4.
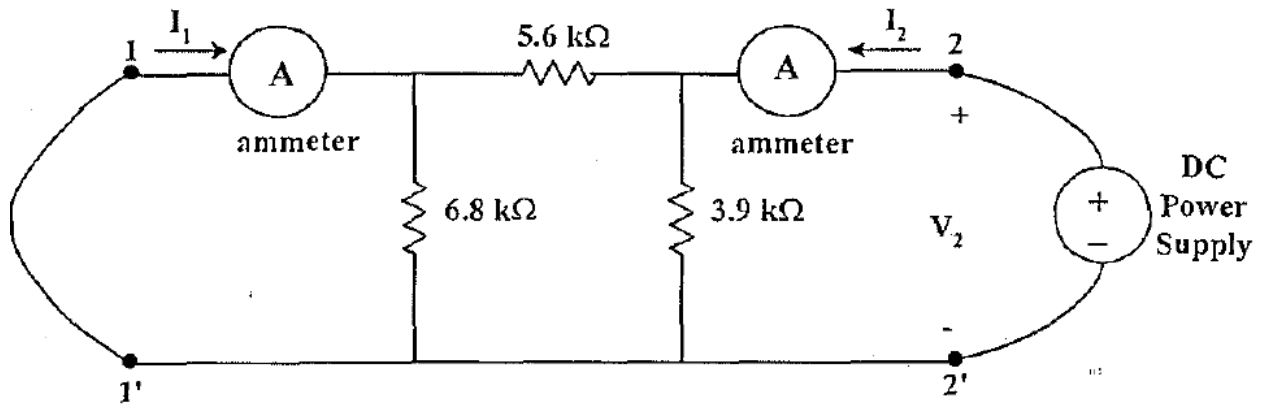

Figure 4

2. Set the dc power supply to 5 V.

3. Record the reading of I_1 and 1_2 in Table 4. (I_1 is the short circuit current across terminal 1 and 1').

4. Repeat step (3) for power supply voltages of 10 V and 15 V.

RESULT & REPORT

PART 1: T-NETWORK

Terminals 2 and 2' opened, $I_2 = 0$

Table 1 (Step 3-4)

Power supply (V_1)	5 V	10 V	15 V
I_1 (mA)			
V_2 (V)			

PO1	CO1	.... /10m

Terminals 1 and l' opened, $I_1 = 0$

Table 2 (Step 3-4)

Power supply (V_2)	5 V	10 V	15 V
I_2 (mA)			
V_1 (V)			

PO1	CO1	.... /10m

PART 2 : π-NETWORK

Terminals 2 and 2' shorted, $V_2 = 0$

Table 3 (Step 3-4)

Power supply (V_1)	5 V	10 V	15 V
I_1 (mA)			
V_2 (V)			

PO1	CO1	.... /10m

Terminals 1 and l' shorted, $V_1 = 0$

Table 4 (Step 3-4)

Power supply (V_2)	5 V	10 V	15 V
I_2 (mA)			
V_1 (V)			

PO1	CO1	.... /10m

DETERMINATION OF TWO-PORT NETWORK PAMMETERS FOR T-NETWORK

1. Referring to Table 1 and Table 2, calculate the Z-parameters. Show all calculation in Table 5.

Power supply	5 V	10 V	15 V
Z_{11}			
Z_{12}			
Z_{21}			
Z_{22}			

Table 5

PO1	CO1	.... /10m

2. Comment on the parameters obtained for various value of source voltage.

....
....
....
....
....
....

PO1	**CO1**	....	**/5m**

DETERMINATION OF TWO-PORT NETWORK PARAMETERS FOR π-NETWORK

Referring to Table 3 and Table 4, calculate the Y-parameters. Show all calculation in Table 6.

Power supply	5 V	10 V	15 V
y_{11}			
y_{12}			
y_{21}			
y_{22}			

Table 6

PO1	**CO1**	....	**/10m**

Comment on the parameters obtained for various value of source voltage.

....
....
....
....
....
....

PO1	CO1	....	/5m

CONCLUSIONS

....
....
....
....
....
....

PO1	CO1	....	/10m

ATTACHMENT 2 : 2-PORT NETWORK PARAMETERS

Z-parameters

$$z_{11} = \left.\frac{V_1}{I_1}\right|_{I_2=0} \qquad z_{21} = \left.\frac{V_2}{I_1}\right|_{I_2=0} \qquad z_{12} = \left.\frac{V_1}{I_2}\right|_{I_1=0} \qquad z_{22} = \left.\frac{V_2}{I_2}\right|_{I_1=0}$$

Y-parameters

$$y_{11} = \left.\frac{I_1}{V_1}\right|_{V_2=0} \qquad y_{21} = \left.\frac{I_2}{V_1}\right|_{V_2=0} \qquad y_{12} = \left.\frac{I_1}{V_2}\right|_{V_1=0} \qquad y_{22} = \left.\frac{I_2}{V_2}\right|_{V_1=0}$$

TOTAL MARKS (PO1, CO1) = ... / 80 marks

		Marks	PO2	PO8
Group members	**1.**			
	2.			
	3.			
	4.			
	5.			
Lecturer	**:**			
Date	**:**			

Guideline of practical skill rubric: PO2

Practical skill (100 marks)						
Scale :	**1 (5marks)**	**2 (10marks)**	**3 (15marks)**	**4 (20marks)**	**5 (25marks)**	**Marks**
Criteria ✓ **Demonstrate the practical skill**	**Very Poor**	**Poor**	**Moderate**	**Good**	**Excellent**	
A. Circuit assembly/construction	5	10	15	20	25	
B. Using appropriate measurement equipment and technique	5	10	15	20	25	
C. Troubleshooting skill and technique	5	10	15	20	25	
D. Follow lab regulation	5	10	15	20	25	
					Total marks	**………/100**

Guideline of ethic rubric: PO8

ETHIC AND PROFESSIONAL MORAL (………/100 marks)					
Scale :	**1 (5marks)**	**2 (10marks)**	**3 (15marks)**	**4 (20marks)**	**5 (25marks)**
Criteria ✓ **Understand the economic, environmental and socio-cultural impacts of professional practice**	**Very Poor**	**Poor**	**Moderate**	**Good**	**Excellent**
A. Professional Practice (Punctuality/Follow the Rules)	Tidak menepati/ Tidak Mematuhi	Kurang menepati/ Kurang mematuhi	Adakala menepati / Adakala mematuhi	Menepati / Mematuhi	Sentiasa menepati / Sentiasa mematuhi
B. Ethical Behavior (Trustworthy / Respectfulness)	Tidak mengamalkan	Kurang mengamalkan	Adakala mengamalkan	Mengamalkan	Sentiasa mengamalkan
C. Social Cultural (Racial Harmony)	Tidak mengamalkan	Kurang mengamalkan	Adakala mengamalkan	Mengamalkan	Sentiasa mengamalkan
D. Personality	Tidak menepati	Kurang menepati	Adakala menepati	Menepati	Sentiasa menepati