1.4 Procedure:

Part I . The i-v Characteristics Of Linear & Nonlinear Devices

1- Construct the test circuit shown in Fig (1.3). The circuit consists of a variable dc-supply voltage-source in series with a **[current-limiting]** resistor of 2.7 kΩ. In addition, a DMM is used as an ammeter and another DMM is used as a voltmeter to measure the current through and the voltage across the **device-under-test [DUT]**, respectively. Use an unknown resistor as the DUT.

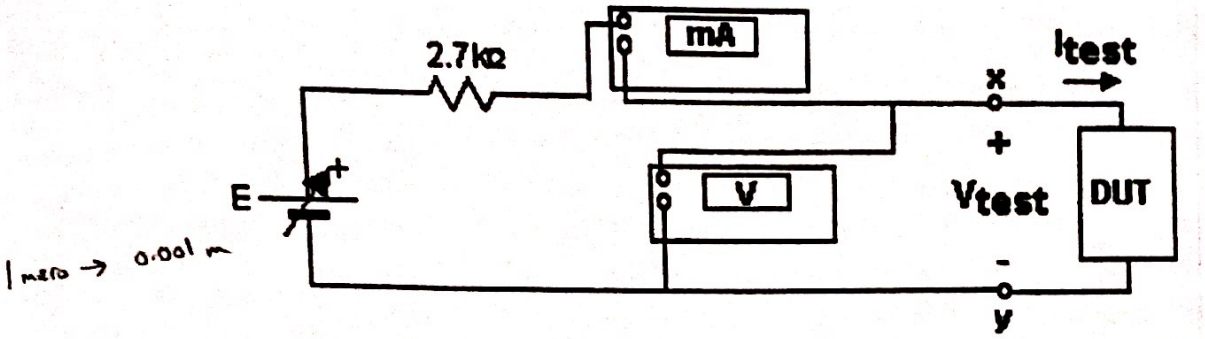


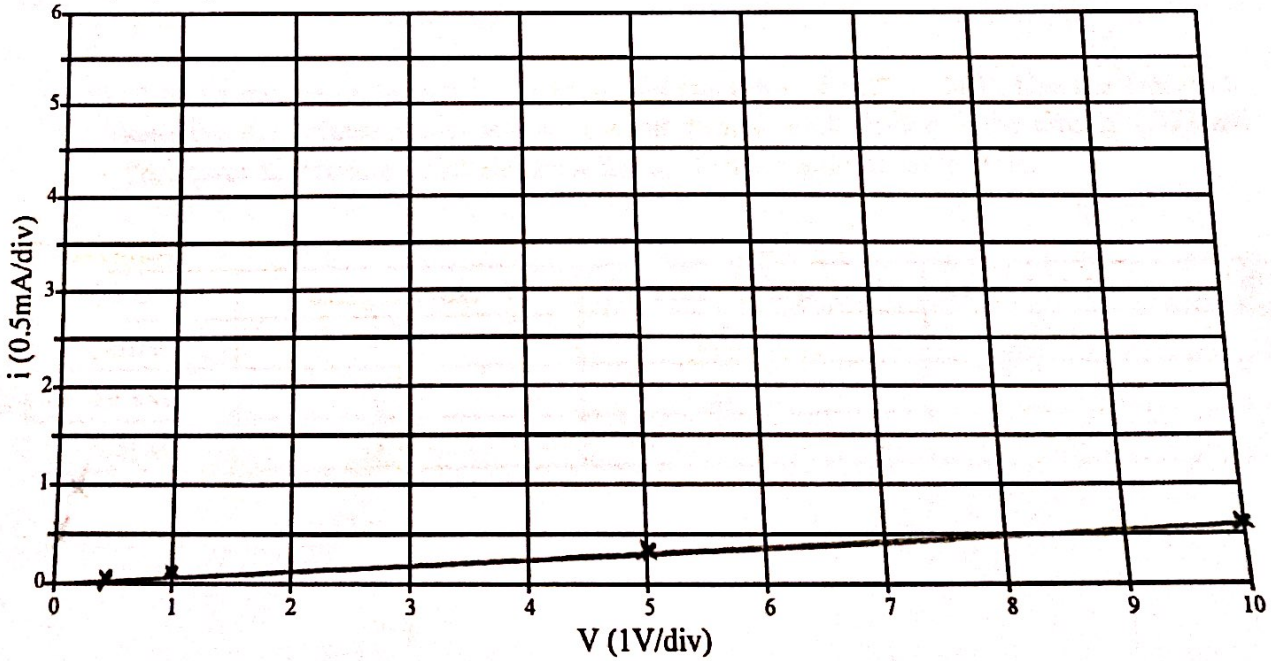
Fig (1.3)

2- Adjust the dc-supply voltage to set V_{test} @ each of the values shown in table (1.1); measure and tabulate the corresponding values for I_{test}.

Table (1.1)

V_{test} (V)	0.5	1	5	10
I_{test} (mA)	0.034	0.068	0.339	0.666

3- Reverse the DUT terminals and observe what happens as you repeat step #2 .Use Graph (1.2) to plot the i-v characteristic of the DUT.

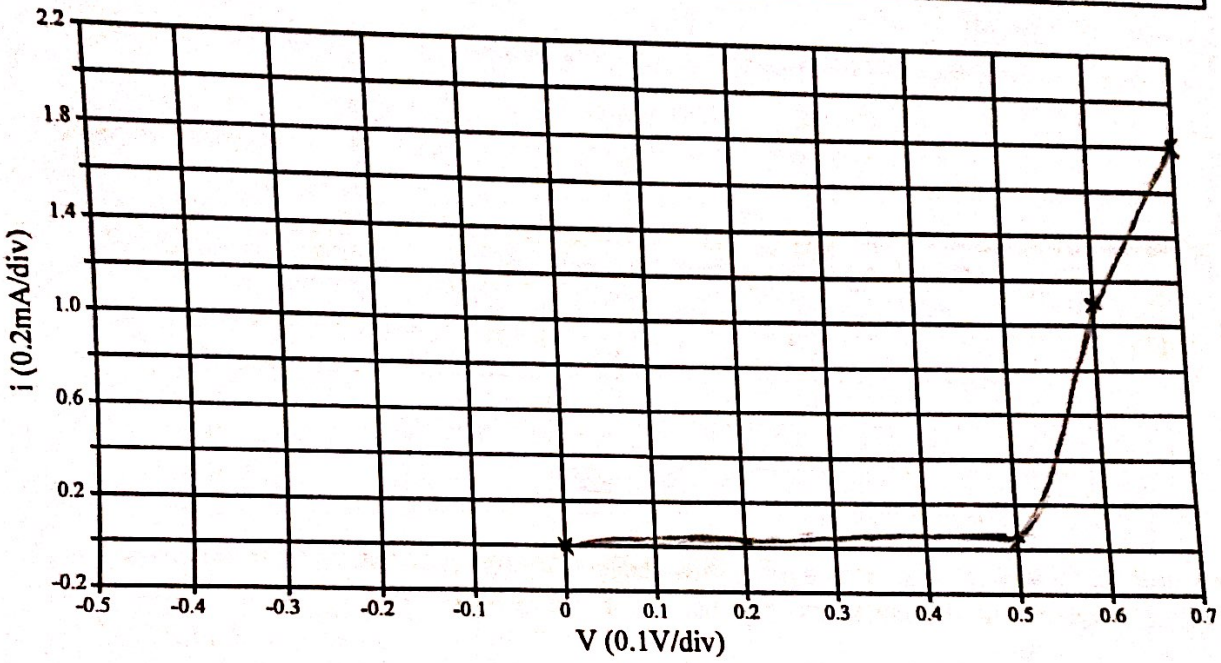


Graph (1.2)

4- Replace the unknown resistor with a forward-bias diode as the DUT. Repeat all the previous steps. Tabulate your results in table (1.2) and use Graph (1.3) to plot the i-v characteristic of the diode.

Table (1.2)

V_{test} (V)	0.2	0.5	0.6	0.7
I_{test} (mA)	430×10^{-9}	0.034	1.11	1.8



Graph (1.3)

Part II. Simple Series Circuit

5- Connect the circuit shown in Fig (1.1). Set the value of **"E" @ 20V.** Use the DMMs to measure the voltage across and the current through each device in the circuit. Calculate the power absorbed by each device and record your results in table (1.3).

Table (1.3)

Device	Voltage across (V)	Current through (mA)	Absorbed Power (mW)
Source	20	1.5	30
10 kΩ	15	1.5	22.5
3.3kΩ	5	1.5	7.5

6- Connect the simple parallel circuit shown in Fig (1.2) and repeat as in step #5. Record your results in table (1.4).

Table (1.4)

Device	Voltage across (V)	Current through (mA)	Absorbed Power (mW)
Source	20	8	160
10 kΩ	20	2	40
3.3kΩ	20	6	120

1.5 Conclusion:

1- Use your plot for the i-v characteristic of the unknown resistor to formulate an expression for the current through "i" as a function of the voltage across "v" of the resistor.

$I = V \times \frac{1}{R}$

$I = \frac{V}{R}$

2- How does the i-v characteristic of a diode differ from that of a resistor? Use two test points on Graph (1.3) to show if the diode satisfies the properties of superposition and homogeneity.

what is even this?

3- Use table (1.3) to derive the basic properties of a simple series circuit.

a) Current is the same for all components in the circuit

b) Voltage of a component is relative to its resistance

c) ratio between voltage of component is relative to its resistance

d) voltage supplied is equal to total voltage drops

e) Total resistance is equal to sum of all resistors

4- Specify at least one practical application for connecting devices in a simple series form.

having 2 4Ω resistors putting them in series give a total of 8Ω resistence

5- Use table (1.4) to derive the basic properties of a simple parallel circuit.

a) Voltage is the same across all components

b) Current entering a node is equal to current leaving

c) Total resistance is equal to the inverse of the sum of the inverse resistors $\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$

d) if a path is broken current will move in other path

e)

6- Specify at least one parctical application for connecting devices in a simple parallel form.

(1) In a simple lamp/chandelier all light bulbs would have same brightness

(2) if 1 light bulb breaks the rest will still work