كلية العلوم

قسم الفيزياء الطبية

MedicalPhysics

المرحله : الأولى

الماده : الكهربائية –عملي

المختبر:الأول

اسم التجربة: "   قنطرة ويتستون "

رقم التجربة : 2

مشرفة المختبر: د . دعاء جعفر

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Wheatstone Bridge

In the year 1843 AD, the English physicist Charles Wheatstone

(1802 – 1875) made an electrical circuit to measure the amount

of unknown resistance. This circuit was distinguished by its high

accuracy in finding the amount of resistance. It relied on finding

the value of the unknown resistance in proportion to the values

of known resistors.

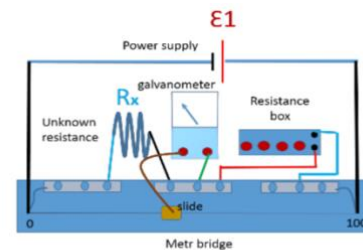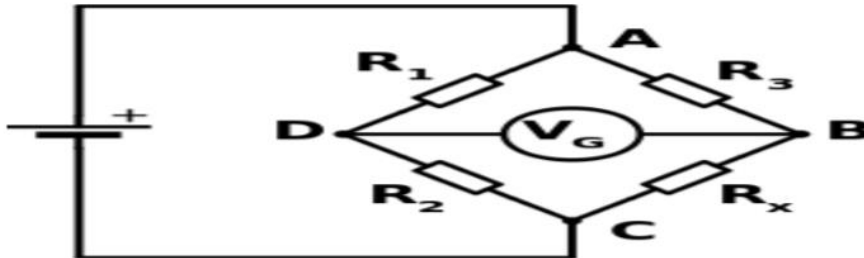## The purpose:

It is to find the amount of unknown resistance .

Figure (1)

Used equipments:

Voltage source (battery), known resistance, wire of

unknown resistance, meter bridge, galvanometer, wires .

Experiment theory:

When an electrical circuit is connected as in Figure (2) and a current passes through the circuit, the current will be divided into two parts. I1 passes through resistors 3R and R4 and I2 passes through resistors R1 and R2 .

If the potential of point B Is equal to the potential of point D, which is what we call the state of equilibrium, then the potential difference of two points AB is equal to the potential difference of two points AD and the potential difference of two points CB is equal to the potential difference of two points CD .

VAB =VAD ………(1)

VCB = VCD ………. (2)

Therefore, we can compensate for the resistances and

currents, and this is:

R3 I1 = R2 I2 ……… (3)

Rx I1 = R1 I2 ………. (4)

By dividing the two equations, we find that:

Rx = R3* R1/R2 ……….. (5)

If R1 and R2 are resistors from the same wire, their

resistance is equal:

R1 = ρ1 * L1/A1 …….. (6)

R2 = ρ2 * L2/A2 ……… (7)

Since, as we mentioned, they are from the same wire,

they have the same specific resistance p and have the

same cross-sectional area A, by dividing (6) by (7)

Equation becomes as follows

Rx = R* L1/L2 ………. (8)

R1/R2 = R3/R4

R	L1	L2=L- L1	Rx=R*L1/L2

Some question

Q\FIND (R4=?)(R1=20,R2=40,R3=42)
(a-892)(b-8kS2)(c-1652)(d-392)

°Q/What is the law total resistance?
(a-Rx=R*L2/L1)(b-Rc=R*L2/L1)(c-Rx=R*L1/L2)(d-Rx=R*L1/L)

Q\FIND (L2=?)(L1=84)
(a-9)(b-16)(c-0.1)(d-0.16)