

07:00  
① Exp No 4

08:00

Potentiometer

09:00

Objectives ① To calibrate

10:00

a one meter slide wire potentiometer using standard cell.

11:00

12:00

② To measure unknown electromotive force

13:00

16:00

③ To find internal resistance

17:00

$$E_x = ? \quad r = ?$$

18:00

Equipment

19:00

① Standard Battery (power supply of fixed voltage 5V)

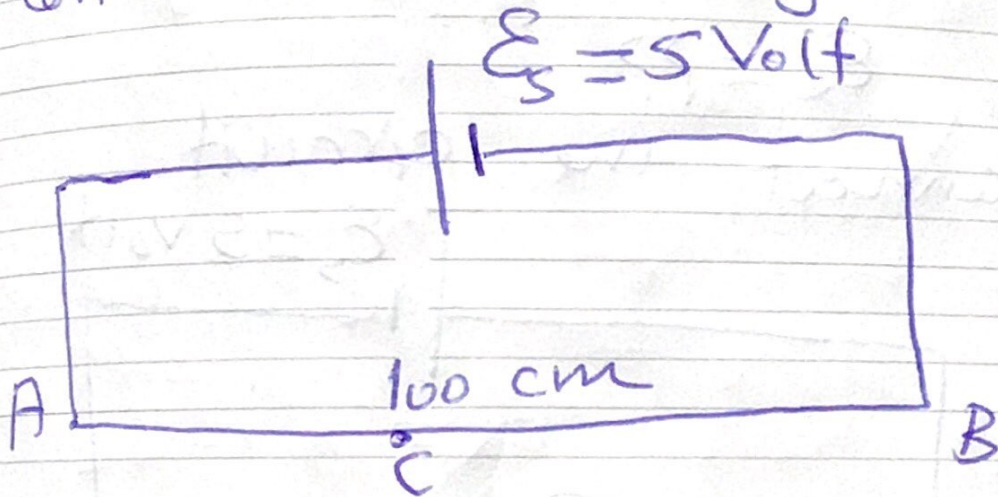
20:00

② Voltmeter ③ Box Resistance  
④ Test cell ⑤ Cables

①

## ② Calibration

connect the following circuit



$$L_{AB} = 100 \text{ cm} \longrightarrow E_s = 5 \text{ volt}$$

$$\longrightarrow 1 \text{ cm} \longrightarrow f$$

$$f = 0.05 \text{ volt/cm}$$

$f$ : calibration factor

$$\underline{K_x} \text{ if } L_{AC} = 40 \text{ cm}$$

$$\begin{aligned} \rightarrow V_{AC} &= f \cdot L_{AC} \\ &= (0.05)(40) \\ &= 2 \text{ volt.} \end{aligned}$$

②

07:00

Part 1 measuring the

08:00

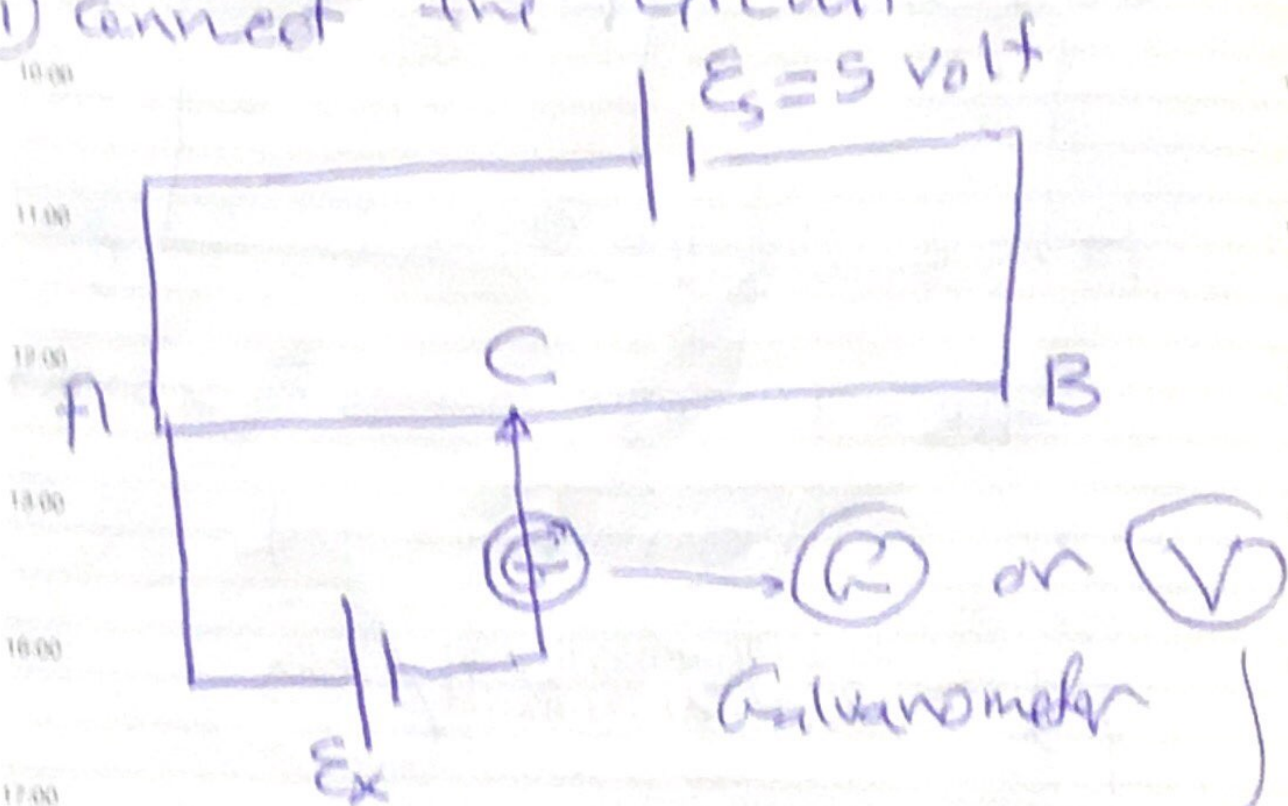
unknown electromotive force.

09:00

$E_x = ??$

① connect the circuit

10:00



11:00

12:00

13:00

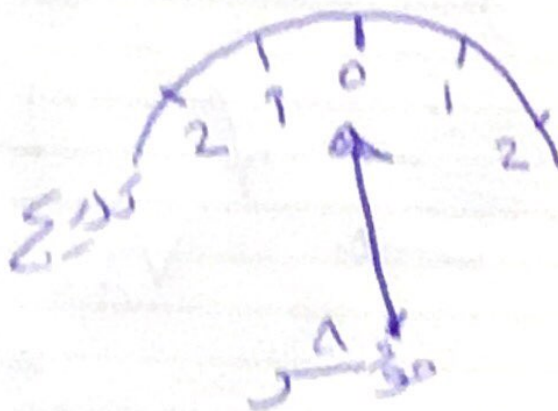
14:00

② move the wire C

until the you see equilibrium pointer on zero

15:00

voltmeter



③

07:00

حرك الطرف (C) على اسلاك الجيتري

08:00

حتى تحصل على حالة التوازن

09:00

المؤشر على الصفر

③

10:00

measure  $L_{AC}$

قراءة المسافة  $L_{AC}$

11:00

④

then  $E_x = f \cdot L_{AC}$

12:00

Part 2  $E_x = ?$   $r = ?$

13:00

Connect the circuit

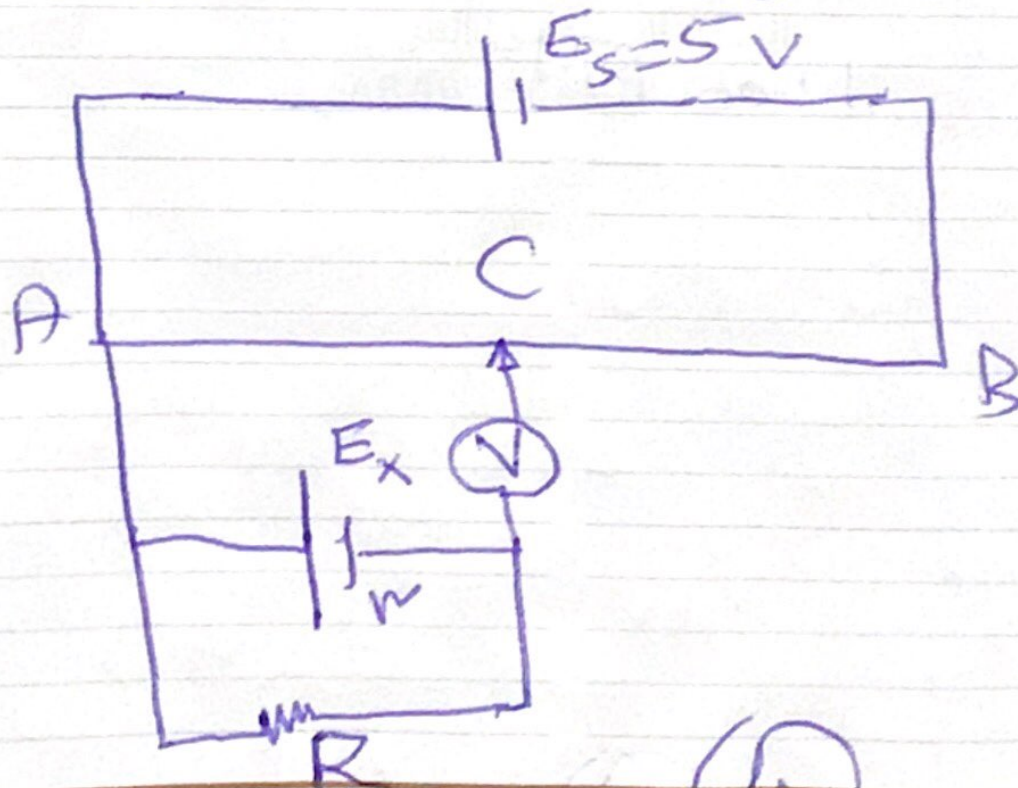
16:00

17:00

18:00

19:00

20:00



④

Here

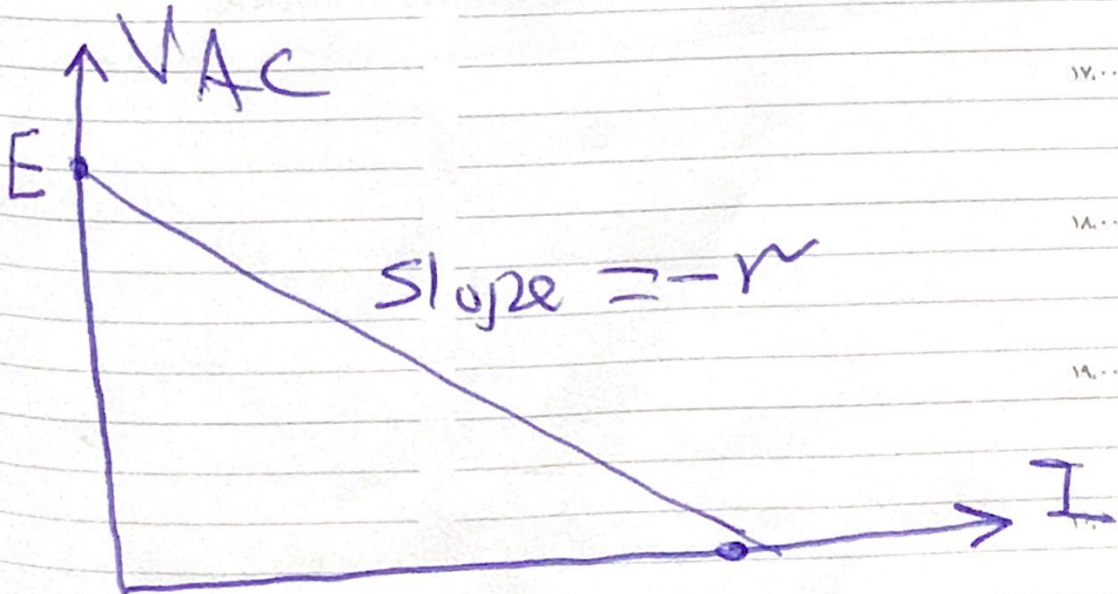
$$V_{AC} = f \cdot L_{AC}$$

$$V_{AC} = I R$$

$$V_{AC} = E_x - I r$$

$(L_{AC}, E_x, R)$  are in parallel  
 $\Rightarrow$  have the same potential difference.

if we plot  $V_{AC}$  versus  $I$



(5)

07:00

$$V_{AC} = -rI + E_x$$

08:00

when  $I=0 \Rightarrow$

09:00

$V$ -intercept is equal  $E_x$

①  $E_x = V\text{-intercept}$

②  $\text{slope} = \frac{\Delta V}{\Delta I} = -r$

12:00

$$r = -\text{slope}$$

13:00

$$E_x$$

16:00

$$E_x = 3.5 \text{ V}$$

17:00

$$r = -\text{slope}$$

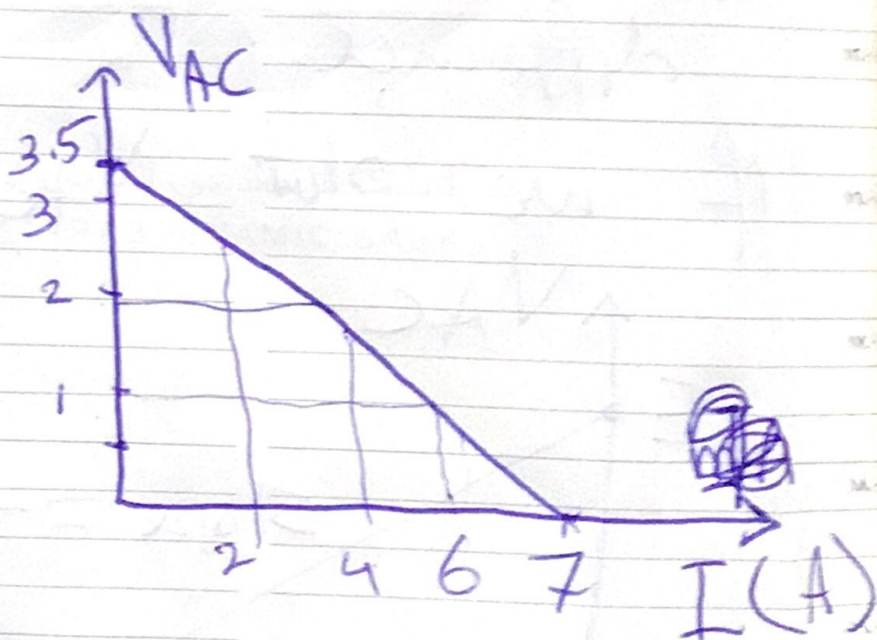
18:00

$$= -\left(\frac{2-1}{4-6}\right)$$

19:00

$$r = 0.5 \Omega$$

20:00



⑥