Part (1):

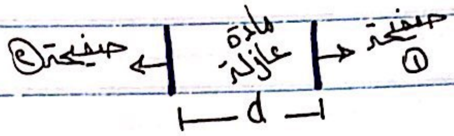
Exp (9): RC Circuit:

- What Does (RC) Means?

. R → Resistor (المقاومة)
. C → Capasitor (المواسع)

Note: at This Experiment The voltage is Direct (DC)

- Notes about Capasitor?



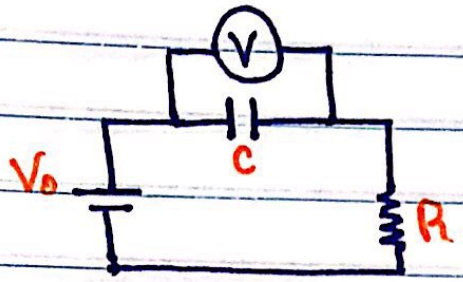
يعتمد المواسع على؟
- مساحة الصفائح
- المسافة بينهما
- معامل نفاذية للعازل.
- يشحن المواسع تدريجياً حتى يصل أعلى قيمة له عندما يصبح فرق الجهد بين طرفيه مساوياً لفرق الجهد بين طرفي البطارية. (وكذلك يُفرّغ تدريجياً).

$$\underset{\text{charge}}{Q} = \underset{\text{Capasitance}}{C}\ \underset{\text{voltage}}{V} \quad \text{—— (1)}$$

- Capasitance unit = Colum / VolT = Farad.

Part (2):

II Charging: (الخطوة الأولى): شحن المواسع:



$$q = CV_0\left(1 - e^{-t/RC}\right)$$

From equation 1 : $q = CV$ so:

$$CV = CV_0\left(1 - e^{-t/RC}\right)$$

V: voltage at anytime — V_0: Max. voltage

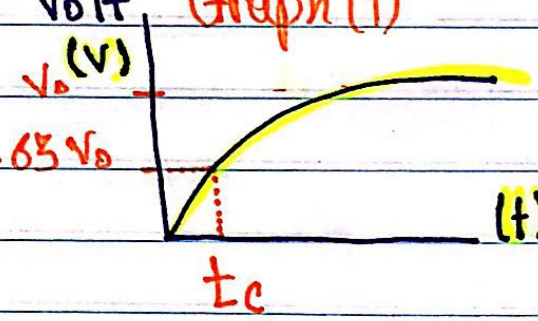
$$V = V_0\left(1 - e^{-t/RC}\right)$$

- when $(-t) = \infty$, $V = V_0$
- when $(-t) = RC$, $V = V_0\left(1 - e^{-RC/RC}\right)$, $e^{-RC/RC} \to .37$

$V = .63\ V_0$

at $t = RC = \tau$ → time constant.

Graph (1)

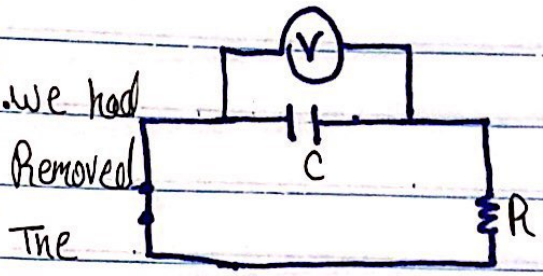


t_c = t_{charge}.

Part (3):

الخطوة الثانية: التفريغ

[2] Discharging:



.we had Removed The Voltage source

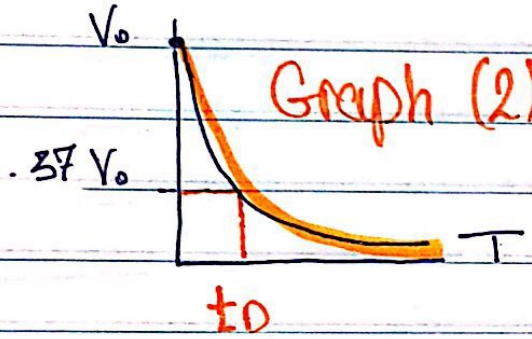
$$q = CV_0 e^{-t/RC}$$

$$CV = CV_0 e^{-t/RC}$$

$$V = V_0 e^{-t/RC}$$

at $t = RC$

$V = V_0 (.37)$



Graph (2)

$t_D = t_{Discharge}$.

Theoritically: $t_D = t_c$

Note we Draw each Graph 1 and 2 at the linear paper.

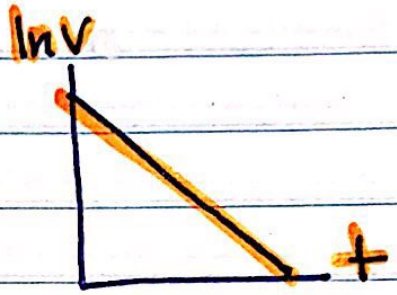
Drawing at semilog paper ?

$V = V_0 e^{-t/RC}$ (Took ln)

$\ln V = \ln V_0 + \left(\frac{-t}{RC}\right)$ $= t$-slope

$\ln V = \left(\frac{-1}{t_s}\right) t + \ln V_0$

- $\ln V$ → Y-axis
- t → X-axis
- $\frac{-1}{t_s}$ → The slope



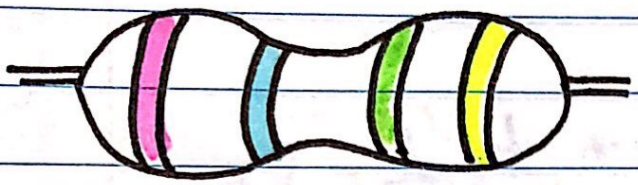
Calculations :

$$\bar{t}\ (\text{Average}) = \frac{t_1 + t_2 + t_3}{3}$$

$$\text{The unc.} = \bar{t} \mp \sigma_m$$

$$\text{The Capistor } (C) = \frac{\bar{t}}{R}$$

$$\text{unc.} = \frac{\Delta C}{C} = \frac{\Delta \bar{t}}{\bar{t}} + \frac{\Delta R}{R}$$



Band A
Band B
Band C
Band D

Theo. 8 $AB \times 10^{C} \mp (D\%) * R$

قيمة المقاومة