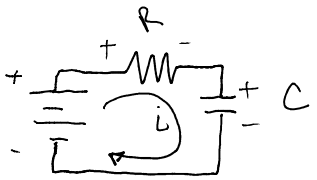
Lab 5 - Board Notes - RC Circuit

Wednesday, May 21, 2014 11:00 AM

LAB 5 - RC CIRCUIT



* CHARGE ON THE CAPACITOR

$$q_c(t) = q_0\left(1 - e^{-t/\tau}\right)$$

WHERE $\tau = RC$

q_0 IS THE MAX CHARGE ON C

SO:

IF $t=0 \rightarrow q_c = 0$

$t=\infty \rightarrow q_c \approx q_0 = CV$

VOLTAGE ACROSS CAPACITOR

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

↑ MAX VOLTAGE OF "C"

SO:

$t=0 \rightarrow V_c = 0$

$t=\infty \rightarrow V_c \approx V_0$

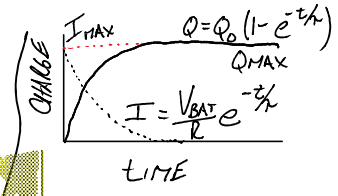
CHARGING PROCESS

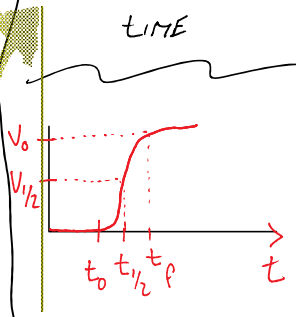
$V_{BAT} = IR + \frac{Q}{C}$ ↑ CHARGE INCREASES

↓ CURRENT DECREASES

CHARGING TIME: $t_{1/2} = RC\ln 2$

$t_{1/2} = \tau \ln 2$





EXPERIMENT

POWER AMP

- POSITIVE SQUARE WAVE

  4V @ 0.1Hz

SAMPLING OPTIONS

- AUTO STOP → 20 SEC.

GRAPH

VOLTAGE VS TIME

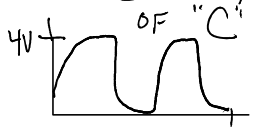
↳ DECIMALS ~ 5

MAX CHARGE: $q_0 = C_{MEAS} \times V_{INPUT}$

LAB REPORT

- COVER SHEET, QUESTIONS
- 2 PLOTS

→ FIG 1: CHARGE/DISCHARGE OF "C"



→ FIG 2: HALF-LIFE ($t_{1/2}$)