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:
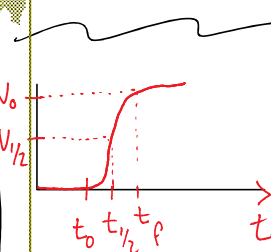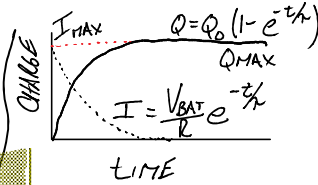 $t = 0 \rightarrow V_c = 0$
   $t = \infty \rightarrow V_c \approx V_0$

CHARGING PROCESS

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

CURRENT DECREASES

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

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

$Q = Q_0\left(1 - e^{-t/\tau}\right)$

I_{MAX} Q_{MAX}

$$I = \frac{V_{BAT}}{R} e^{-t/\tau}$$

CHARGE | TIME

V_0
$V_{1/2}$

$t_0 \; t_{1/2} \; t_f$ t

EXPERIMENT

POWER AMP

- POSITIVE SQUARE WAVE

    4V @ 0.1Hz

SAMPLING OPTIONS

- AUTO STOP → 20 SEC.

GRAPH

   VOLTAGE VS TIME
     ↳ DECIMALS ~ 5
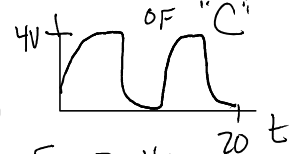
MAX CHARGE: $q_0 = C_{MEAS} \times V_{INPUT}$

LAB REPORT

- COVER SHEET, QUESTIONS
- 2 PLOTS
   → FIG 1: CHARGE/DISCHARGE OF "C"

4V

   20   t

→ FIG 2: HALF-LIFE $(t_{1/2})$

V
$2V$

$t_0 \; t_f$ t
   $\Delta = t_f - t_0$
   FROM SMART TOOL