

ES 1

$$t = 5 \text{ ANNI} = 3.15 \cdot 10^7 \text{ sec}$$

IMPULSO

$$0.40 \text{ mV} \cdot \text{sec}$$

$$f = 75 \text{ bpm}$$

$$T = 1/75/60 = 0.80 \text{ sec}$$

$$d = \frac{0.40 \text{ mV} \cdot \text{sec}}{0.80 \text{ sec}} = 0.5 \cdot 10^{-3}$$

$$V = ?$$

BATTERIA

$$V_b = 2.5 \text{ V}$$

$$E_b = 0.5 \text{ kJ}$$

$$75\% \text{ di } E_b \rightarrow \text{PRODUZIONE IMPULSI}$$

$$I_b = ?$$

OUTPUT

$$P = 10 \mu \text{ W}$$

$$R_i = 450 \Omega$$

$$0.75 \cdot V_b \cdot \overbrace{I_b}^{(A \cdot s)} = 10 \cdot 10^{-6} \cdot 3.15 \cdot 10^7 \text{ sec}$$

$$I_b = \frac{10 \cdot 10^{-6} \cdot 3.15 \cdot 10^7}{0.75 \cdot 2.5} = \frac{\sqrt{A \cdot \text{sec}}}{\sqrt{V}} = 168 \text{ A} \cdot \text{sec} = 604.800 \text{ A} \cdot \text{h}$$

$$V = \sqrt{\frac{10 \cdot 10^{-6} \cdot 450 \cdot \frac{V \cdot s}{A}}{0.5 \cdot 10^{-3} \frac{A \cdot s}{V}}} \quad R = 3 \text{ V}$$

b) Vedere appunti rel.

Esercizio 2

DIALETTATORE	PACAMETRI
E_{Na^+}	0.45
K	0.0182 cm/min
Q_D ($Q_D > Q_E$)!	2000 ml/min
V_D	2000 ml/min

	SANGUE	DIALETTANTE
N_a	165 mg/dL	-
K	50 mg/L	5 mmol/L
C_g	-	2 mmol/L

$$N_a \Rightarrow 165 \text{ mg/L} = \frac{165 \cdot 10^{-3} \text{ g}}{23 \text{ g/mol}} \cdot \frac{\text{mol}}{\text{L}} = 7.17 \frac{\text{mmol}}{\text{L}}$$

$$K \Rightarrow 50 \text{ mg/L} = \frac{50 \cdot 10^{-3} \text{ g}}{39 \text{ g/mol}} \cdot \frac{\text{mol}}{\text{L}} = 1.28 \frac{\text{mmol}}{\text{L}}$$

~~NA~~

	S	D	ANDAMENTO
N_a	7.17 mmol/L	0	$S \rightarrow D$
K	1.28 mmol/L	5 mmol/L	$D \rightarrow S$
C_g	0	2 mmol/L	$D \rightarrow S$

$$E_{Na^+} = 1 - \frac{C_{eo}}{C_{ei}} = 1 - e^{-\frac{N_T}{\beta}} = 0.45$$

$$1 - 0.45 = e^{-\frac{N_T}{\beta}} \rightarrow A = 0.41 \text{ m}^2$$

$$C_{eo} = C_{Na^+} = 3.94 \text{ mmol/L}$$

fisso

$$t_{Na} = \ln \left(\frac{3.94}{7.17} \right) \cdot \frac{2000 \text{ cm}^3}{(0.45) \cdot 125 \text{ cm}^3} \cdot \text{min} = 53.22 \text{ min}$$

Prendi questo t come riferimento

K

$$C_{K_{eq}} = 3.14 \text{ mmol/L}$$

È GENERATO ESATTO!

$$C_K|_{53.22 \text{ min}} = 1.28 \frac{\text{mmol}}{\text{L}} \cdot e^{-\frac{Q_D (1-\beta) t}{V_D}} = 1.28 \frac{\text{mmol}}{\text{L}} \cdot 1.32 = 2.33 \text{ mmol/L}$$

$$C_K|_{53.22 \text{ min}} = 2.33 \text{ mmol/L} \quad (C_K|_{53.22 \text{ min}} < C_{K_{eq}})$$

• C_a

$$C_{a,eq} = 2 \text{ mmol/L}$$

$$C_p|_{59.22} = 2 \frac{\text{mmol}}{\text{L}} \quad e^{\frac{Q_0 \cdot (P_0 - 1)}{V_0}} \quad P_0 = \frac{KA}{Q_0}$$

$$= 2 \frac{\text{mmol}}{\text{L}} \cdot 0.96$$

$$= \cancel{1.92 \frac{\text{mmol}}{\text{L}}} = 1.92 \frac{\text{mmol}}{\text{L}} \quad - 0.92$$

$$P_0 = \frac{KA}{Q_0} = \frac{0.0122 \cdot 0.41 \cdot 10^4 \frac{\text{cm}^2}{\text{cm}}}{1000 \text{ cm}^3} = 0.004992$$

$$C_p|_{59.22} = 1.92 \frac{\text{mmol}}{\text{L}} \longrightarrow C_s|_{59.22} = 0.078 \frac{\text{mmol}}{\text{L}}$$

Esercizio 3
Appunti in rete.

Soluzioni esercizio 4

Per la parte teorica, vedere il materiale didattico

$$MRT = \frac{AUMC}{AUC}$$

$$Clearance = \frac{Dose}{AUC}$$

$$AUC = \sum_i (t_i - t_{i-1}) * \frac{(C_i + C_{i-1})}{2} = 12.02$$

$$AUMC = \sum_i (t_i - t_{i-1}) * \frac{(t_i * C_i + t_{i-1} * C_{i-1})}{2} = 43.24$$

$$MRT = 3.93 \text{ min}$$

$$Clearance = 1.08 \cdot 10^{-4} \frac{\text{ml}}{\text{min}}$$