Camp elèctric: $\boxed{F = K \cdot \frac{q_1 \cdot q_2}{d^2}}$ (N) $\boxed{E_1 = K \cdot \frac{q_1}{d^2}}$ (N/C ó V/m) $\boxed{F = q_2 \cdot E_1}$ (N) $K = 9 \cdot 10^9 \frac{N \cdot m^2}{C^2}$

Potencial: $\boxed{\Delta V = V_1 - V_2 = E \cdot d}$ (V) Energia: $\boxed{U = Q \cdot V}$ (J) Potencia: $\boxed{P = \frac{\Delta U}{\Delta t} = I \cdot V = R \cdot I^2 = \frac{V^2}{R}}$ (W)

Intensitat: $\boxed{I = \frac{\Delta q}{\Delta t}}$ (A) Llei d'Ohm: $\boxed{V = R \cdot I}$ (V) T. màx. Transf. Pot.: $\boxed{R_{max} = r}$ (Ω)

Resistències en paral·lel: $\boxed{\frac{1}{R_{eq}} = \frac{1}{R_1} + \cdots + \frac{1}{R_n}}$ (Ω) $\boxed{I_{tot} = I_1 + \cdots + I_n}$ (A) $\boxed{V_{tot} = V_1 = \cdots = V_n}$ (V)

Resistències en sèrie: $\boxed{R_{eq} = R_1 + \cdots + R_n}$ (Ω) $\boxed{I_{tot} = I_1 = \cdots = I_n}$ (A) $\boxed{V_{tot} = V_1 + \cdots + V_n}$ (V)

T. Thévenin: ε_{TH} = ddp entre A i B (V) R_{TH} = curcitcuit a ε_s i calculem R_{eq} (Ω)

Condensador: $\boxed{\Delta V = E \cdot d = Q \cdot \frac{d}{\varepsilon_0 \cdot S}}$ (V) $\boxed{Q = C \cdot \Delta V}$ (C) $\boxed{U = \frac{Q^2}{2 \cdot C}}$ (J) C: F S: m^2 l,d: m

Cable: $\boxed{\Delta V = E \cdot l}$ (V) $\boxed{\frac{1}{\sigma} = \rho}$ $(\Omega \cdot m)$ $\boxed{R = \rho \cdot \frac{l}{S}}$ (Ω) $\boxed{I = \sigma \cdot E \cdot S}$ (A) σ: $\frac{S}{m}$ $\left(\frac{1}{\Omega \cdot m}\right)$

....

Càrrega C	Descàrrega C	C. temps	Energia
$q(t) = C\,\epsilon\left[1 - e^{-\frac{t}{\tau}}\right]$	$q(t) = Q_0 \cdot e^{-\frac{t}{\tau}}$	$\tau = R \cdot C$	$U_{con} = \frac{1}{2} \cdot Q \cdot V$
$i(t) = \frac{\epsilon}{R} \cdot e^{-\frac{t}{\tau}}$	$i(t) = \frac{Q_0}{R} \cdot e^{-\frac{t}{\tau}}$		$Q = C \cdot V$

Càrrega L	Descàrrega L	C.temps	Energia
$i(t) = \frac{\epsilon}{R}\left[1 - e^{-\frac{t}{\tau}}\right]$	$i(t) = I_0 \cdot e^{-\frac{t}{\tau}}$	$\tau = \frac{L}{R}$	$U_{bob} = \frac{1}{2} \cdot L \cdot i^2$

$\omega = \frac{2\pi}{T} = 2\pi f$ $\cos x = \sin\left(x + {}^{\pi}/_{2}\right)$

$V(t) = V_0 \cdot \cos(\omega t + \theta) \longrightarrow \bar{V} = V_0\underline{|\theta}$

$I(t) = I_0 \cdot \cos(\omega t + \alpha) \longrightarrow \bar{I} = I_0\underline{|\alpha}$

RLC sèrie $\longrightarrow \bar{Z} = R + j \cdot X = Z\underline{|\varphi}$ $X = X_L - X_C = L \cdot \omega - \frac{1}{C \cdot \omega}$

$\boxed{\bar{I} = \frac{\bar{V}}{\bar{Z}}} \begin{cases} I_0 = \frac{V_0}{Z} \\ \alpha = \theta - \varphi \end{cases}$ As. Imp.: $\begin{cases} \text{Sèrie: } \bar{Z}_S = \sum \bar{Z}_i \\ \text{Paral·lel: } \frac{1}{\bar{Z}_P} = \sum \frac{1}{\bar{Z}_i} \end{cases}$ P. instantània: $\boxed{p(t) = \frac{V_0 \cdot I_0}{2}[\cos(\varphi) + \cos(2\omega t + \theta + \alpha)]}$ (W)

P. mitjana: $\boxed{P_m = \frac{V_0 \cdot I_0}{2} \cos\varphi = I_e V_e \cos\varphi = I_e V_e \frac{R}{Z} = R I_e^{\,2}}$ (W) P. activa: $\boxed{P = V_e I_e \cos\varphi}$ (W) P. aparent: $\boxed{S = V_e I_e}$ (VA)

P. reactiva: $\boxed{Q = V_e I_e \sin\varphi}$ (VAR) F. pot.: $\boxed{\cos(\varphi) = \frac{R}{Z}}$ C. fact. pot.: $\boxed{X_P = -\frac{Z^2}{X}}$ (Ω) I, V eficaç: $\boxed{I_e = \frac{I_0}{\sqrt{2}}}$ (A) $\boxed{V_e = \frac{V_0}{\sqrt{2}}}$ (V)

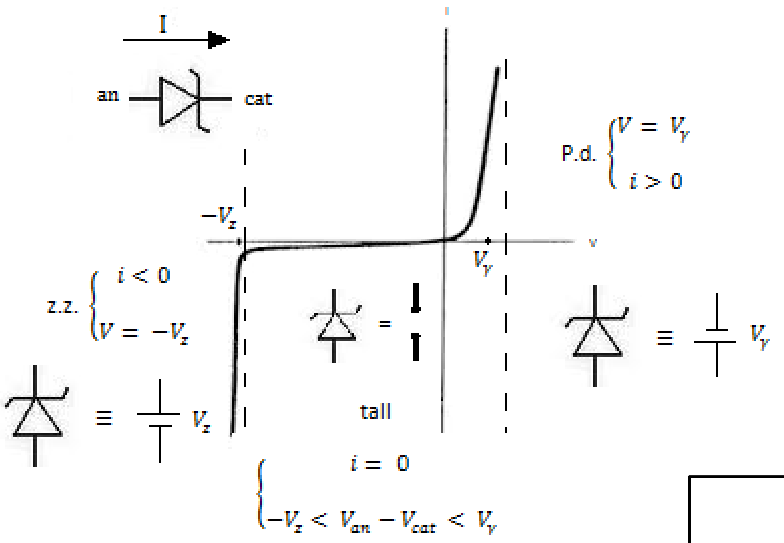
Relació de pot.: $\boxed{S^2 = P^2 + Q^2}$ Res.: $\boxed{\omega_{res} = \frac{1}{\sqrt{L \cdot C}}}$ $\left(\frac{rad}{s}\right)$ $\boxed{f_{res} = \frac{1}{2\pi\sqrt{L \cdot C}}}$ (Hz) A. banda: $\boxed{BW = \frac{1}{\tau}}$ (Hz) $\boxed{V = \frac{BW}{2}}$ $\left(\frac{bits}{s}\right)$

Funció de transferència: $T(\omega) = \frac{V_{out}(\omega)}{V_{in}(\omega)}$

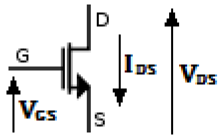
$\text{si} \begin{cases} \omega \to 0 \Rightarrow T(\omega) \to 0 \\ \omega \to \infty \Rightarrow T(\omega) \to 1 \end{cases} \Rightarrow \text{Filtre PASSA} - \text{ALTS}$

$\text{si} \begin{cases} \omega \to 0 \Rightarrow T(\omega) \to 1 \\ \omega \to \infty \Rightarrow T(\omega) \to 0 \end{cases} \Rightarrow \text{Filtre PASSA} - \text{BAIXOS}$

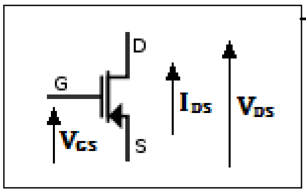
Diode Zener:



Diode nMOS:



- $V_{GS} < V_T \Rightarrow$ OFF $\boxed{I_{DS} = 0}$
- $V_{GS} > V_T \Rightarrow$ ON
  - $0 < V_{DS} < V_{GT} \Rightarrow$
    Ohm. $\boxed{I_{DS} = \beta \cdot \left(V_{GT} \cdot V_{DS} - \frac{V_{DS}^2}{2}\right)}$
  - $V_{DS} > V_{GT} \Rightarrow$
    Sat. $\boxed{I_{DS} = \frac{\beta}{2} \cdot V_{GT}^2}$



Diode pMos:

- $V_{GS} > V_T \Rightarrow$ OFF $\boxed{I_{DS} = 0}$
- $V_{GS} < V_T \Rightarrow$ ON
  - $0 > V_{DS} > V_{GT} \Rightarrow$ Ohm. $\boxed{I_{DS} = \beta \cdot \left(V_{GT} \cdot V_{DS} - \frac{V_{DS}^2}{2}\right)}$
  - $V_{DS} < V_{GT} \Rightarrow$ Sat. $\boxed{I_{DS} = \frac{\beta}{2} \cdot V_{GT}^2}$

Recta Carga $\boxed{V_{DS} + R_D I_{DS} - V_{DD} = 0}$ $\boxed{V_{GT} = V_{GS} - V_T}$

$\boxed{t_{p\,LH} = \frac{1{,}7\,C_L}{\beta_p V_{DD}}}$ $\boxed{t_{p\,HL} = \frac{1{,}7\,C_L}{\beta_n V_{DD}}}$ $\boxed{t_p = \frac{t_{p\,LH} + t_{p\,HL}}{2}}$ $\boxed{\tau = \frac{t_p}{\ln 2}}$ pot: $\boxed{p = f \cdot C_L \cdot V_{DD}^2}$(W) prod. delay – pot.: $\boxed{p \cdot t_p}$

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pos. ona: $\boxed{y(x,t) = A\sin(kx \mp \omega t + \varphi)}$ (m) $\boxed{k = \frac{2\pi}{\lambda}}\left(\frac{rad}{m}\right)$ $\boxed{T = \frac{1}{f}}$(s) v. ona: $\boxed{v(x,t) = \pm A\omega\cos(kx \pm \omega t + \varphi)}\left(\frac{m}{s}\right)$

$\boxed{\omega = \frac{2\pi}{T} = 2\pi f}\left(\frac{rad}{s}\right)$ $\boxed{v = \frac{\omega}{k} = \frac{\lambda}{T} = \lambda f}$ Camp elèctric: $\boxed{\vec{E}(x,t) = \vec{E}_0\sin(kx \mp \omega t + \varphi)}\left(\frac{V}{m}\right)$

Camp magnètic: $\boxed{\vec{B}(x,t) = \vec{B}_0\sin(kx \mp \omega t + \varphi)}$ (T) B_0 $\begin{cases} B_0 = \frac{E_0}{c} \quad \text{on } c = 3 \cdot 10^8\,\frac{m}{s} \\ \text{perp. a } \vec{E} \text{ i a sentit propagació} \\ \text{regla ma dreta} \end{cases}$ Potencia: $\boxed{\bar{P} = \bar{I} \cdot S}$ (W)

Densitat: $\boxed{\bar{u} = \frac{\varepsilon_0 \cdot E_0^2}{2} = \frac{B_0^2}{2\,\mu_0}}\left(\frac{J}{m^3}\right)$ Intensitat: $\boxed{\bar{I} = c \cdot \bar{u}}\left(\frac{W}{m^2}\right)$ $\boxed{\left.\begin{array}{l} \bar{I} = c \cdot \bar{u} \\ \bar{u} = \frac{\varepsilon_0 \cdot E_0^2}{2} \end{array}\right\} E_0 = \sqrt{\frac{2 \cdot \bar{I}}{c \cdot \varepsilon_0}}}$ $\varepsilon_0 = 8{,}85 \cdot 10^{-12}$ F/m, $\mu_0 = 4\pi \cdot 10^{-7}$ Tm/A

$\boxed{P(r_1) = P(r_2)}$(W) $\boxed{E_2 = E_1\frac{r_1}{r_2}}$ $\boxed{S_{esf} = 4\pi r^2}(m^2)$ $\boxed{E_{ef} = \frac{E_0}{\sqrt{2}}}\left(\frac{V}{m}\right)$ $\boxed{B_{ef} = \frac{B_0}{\sqrt{2}}}(T)$ $\boxed{\frac{I_2}{I_1} = \frac{r_1^2}{r_2^2}}$

$\boxed{E = h \cdot f}(J), h = 6{,}6 \cdot 10^{-34}\,\frac{J}{s}$ Ll. Pol.: $\boxed{I_s = I_e \cdot \cos^2\theta}$ Ll. Nat.: $\boxed{I_s = \frac{I_e}{2}}$ reflexió: $\boxed{\theta_i = \theta_r}$

Refracció: $\boxed{v_i = \frac{c}{n_i}}$ $\boxed{n_1 \cdot \sin\theta_1 = n_2 \cdot \sin\theta_2}$ $\boxed{\lambda_i = \frac{\lambda}{n_i}}$ freq. no varia a. crític: $\boxed{\theta_c = \sin^{-1}\left(\frac{n_2}{n_1}\right)}$

Interf. d'ones: $\boxed{y = y_1 + y_2 = 2A\cos\left[k\frac{x_1 - x_2}{2} + \frac{\varphi_1 - \varphi_2}{2}\right] \cdot \sin\left[k\frac{x_1 + x_2}{2} - \omega t + \frac{\varphi_1 + \varphi_2}{2}\right]}$ (m)

A_{total}: $2A\cos\left[k\frac{x_1 - x_2}{2} + \frac{\varphi_1 - \varphi_2}{2}\right]$ $\begin{cases} \text{si } \cos[-] = 1 \Rightarrow 2A \text{ int. constructiva} \\ \text{si } \cos[-] = 0 \Rightarrow 0 \text{ int. destructiva} \end{cases}$

Constructiva: $x_1 - x_2 = n\lambda$

Destructiva: $x_1 - x_2 = (2n+1)\frac{\lambda}{2}$