

FORMÚLA	FORMÚLUTEXTI		
$I = \frac{Q}{t}$	Straumur / rafhleðsla	$\epsilon_r = \frac{\epsilon}{\epsilon_0}$	Hlutfallslegur rafsvörunarstuðull
$U = R \cdot I$	Lögmál Ohms	$C = \epsilon \cdot \frac{A}{l}$	Rýmd þéttis
$R = R_1 + R_2 + R_3 + \dots$	Raðtenging mótstaðna	$Q = C \cdot U$	Rafhleðsla
$U = U_1 + U_2 + U_3 + \dots$	2. lögmál Kirchhoffs (hlutspennur)	$\tau = R \cdot C$	Tímastuðull, RC – liður
$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$	Hliðtenging mótstaðna	$C = C_1 + C_2 + C_3 + \dots$	Hliðtenging þétta
$R = \frac{R_1 \cdot R_2}{R_1 + R_2}$	Hliðtenging mótstaðna	$Q = Q_{C1} + Q_{C2} + Q_{C3} + \dots$	Hleðsla þétta í hliðtengingu
$I = I_1 + I_2 + I_3 + \dots$	1. lögmál Kirchhoffs (greinistraumar)	$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots$	Raðtenging þétta
$R_x = \frac{R_3 \cdot R_2}{R_4}$	Mælibrú Wheatstones	$Q = Q_{C1} = Q_{C2} = Q_{C3} = \dots$	Hleðsla þétta í raðtengingu
$R_l = \frac{\rho \cdot l}{A}$	Viðnám leiðara	$F = B \cdot I \cdot l$	Kraftur á straumfara leiðara í segulsviði
$U_l = I \cdot \frac{\rho \cdot l}{A}$	Spennufall í leiðara	$F_m = I \cdot N$	Ampervafningatala / segulspenna / fseglun
$R_2 = R_1 + R_1 \cdot \alpha (t_2 - t_1)$	Viðnámsbreyting vegna hitabreytinga	$H = \frac{I \cdot N}{l}$	Segulsviðsstyrkur
$G = \frac{1}{R}$	Rafleiðni	$\mu_r = \frac{\mu}{\mu_0}$	Hlutfallsleg segulleiðni
$\gamma = \frac{1}{\rho}$	Eðlisleiðni	$B = \mu \cdot \frac{I \cdot N}{l}$	Segulflæðiþéttleiki / segulþykki
$I_k = \frac{E}{R_k}$	Skammhlaupsstraumur spennugjafa	$R_m = \frac{l}{\mu \cdot A}$	Segulviðnám
$E = U_p + U_i$	2. lögmál Ohms (spenna, klemmuspenna, innra viðnám)	$e = B \cdot l \cdot v$	Spönuð spenna
$U_i = I \cdot R_i$	Innra spennufall spennugjafa	$L = \mu \frac{N^2 \cdot A}{l}$	Spanstuðull
$U_p = E - I \cdot R_i$	Skautspenna spennugjafa (klemmuspenna)	$L = L_1 + L_2 + L_3 + \dots$	Spanstuðull raðtengdra spóla
$E = E_1 + E_2 + E_3 + \dots$	Raðtenging spennugjafa	$\frac{1}{L} = \frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3} + \dots$	Spanstuðull hliðtengdra spóla
$R_i = R_{i1} + R_{i2} + R_{i3} + \dots$	Innra viðnám raðtengdra spennugjafa	$\tau = \frac{L}{R}$	Tímastuðull RL – liðs
$E = E_a$	Hliðtenging spennugjafa	$f = \frac{1}{T}$	Tíðni
$R_i = \frac{R_{in}}{n}$	Innra viðnám hliðtengdra spennugjafa	$T = \frac{1}{f}$	Riðtími / umferðartími
$W = U \cdot I \cdot t$	Orkulögmálið, lögmál Joules	$\lambda = v \cdot T$	Bylgjulengd
$P = \frac{W}{t}$	Rafafi	$U_{med} = 0,637 \cdot U_i$	Reiknað meðalgildi (hálf sínuskúrfa)
$P = U \cdot I$	Afl-lögmálið	$\omega = 2\pi \cdot f$	Horntíðni
$R_y = R_i$	Afl-aðlögun	$S_2 \approx S_1$	Sýndarafli
$\eta = \frac{P_2}{P_1}$	Nýtni	$U_2 = U_1 \frac{N_2}{N_1}$	Spenna
$W = c \cdot m (t_2 - t_1)$	Varmaorka	$I_2 = I_1 \frac{N_1}{N_2}$	Straumur
$J = \frac{I}{A}$	Straumþéttleiki		
$Q_J = \sqrt{S}$	Kjarnaflatarmál [cm <sup>2</sup> ], [VA]		
$N_p = \frac{U_p}{4,44 \cdot B \cdot A \cdot f}$	Vindingafjöldi [V], [Wb], [m <sup>2</sup> ], [Hz]		

Athugið: Hæfilegt er að hafa  $B = 1,2 \text{ Wb}$   
og að  $1 \text{ m}^2 = 10.000 \text{ cm}^2$

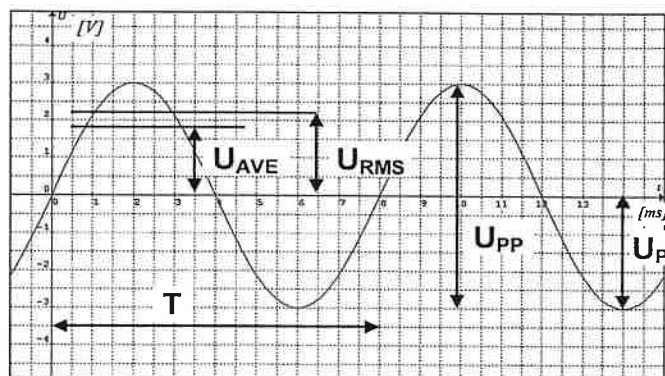
$i = I_1 \cdot \sin \omega t$	Augnabliksgildi riðstraums
$u = U_1 \cdot \sin \omega t$	Augnabliksgildi riðspennu
$U = \frac{U_1}{\sqrt{2}}$	Virtk gildi riðspennu
$I = \frac{I_1}{\sqrt{2}}$	Virtk gildi riðstraums
$P = U \cdot I$	Virtk afl (meðalgildi)
$X = 2\pi \cdot f \cdot L$	Spanviðnám
$Z = \frac{U}{I}$	Samviðnám / sýndarviðnám
$U = Z \cdot I$	Lögmál Ohms fyrir riðstraum
$X_C = \frac{1}{2\pi \cdot f \cdot C}$	Rýmdarviðnám
$Q = U \cdot I \cdot \sin \varphi$	Launafl
$P = U \cdot I \cdot \cos \varphi$	Raunafl
$S = U \cdot I$	Sýndarafl
$\eta = \frac{P_2}{P_1}$	Nýtni
$f_b = \frac{1}{2\pi RC}$	Marktíðni
$f = \frac{1}{2\pi \sqrt{L \cdot C}}$	Eigintíðni

Rafsvörun lofttæmis:  $\epsilon_0 = 8,854 \times 10^{-12}$  F/m  
 Segulleiðni lofttæmis:  $\mu_0 = 1,256 \times 10^{-6}$  H/m  
 Ljóshraði í lofttæmi:  $c = 299.792.458$  m/s  
 Notað má  $c = 3 \times 10^8$  m/s (alveg nægilega nákvæmt)

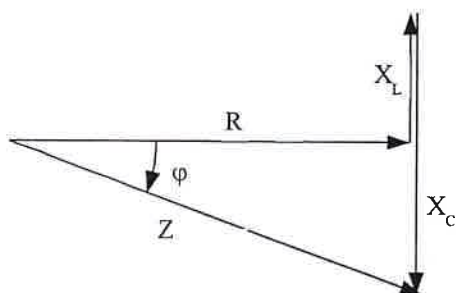
Segulleiðni, rafsvörun og ljósraði tengjast þannig:

$$c = \frac{1}{\sqrt{\mu_0 \cdot \epsilon_0}}$$

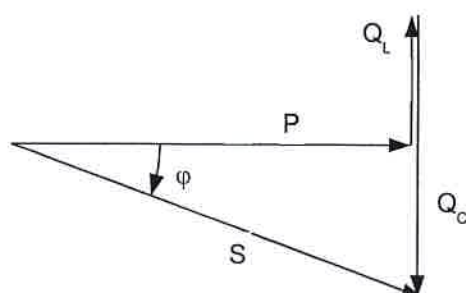
$U_{\max} = U_P = U_T$  (þrjú nöfn á sömu spennu)  
 $U_{\text{eff}} = U_{\text{rms}} = U_{\text{virk}}$  (þrjú nöfn á sömu spennu)  
 $U_{\text{ave}} = U_{\text{avg}} = U_{\text{með}}$  (þrjú nöfn á sömu spennu)  
 $U_{PP} = 2 \times U_P = 2 \times U_{\max}$   
 $U_{\max} = U_{PP}/2 = 1,414 \times U_{\text{eff}} = \sqrt{2} \times U_{\text{eff}} = 1,57 \times U_{\text{með}}$   
 $U_{\text{eff}} = U_{\max}/\sqrt{2} = 0,707 \times U_{\max} = 1,11 \times U_{\text{með}}$   
 $U_{\text{með}} = 2 \times U_{\max}/\pi = 0,637 \times U_{\max} = 0,90 \times U_{\text{eff}}$   
 Bylgjutími (lotutími) = T tíðni =  $f = 1/T$



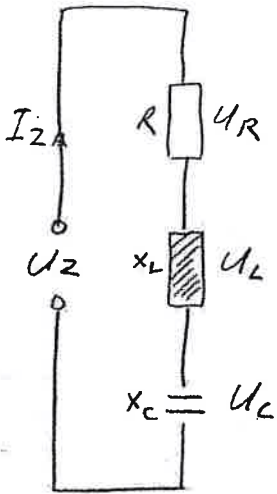
$Z = U/I$	$Z = \sqrt{R^2 + X^2}$	(samviðnám)
$R = Z \cdot \cos \varphi$	$R = \sqrt{Z^2 - X^2}$	(raunviðnám)
$X = Z \cdot \sin \varphi$	$X = \sqrt{Z^2 - R^2}$	(launviðnám)
$Z = \sqrt{R^2 + (X_L - X_C)^2}$		(samviðnám) (sýndarviðnám)
$R = \sqrt{Z^2 - (X_L - X_C)^2}$		(raunviðnám)
$X = \sqrt{Z^2 - R^2}$		(launviðnám)
$X = X_L - X_C$		(launviðnám, spanviðnám, rýmdarviðnám)



$S = U \cdot I$	$S = \sqrt{P^2 + Q^2}$	(sýndarafl) [VA]
$P = S \cdot \cos \varphi$	$P = \sqrt{S^2 - Q^2}$	(raunafl) [W]
$Q = S \cdot \sin \varphi$	$Q = \sqrt{S^2 - P^2}$	(launafl) [VAr]
$S = \sqrt{P^2 + (Q_L - Q_C)^2}$		(sýndarafl)
$P = \sqrt{S^2 - (Q_L - Q_C)^2}$		(raunafl)
$Q = \sqrt{S^2 - P^2}$		(launafl)
$Q = Q_L - Q_C$		(launafl, span-launafl, rýmdar-launafl)



Raunviðnám + spóla + þéttir  
Rottenging.



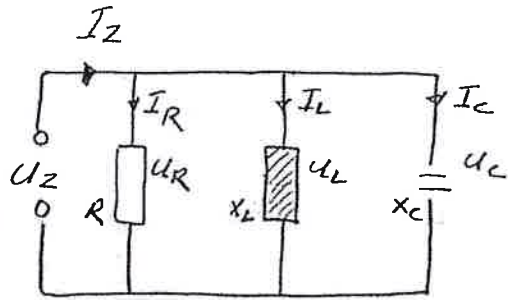
$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$U_2 = \sqrt{U_R^2 + (U_L - U_C)^2}$$

$$P = U \cdot I \cdot \cos \varphi$$

$$\cos \varphi = \frac{U_R}{U_2}$$

Raunviðnám + spóla + þéttir  
Hliðtenging.

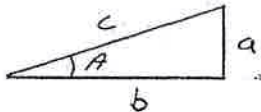


$$I_2 = \sqrt{I_R^2 + (I_C - I_L)^2}$$

$$Z = \frac{U_2}{I_2}$$

$$\cos \varphi = \frac{I_R}{I_2}$$

$$P = U \cdot I \cdot \cos \varphi$$



$$\sin A = \frac{a}{c}$$

$$\cos A = \frac{b}{c}$$

$$\tan A = \frac{a}{b}$$

$$c^2 = a^2 + b^2$$

Viruverleiki á forvati

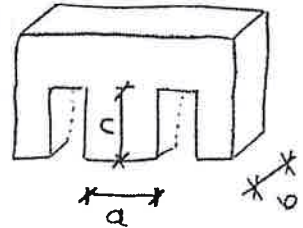
$$A = \frac{I}{J}$$

A = þverfláttarmál  
J = ströum þéttleiki

Spennar:

Ströumur á forvati:

$$I = \frac{S}{U}$$



All sem hægt er að yfirtæna

$$S = \text{ýndarall}$$

$$V_K = a \cdot b \cdot c$$

$$dW = \frac{a}{\lambda}$$

$$S = \frac{V_K \cdot dW}{0,8}$$

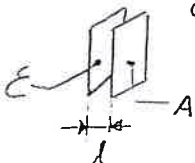
Taplaus spennir:

$$\frac{U_1}{U_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$$

$$E = E_0 \cdot E_r$$

E<sub>0</sub> = ratsvari loftlæmis

E<sub>r</sub> = ratsvari efnis



l = fjarlægð milli plötanna

A = fláttarmál plötanna

$$C = \frac{E_r \cdot E_0 \cdot A}{l}$$

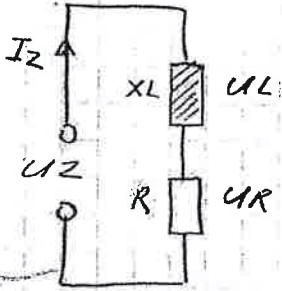
Spóla + raunviðnáðm  
Röðtenging

$$U_Z = \sqrt{U_R^2 + U_L^2}$$

$$Z = \sqrt{R^2 + X_L^2}$$

$$I_Z = \frac{U_Z}{Z}$$

$$\cos \varphi = \frac{U_R}{U_Z}$$



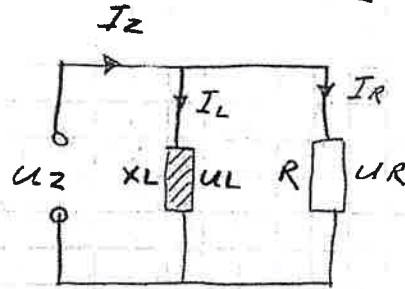
Spóla + raunviðnáðm  
Hliðtenging

$$I_Z = \sqrt{I_R^2 + I_L^2}$$

$$Z = \frac{U_Z}{I_Z}$$

$$I_R = \frac{U_R}{R} \quad I_L = \frac{U_L}{X_L}$$

$$\cos \varphi = \frac{I_R}{I_Z}$$



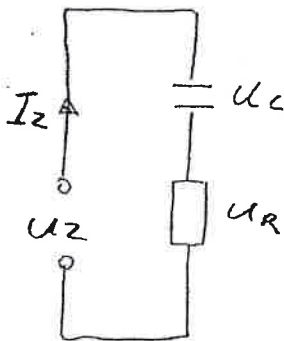
Þéttir + raunviðnáðm  
Röðtenging

$$Z = \sqrt{R^2 + X_C^2}$$

$$I_Z = \frac{U_Z}{Z}$$

$$U_Z = \sqrt{U_R^2 + U_C^2}$$

$$\cos \varphi = \frac{U_R}{U_Z}$$



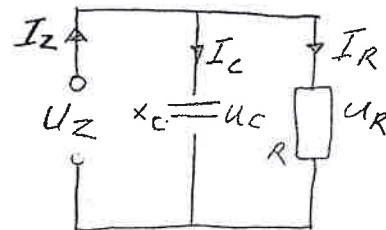
Þéttir - raunviðnáðm  
Hliðtenging

$$I_Z = \sqrt{I_R^2 + I_C^2}$$

$$Z = \frac{U_Z}{I_Z}$$

$$I_R = \frac{U_R}{R} \quad I_C = \frac{U_C}{X_C}$$

$$\cos \varphi = \frac{I_R}{I_Z}$$



Viðnáðm:

$$X_C = \frac{1}{2 \cdot \pi \cdot f \cdot C}$$

$$X_L = 2 \cdot \pi \cdot f \cdot L$$

$X_C$  = Launviðnáðm þéttis  
 $X_L$  = Launviðnáðm spólu  
 $R$  = Raunviðnáðm

Eigintíðni:

Eigintíðni er þegar  $X_L = X_C$

$$f = \sqrt{\frac{1}{4 \cdot \pi^2 \cdot L \cdot C}}$$