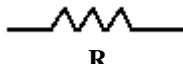
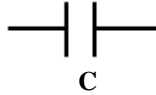



DO NOT WRITE ON THIS SHEET

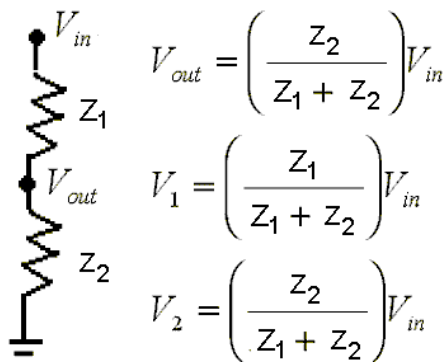
RETURN SHEET AFTER QUIZ

components	Resistors	Capacitors	Inductors
symbol	 R	 C	 L
general equation	$V_R = I_R R$	$I_C = C \frac{dV_C}{dt}$	$V_L = L \frac{dI_L}{dt}$
combining in series	$R_T = R_1 + R_2 + \dots + R_n$	$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \dots + \frac{1}{C_n}$	$L_T = L_1 + L_2 + \dots + L_n$
combining in parallel	$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$	$C_T = C_1 + C_2 + \dots + C_n$	$\frac{1}{L_T} = \frac{1}{L_1} + \frac{1}{L_2} + \dots + \frac{1}{L_n}$
impedance	$Z_R = R$	$Z_C = \frac{1}{j\omega C} \sim \frac{1}{f}$	$Z_L = j\omega L \sim f$
frequency $\rightarrow 0$	R	open circuit	short circuit
frequency $\rightarrow \infty$	R	short circuit	open circuit
Stored Energy		$W_C = \frac{1}{2} CV^2$	$W_L = \frac{1}{2} LI^2$

Laws and Rules

Ohm's Law	$V = IR$	
Kirchoff's Voltage Law	Sum of voltages in a loop is zero.	
Kirchoff's Current Law	Sum of currents entering junction equals the sum of currents leaving junction.	
Reading Resistors	XYZ = XY x 10 ^Z ohms	black-brown-R-O-Y-G-B-V-grey-white 0 1 2 3 4 5 6 7 8 9
Reading Capacitors	XYZ = XY x 10 ^Z picofarads = XY x 10 ^(Z-6) microfarads	
suffixes	k (10 ³) M _{eg} (10 ⁶) G(10 ⁹) T(10 ¹²)	m(10 ⁻³) μ(10 ⁻⁶) n(10 ⁻⁹) p(10 ⁻¹²)
	<u>parallel combination shortcut</u> $R_{12} = \frac{R_1 R_2}{R_1 + R_2}$	<u>Power Equation</u> $P = VI = I^2 R = \frac{V^2}{R}$

Voltage Dividers



Sine Waves

$$v(t) = A \sin(\omega t + \phi) + V_{DC}$$

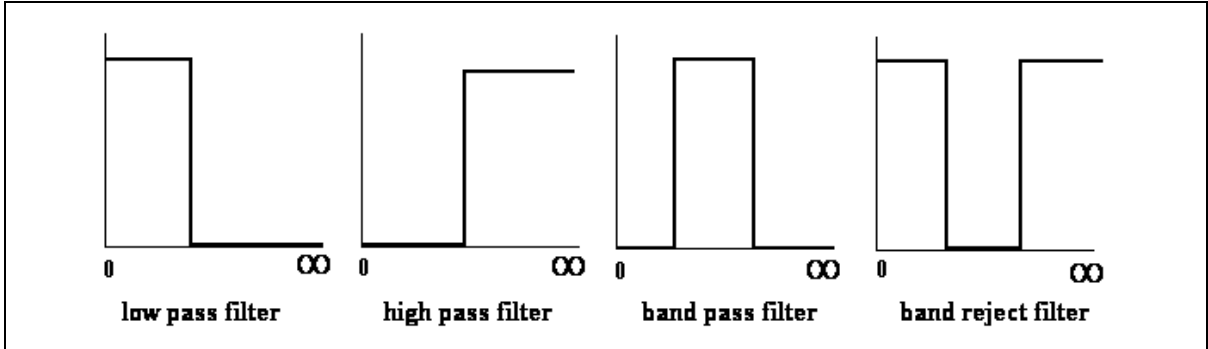
$$\omega = 2\pi f \quad f = \frac{1}{T}$$

$$\phi = -\omega t_0 = -2\pi \frac{t_0}{T}$$

$$V_{p-p} = 2A \quad V_{rms} = \frac{A}{\sqrt{2}}$$

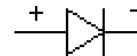
Filters (Characteristic Frequency & Time Constant)

RC Circuit (corner)	RL Circuit (corner)	RLC Circuit (resonant)
$\omega_c = \frac{1}{\tau} = \frac{1}{RC}; f_c = \frac{1}{2\pi RC}$	$\omega_c = \frac{1}{\tau} = \frac{R}{L}; f_c = \frac{R}{2\pi L}$	$\omega_0 = \frac{1}{\sqrt{LC}}; f_c = \frac{1}{2\pi\sqrt{LC}}$

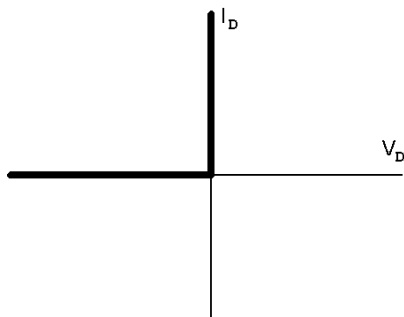


Diodes

1N914 silicon diode: $V_{on} = 0.7$ Volts

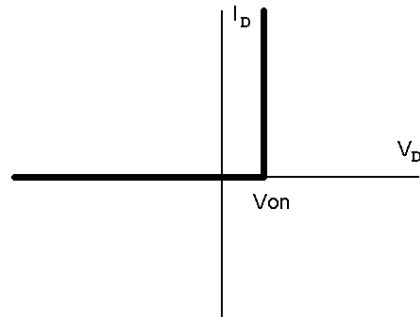


Ideal Diode



$$\begin{cases} On: & V_D = 0 & I_D > 0 \\ Off: & V_D < 0 & I_D = 0 \end{cases}$$

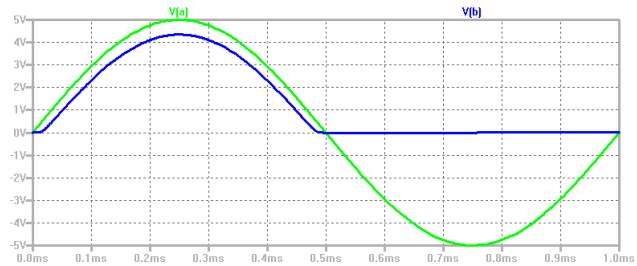
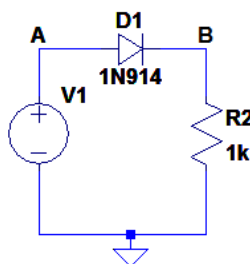
V_{on} Model



$$\begin{cases} On: & V_D = V_{on} & I_D > 0 \\ Off: & V_D < V_{on} & I_D = 0 \end{cases}$$

Diode Circuits

Half-Wave Rectifier



Full-Wave Rectifier

