Power System Components

① R, L, C elements

② Transformers

③ Solid State Switches:

Ideal Switch?

ON: R_{ON}, V_{ON}?

Max I_{ON}? through Sw

Real switch values?

Off: R_{off}, I_{off}

Max V_{off} across Sw

Switch Time: Ideal $\Delta t = 0$

Δt(off-on) $\neq$ Δt(on-off)

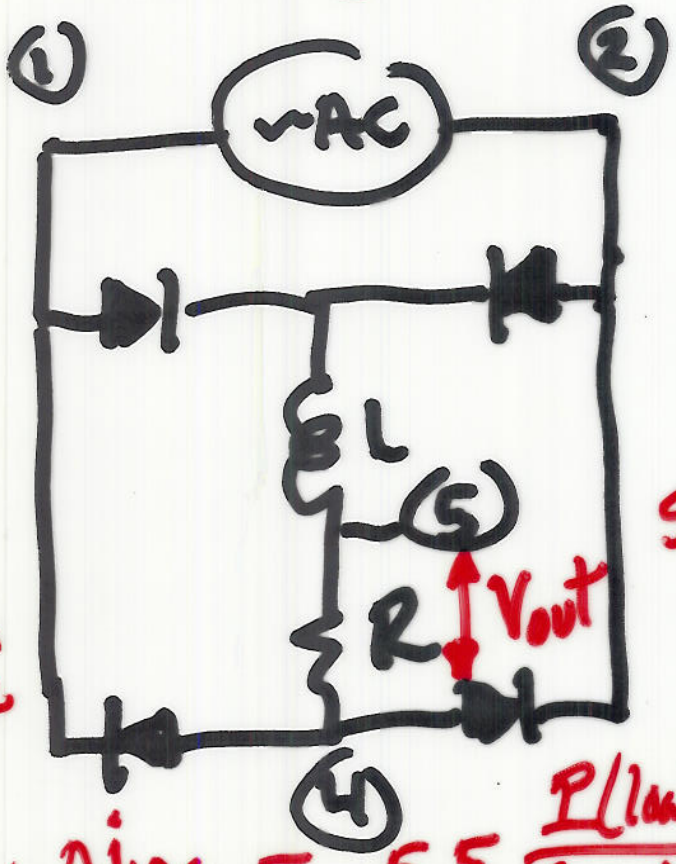
Why?

Stored charge — diodes bipolar

Parasitic C and L

↑ How? eg trans. line — Transformer

Change to L-R load



L-R load

L acts for:

1. i limiter if R is shorted
   Short Ckt Protect
2. Keeps rectified i a D-wave
   Limits ripple i

EQ 21.2

? $\frac{\Delta i_{AC}}{I_{DC}} \equiv 5.5 \frac{P(\text{load})}{f\, W_L(\text{stored})}$ Ex Cr. derive ?

If "L" achieves V-sec balance over an ac cycle next

then $V_L(DC) = ?$ $\Rightarrow V_{DC} = ?$

We will see that

$E_{DC}\left(\text{out across } \frac{}{R}\right) \approx 0.9\, E_{rms}$

for a full wave rectifier

PROPERTIES OF SOME TYPICAL DIODES

Relative power	I_0 [A]	E_0 [V]	I_{cr} [A]	E_2 [V]	I_2 [mA]	T_J[°C]
low	1	0.8	30	1000	0.05	175
medium	12	0.6	240	1000	0.6	200
high	100	0.6	1 600	1000	4.5	200
very high	1000 KA	1.1	10 000	2000	50	200

I_0 – average dc current
E_0 – voltage drop corresponding to I_0
I_{cr} – peak value of surge current for one cycle
E_2 – peak inverse voltage
I_2 – reverse leakage current corresponding to E_2
T_J – maximum junction temperature (inside the diode)
d – diameter
l – length

T_{MAX}