Wednesday, January 30, 2013
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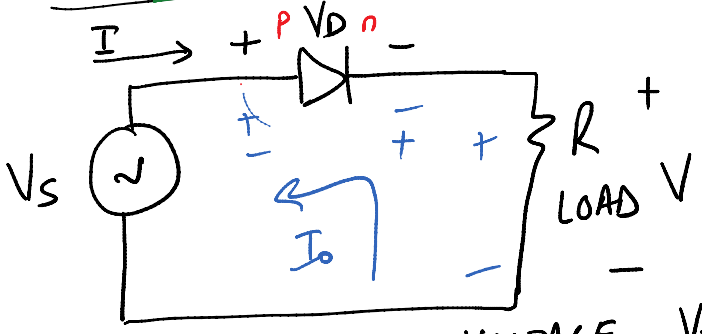
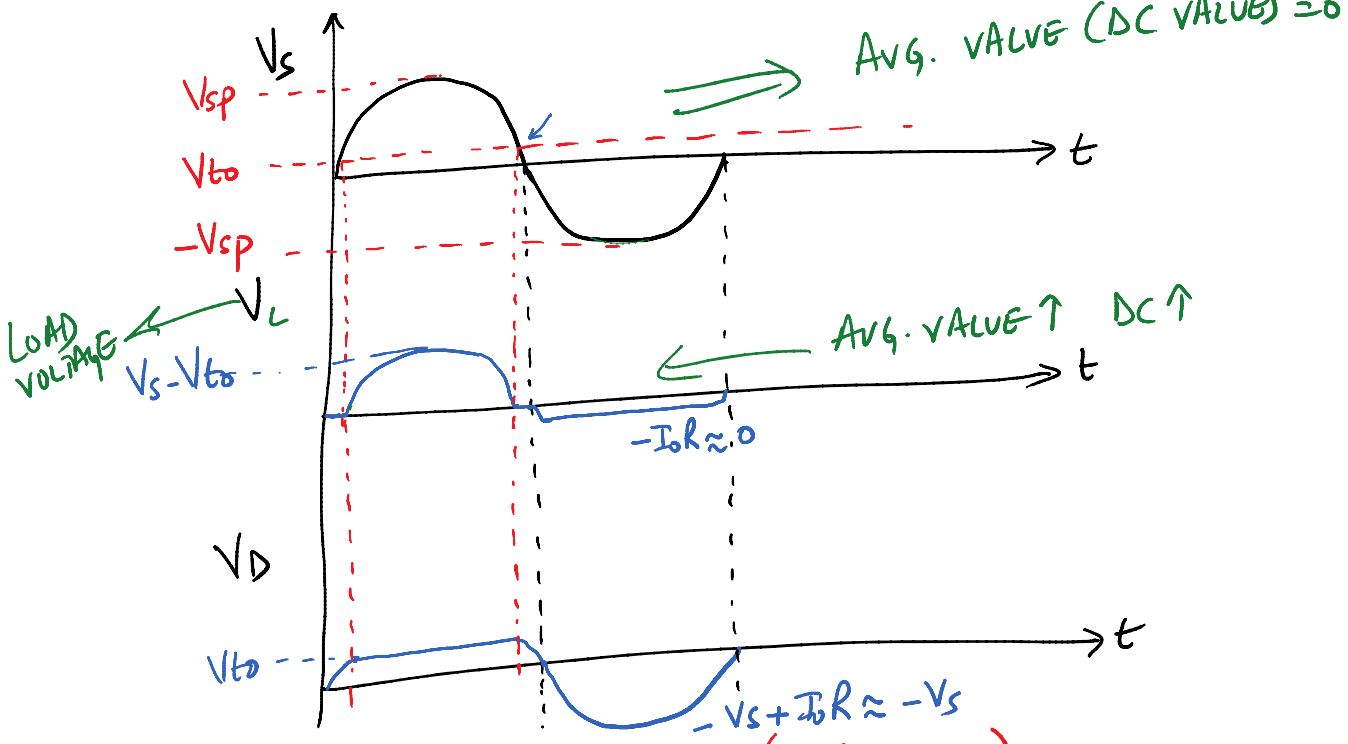
LECTURE - 20

RECTIFIER CIRCUITS → CONVERT AC TO DC

HALF WAVE RECTIFIER (HWR)



* TURN ON VOLTAGE V_{to}
* REVERSE SATURATION CURRENT I_o



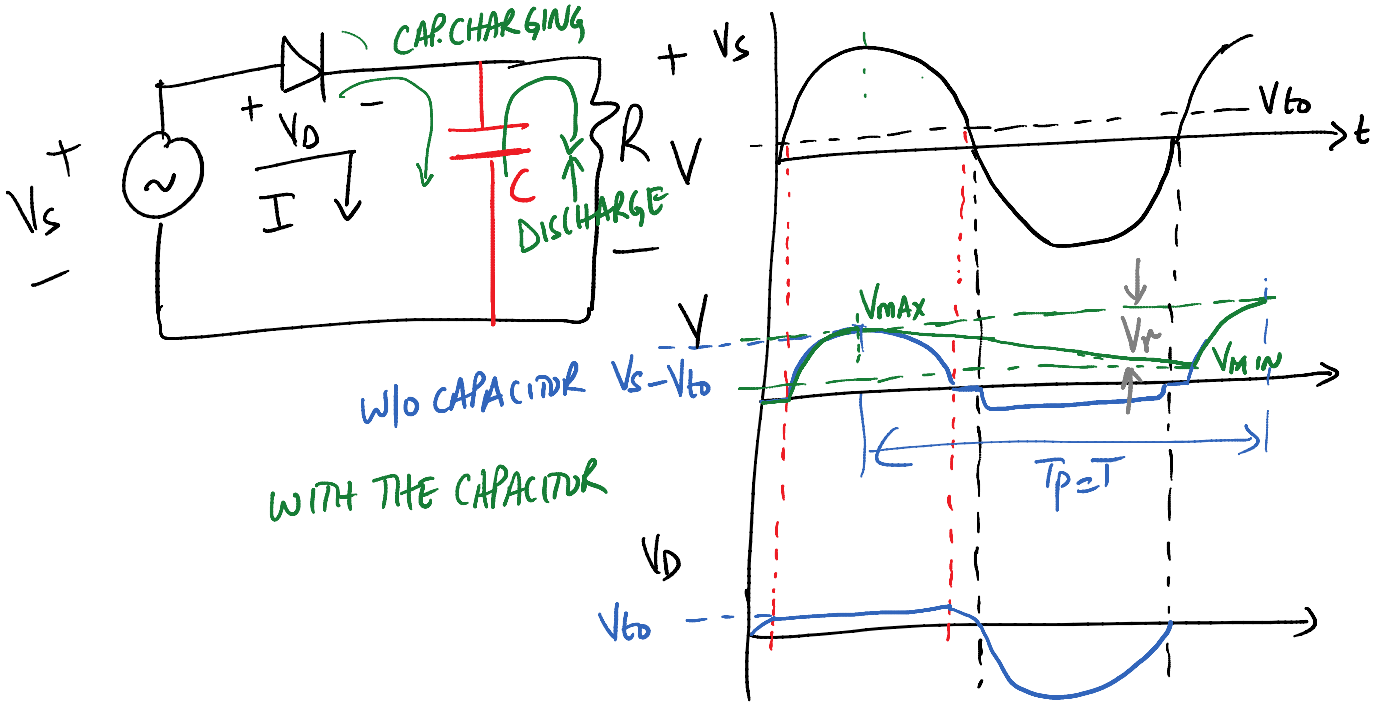
* FB → DIODE CONDUCTS (TURNS-ON) WHEN

$V_s > V_{to}$

GOAL → DC VOLTAGE → f = 0


GOAL→
↳ f=0

HALF WAVE RECTIFIER WITH FILTER



C → CAPACITOR IS THE FILTER CIRCUIT

CHARGING AND DISCHARGING OF CAPACITOR EFFECTIVELY INCREASES THE DC VALUE OF LOAD VOLTAGE

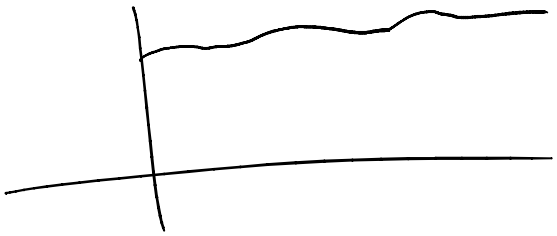
DC VALUE = AVERAGE VALUE

DISCHARGE RATE DEPENDS UPON RC TIME CONSTANT

$\tau = RC$

DESIGN ← V_r → RIPPLE VOLTAGE $= V_{MAX} - V_{MIN}$

← GOAL → $V_r \downarrow\downarrow$



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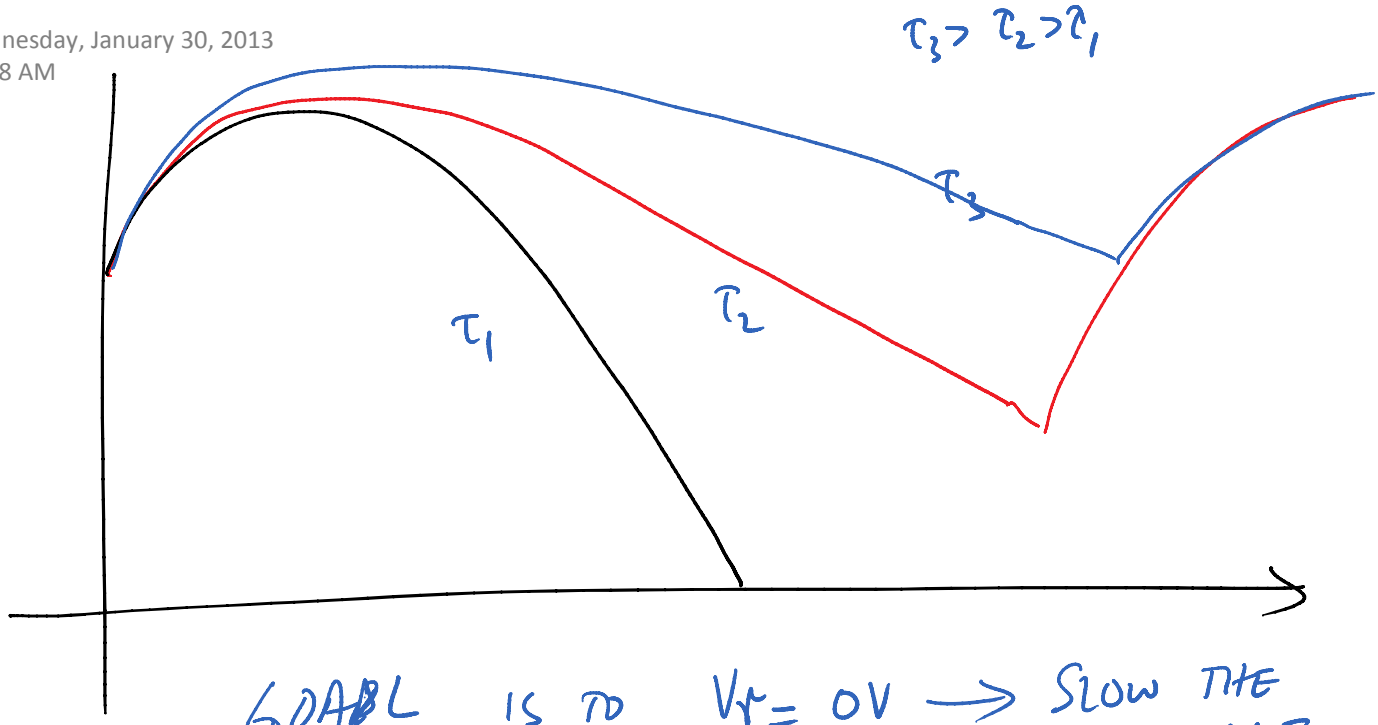

GOAL IS TO $V_r = 0V$ → SLOW THE DISCHARGE OR INCREASE τ

$$V_r = V_M \left(\frac{T_p}{RC}\right)$$

V_M = MAXIMUM OUTPUT VOLTAGE

T_p → HWR $T_p = T$

FWR $T_p = \frac{T}{2}$

T_p ⇒ TIME BETWEEN PEAKS OF OUTPUT VOLTAGE

T ⇒ TIME PERIOD

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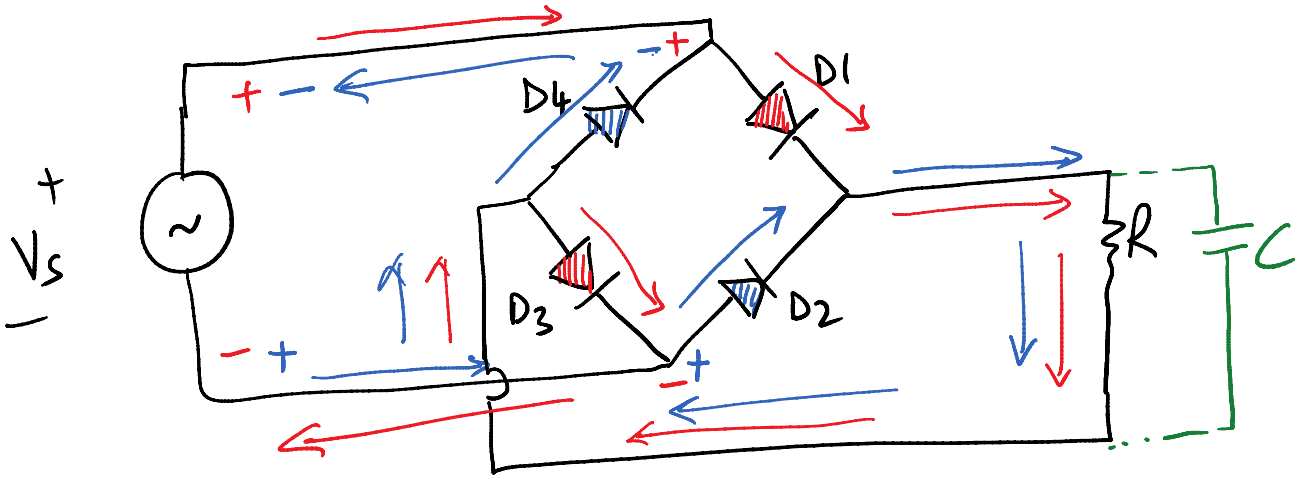
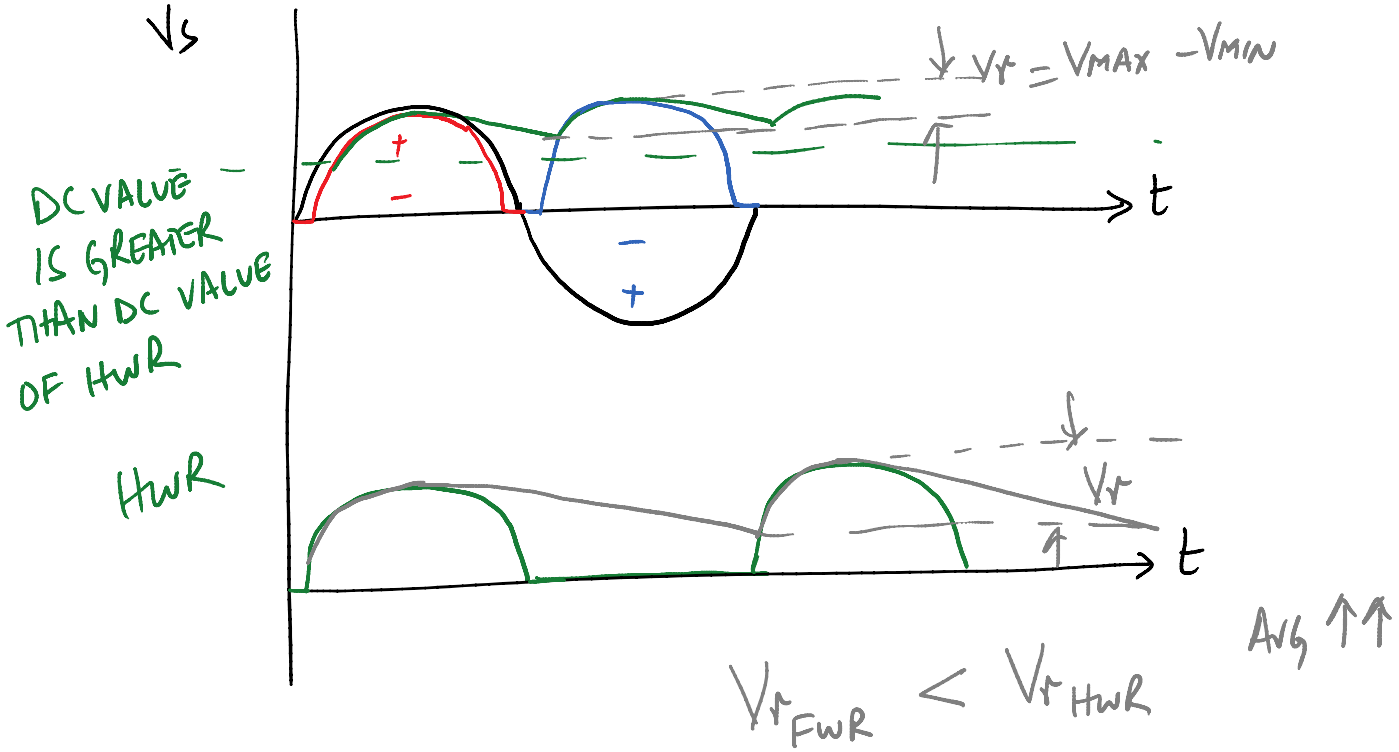
FWR → FULL WAVE BRIDGE RECTIFIER





$V_{r_{FWR}} < V_{r_{HWR}}$

RIPPLE VOLTAGE FOR FWR IS LESS THAN RIPPLE VOLTAGE FOR HWR