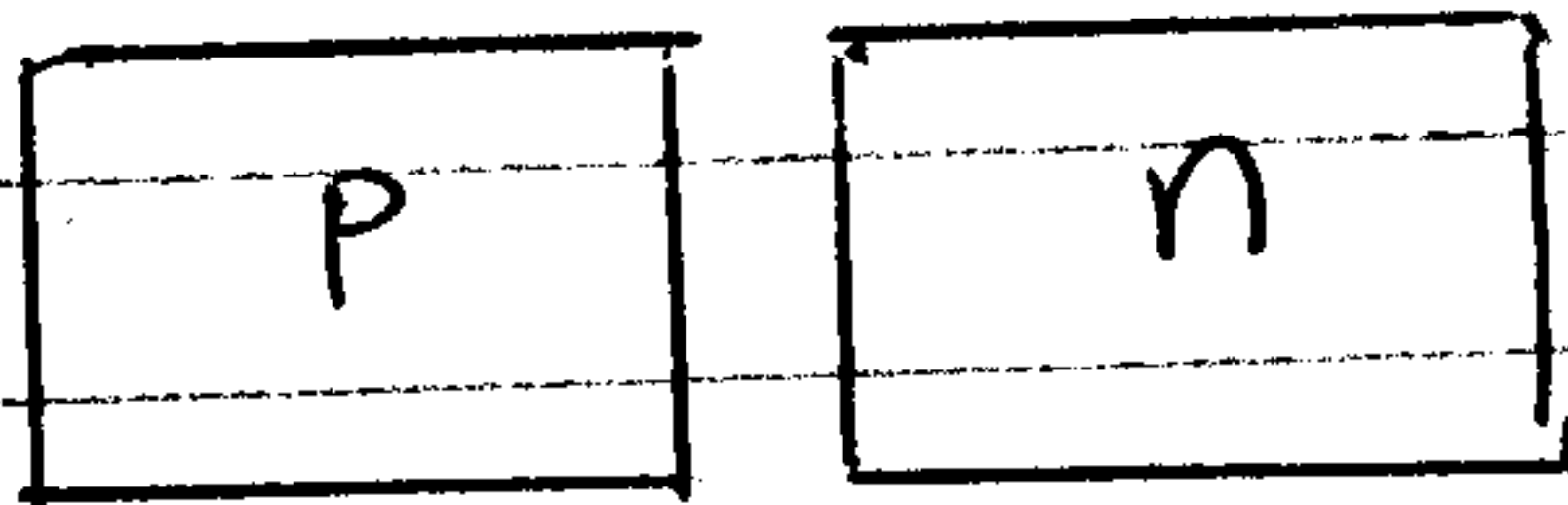


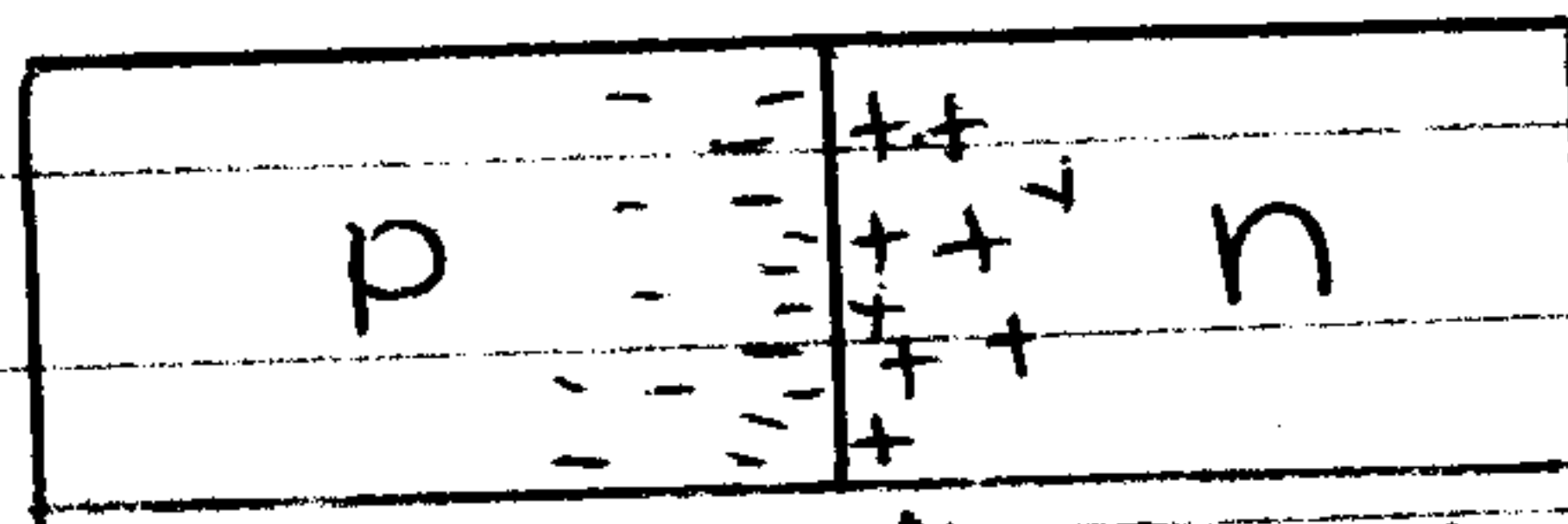
P-N JUNCTIONS

Formed by fabrication of a p-doped region in contact with n-doped region:

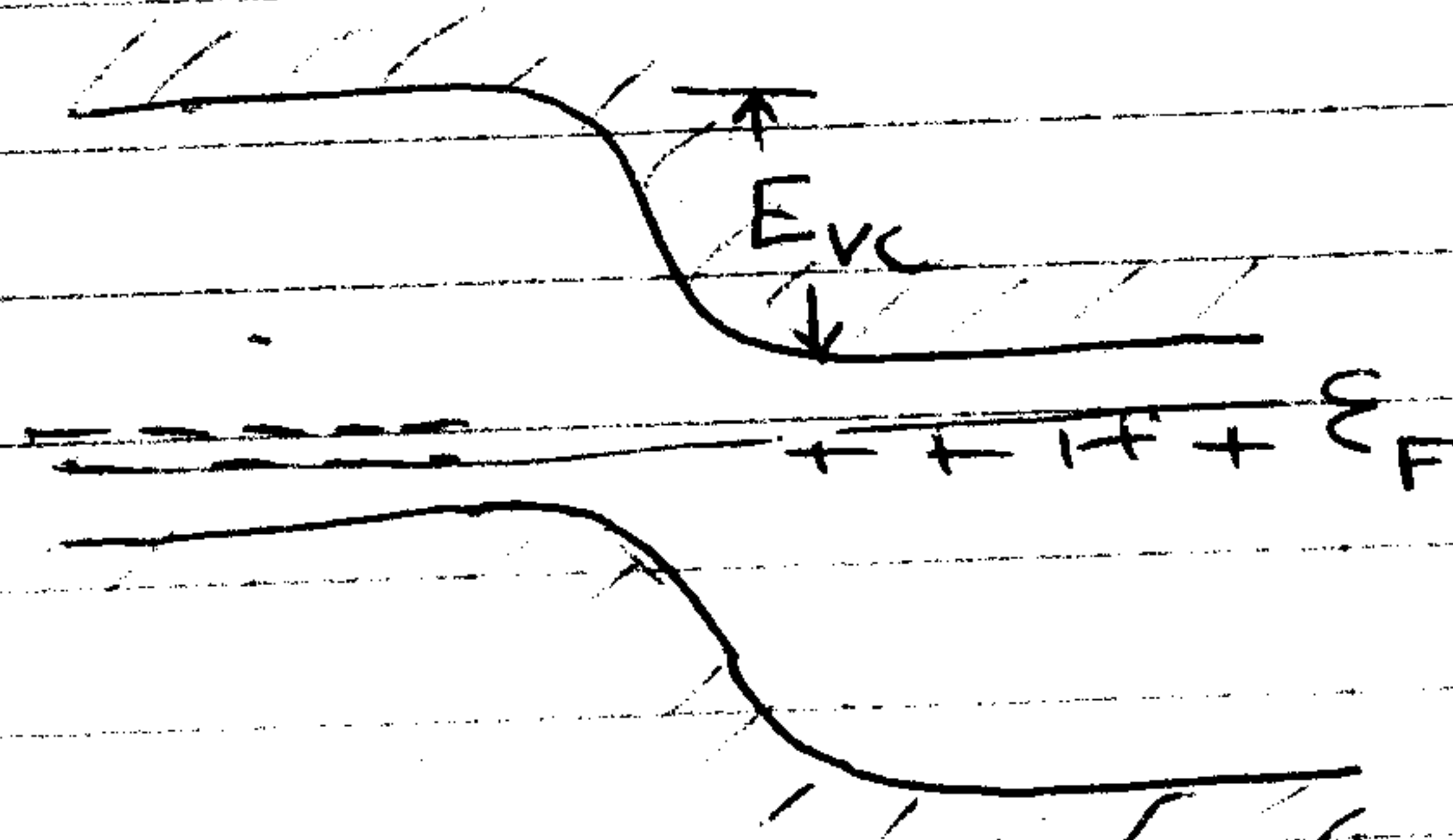
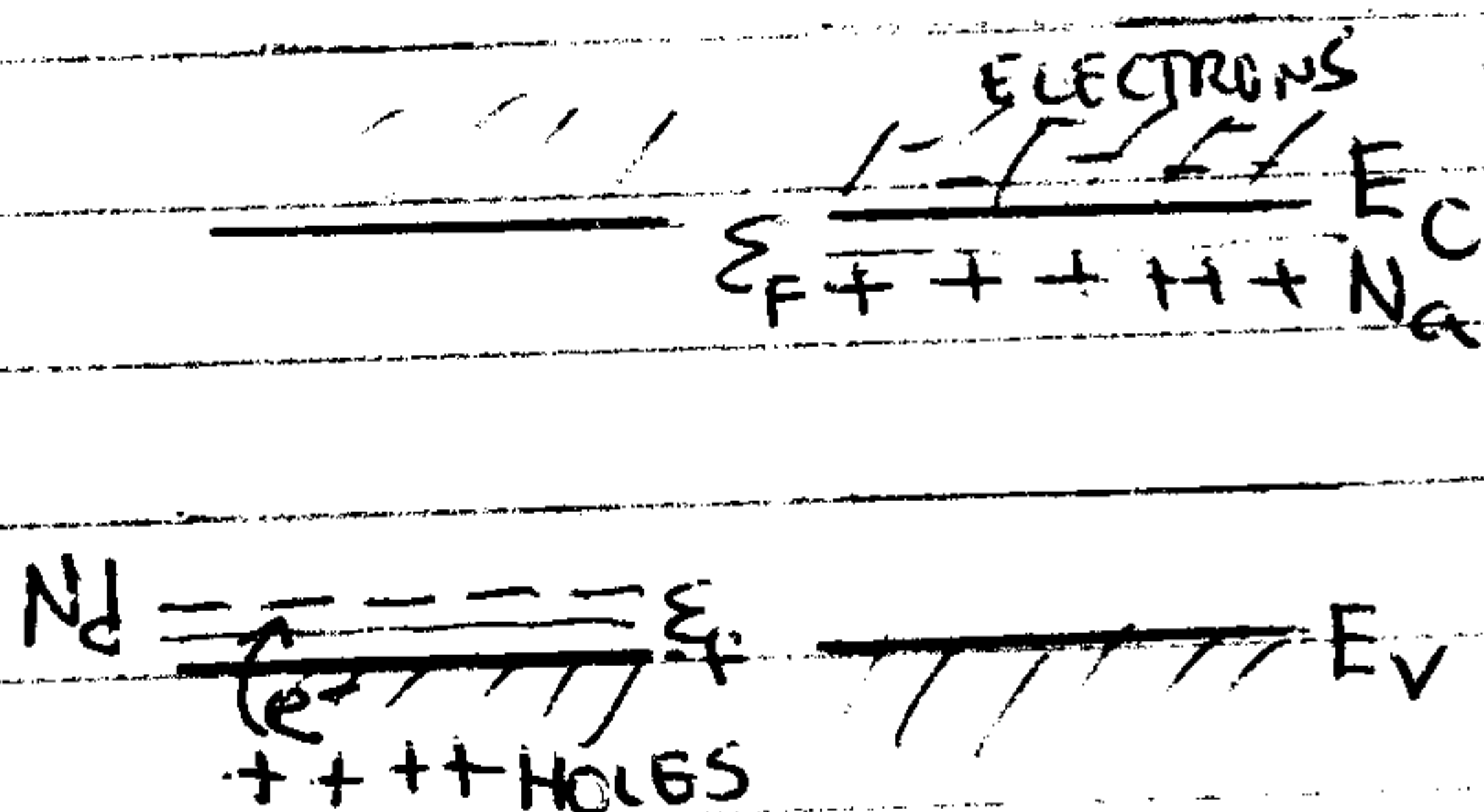
BEFORE



AFTER



minority carriers

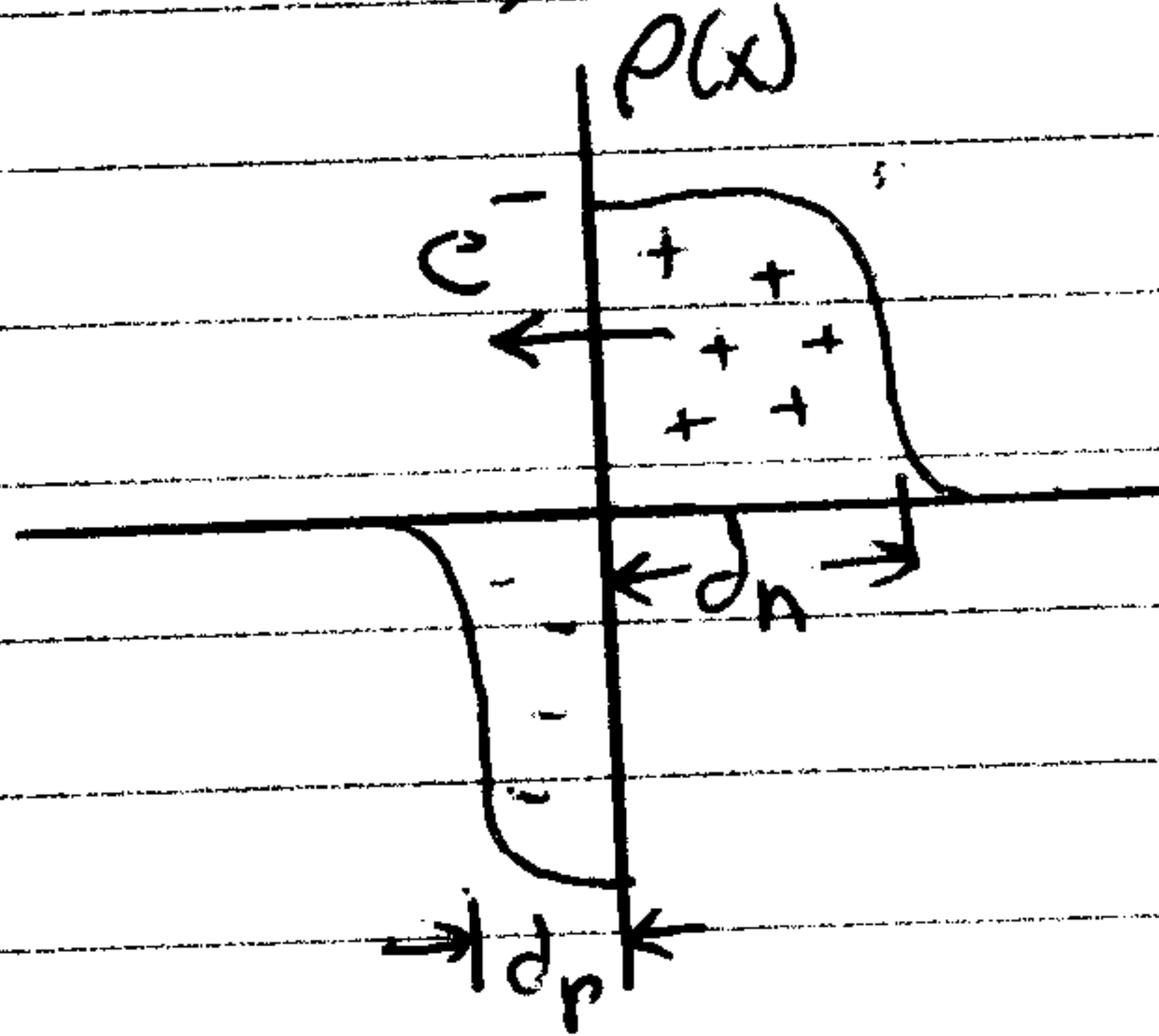


Dopants are typically added via implantation to Si:

p: GROUP III (B) ← ACCEPTORS, negatively ionized by e^- from valence band

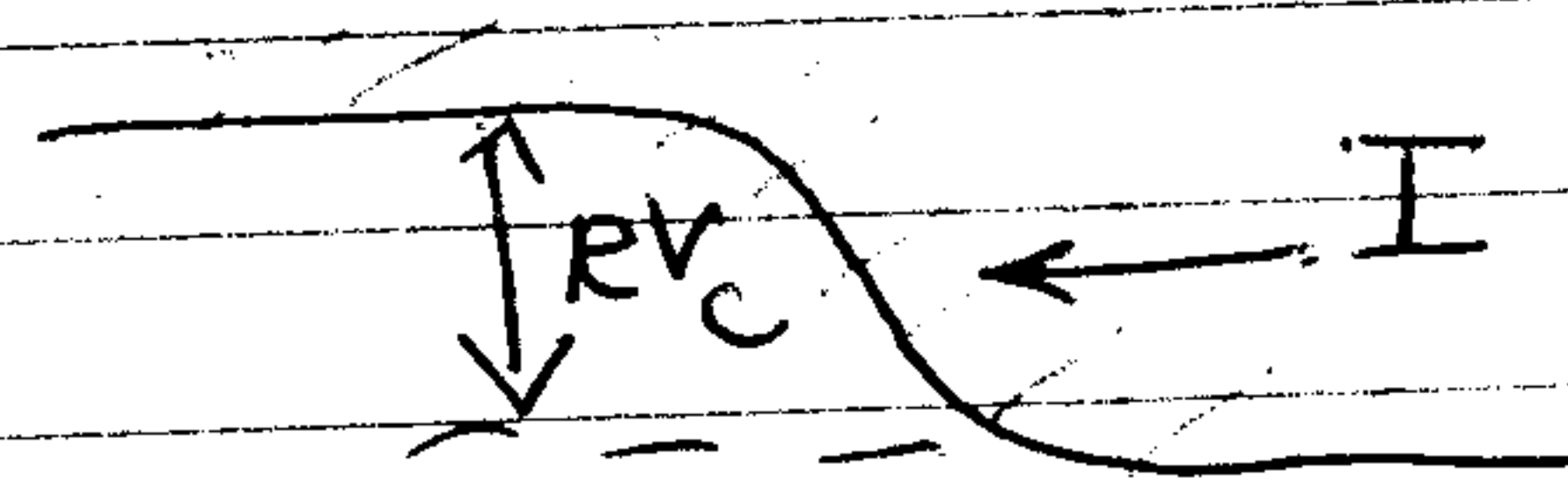
n: GROUP V (P, As, Sb) ← DONORS, donate e^- to conduction band (positively ionized)

When joined, depletion regions form at interface



d_n = region of (+) ionized donors left behind

d_p = region of (-) ionized acceptors left behind



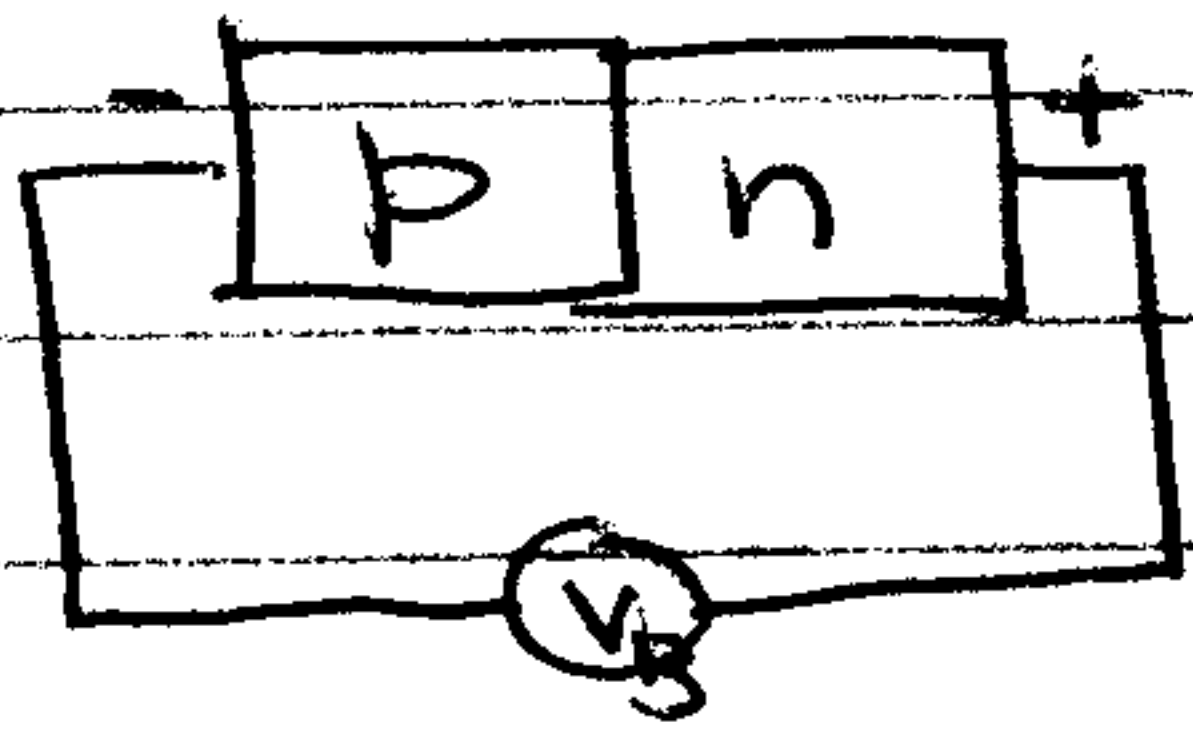
CONTACT POTENTIAL (eV_c)

- Charge imbalance in depletion region distorts bands until E_F is equilibrated

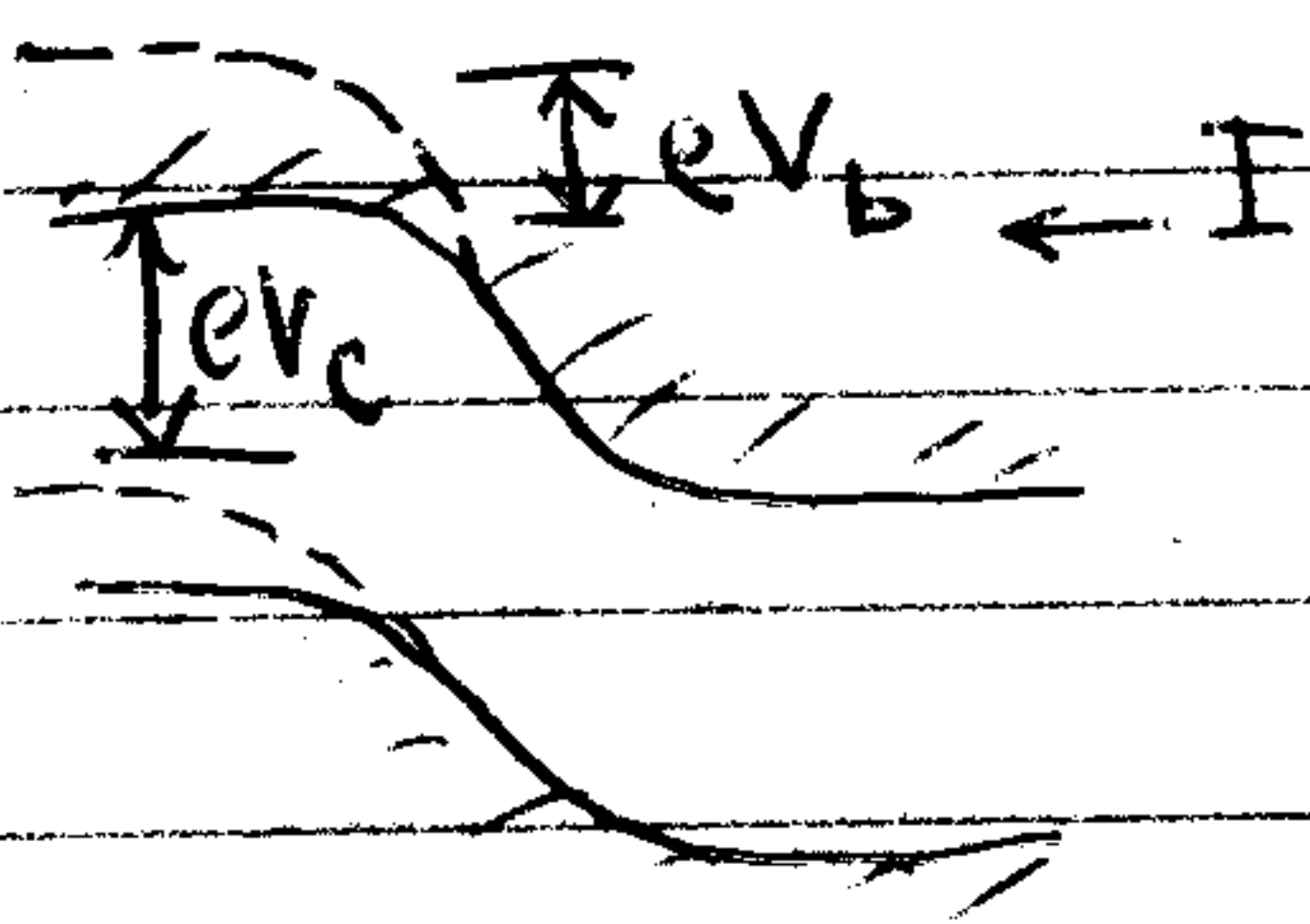
- Barrier to current flow $I = I_0 \exp\left(\frac{-eV_c}{KT}\right)$

BIAS

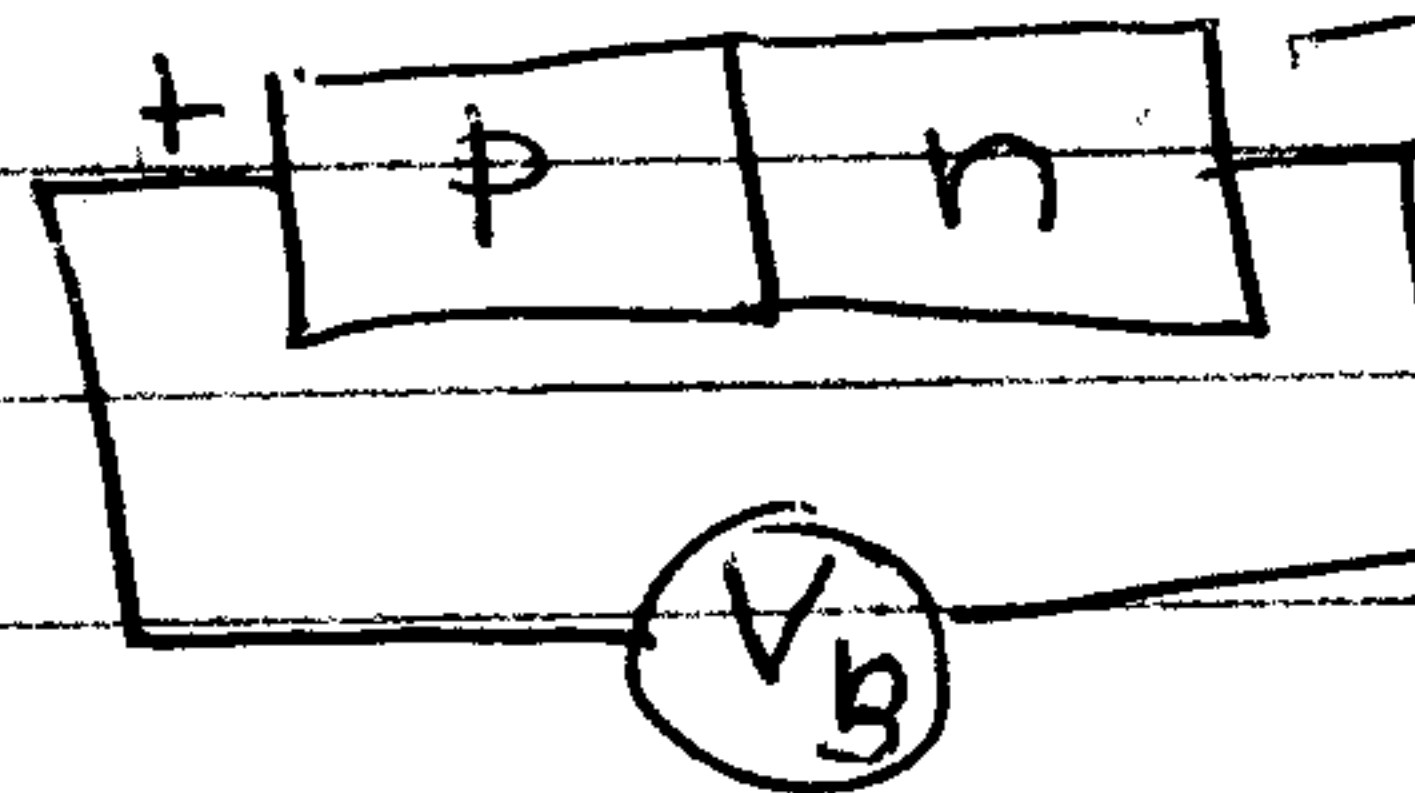
REVERSE



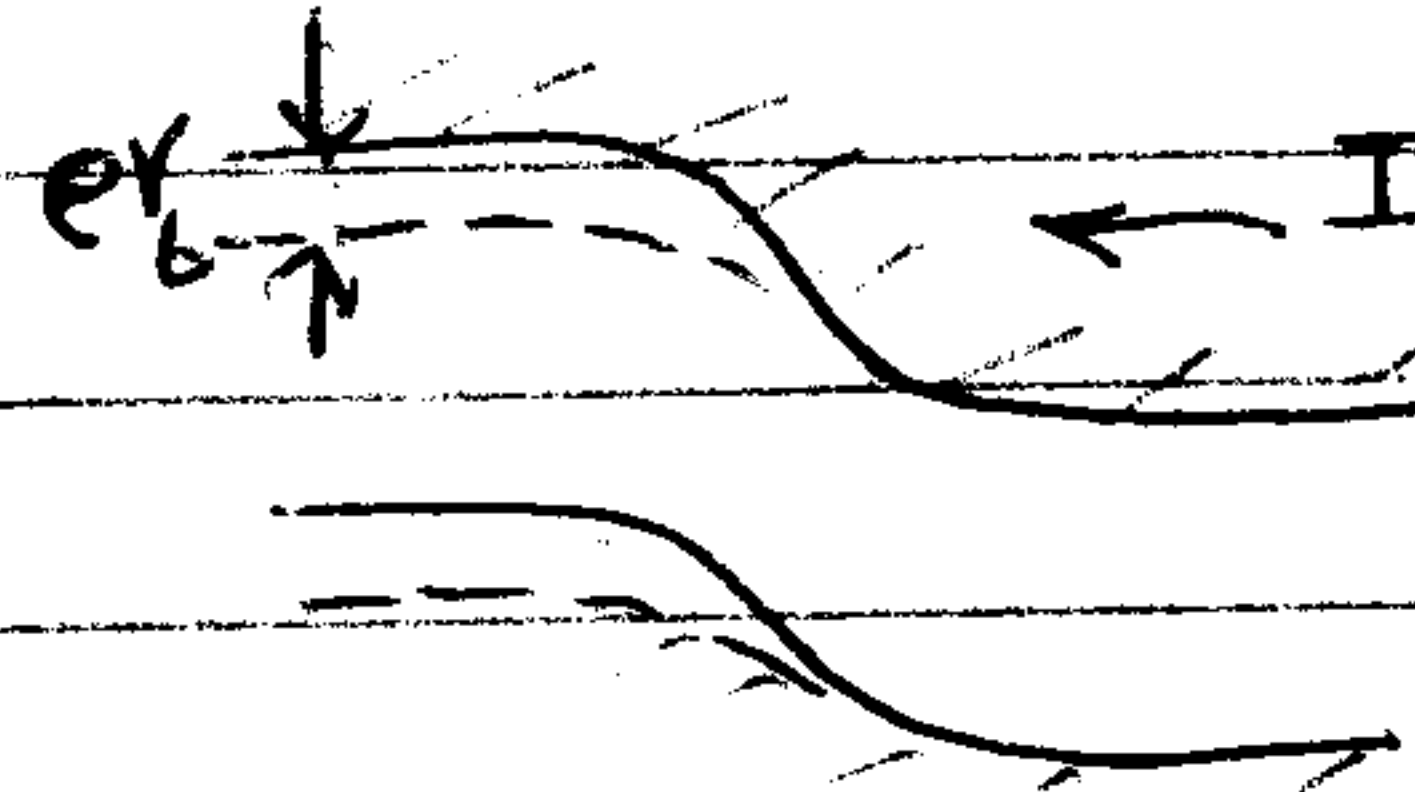
- Barrier Raised
- Inhibits current flow



FORWARD



- Barrier Lowered
- Current Flows



-I-V CURVE

