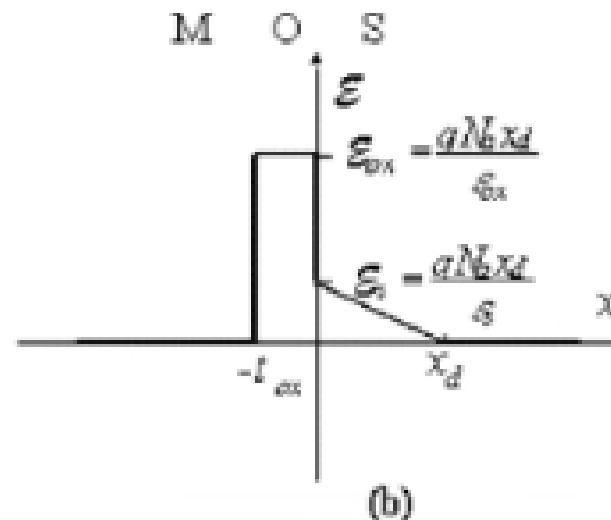
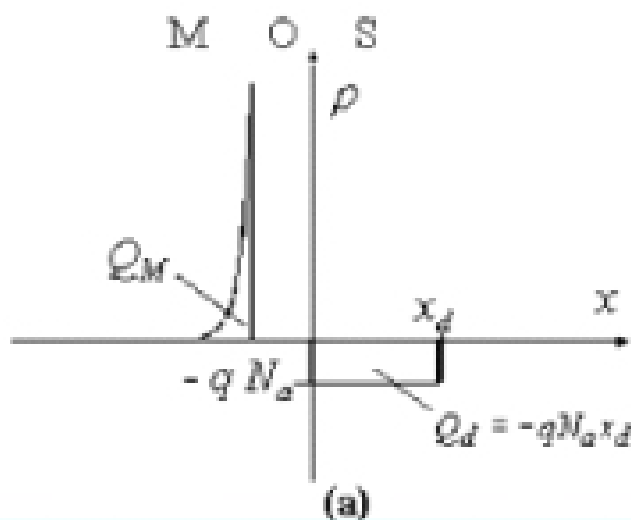


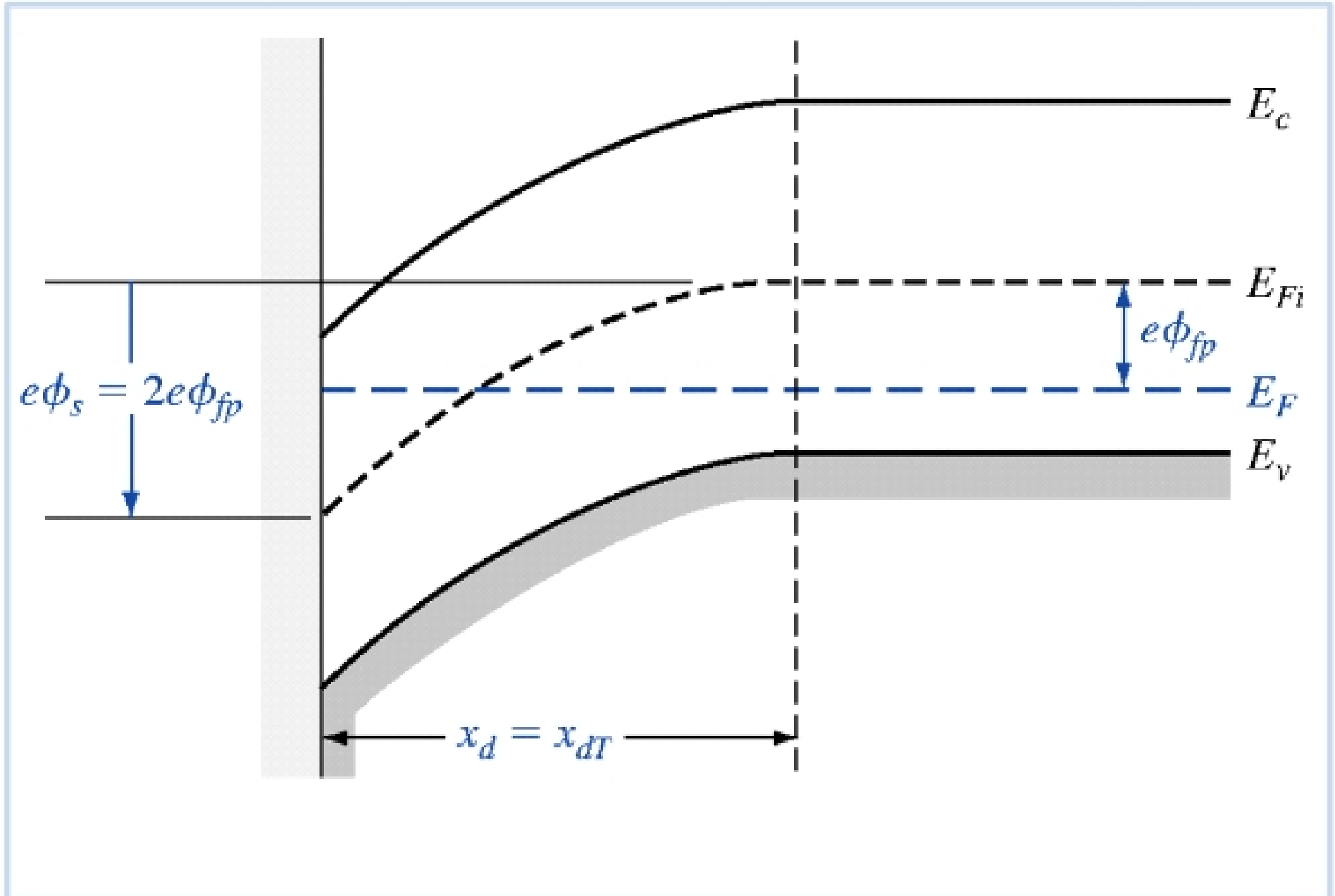
Assumptions: 1) we assume that we can use the full depletion approximation and 2) we assume that the inversion layer charge is zero

Depletion charge, $Q_d = -qN_a x_d$ $x_d = \sqrt{\frac{2\epsilon_s \phi_s}{qN_a}}$

where x_d is the depletion layer width and N_a is the acceptor density in the substrate

The electric field in the semiconductor at the interface, E_s , and the field in the oxide equal, E_{ox}







$$V_T = V_{FB} + 2\phi_{fp} + \frac{\sqrt{4\epsilon_s q N_A \phi_{fp}}}{C_{ox}}$$

What does threshold voltage depend on ?

→ oxide thickness (dielectric constant) —

→ semiconductor doping

→ metal workfunction

→ semiconductor affinity

→ bandgap

↳ material choice

↳ strain ↓

↳ quantum confinement ↑

— E_c

— E_v

