Essentials of MOSFETs

Lecture 3.6: The Mobile Charge vs. Surface Potential

Short Problem

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Assume a P-type semiconductor with the following properties

$N_A = 1.0 \times 10^{18}\ \text{cm}^{-3}$
$n_i = 1.0 \times 10^{10}\ \text{cm}^{-3}$
$t_{ox} = 1.2\ \text{nm} \qquad \kappa_{ox} = 3.9 \qquad \kappa_{Si} = 11.8$
$T = 300\ \text{K}$

and answer the following question.

1) A strong inversion layer charge corresponds to about 10^{13} electrons per cm^3. What **surface potential** is required to produce this charge?