

PN junctions in semiconductors

Part A. Electrostatics (5.0 points)

A.1 (0.5pt)
Relation:

A.2 (0.5pt)
Proof:

A.3 (1.0pt)

$$E_x(x) =$$

A.4 (1.0pt)

$$\varphi(x) =$$

A.5 (0.5pt)

Plot:

A.6 (1.0pt)

(Formula) $d_n =$

(Value) $d_n =$

(Formula) $d_p =$

(Value) $d_p =$

A.7 (0.5pt)

(Formula) $E_{\max} =$

(Value) $E_{\max} =$

Part B. Junction with external voltage (5.0 points)

B.1 (0.5pt)

$n_1 =$

$p_1 =$

B.2 (1.0pt)

Equation:

B.3 (0.6pt)

(Formula) $L_p =$

(Value) $L_p =$

B.4 (0.8pt)

$p_1(x) =$

B.5 (0.8pt)

$j_p =$

B.6 (0.8pt)

$I =$

B.7 (0.3pt)

Plot:

B.8 (0.2pt)

$I_\infty =$

$I_1 =$