

### Formulas and constants

Mass of electron  $m_e = 9.1 \cdot 10^{-31}$  kg

Charge on electron =  $1.6 \cdot 10^{-19}$  C

Planck's Constant  $h = 6.626 \cdot 10^{-34}$  J.s =  $4.136 \cdot 10^{-15}$  eV.s

$\hbar = h / 2\pi = 1.055 \cdot 10^{-34}$  J.s =  $6.582 \cdot 10^{-16}$  eV.s

1 eV =  $1.6 \cdot 10^{-19}$  J

Coulomb's constant  $k = 1 / (4\pi\epsilon_0) = 8.99 \cdot 10^9$  N.m<sup>2</sup> / kg<sup>2</sup>

Velocity of light  $c = 3 \cdot 10^8$  m/s

Energy of photon  $E = hf$

Momentum operator  $p = -i\hbar \frac{\partial}{\partial x}$

Stationary Schrodinger Equation  $-\frac{\hbar^2}{2m} \frac{d^2\psi}{dx^2} + U(x)\psi = E\psi$

Electron current through unit area for free electrons =  $nv |A|^2$  where n = number density of electrons; v = velocity of electrons; A = amplitude of plane wave.