

Numerical answers to the past exam questions:

2008-2009

Q1 d $k_{BZ}=2\times 10^8 \text{ m}^{-1}$

Q2 d(i) $\rho=4.16\times 10^{-10} \Omega\text{m}$

Q2 d(ii) $\delta k = 2.16 \times 10^4 \text{ m}^{-1}$

Q3 b(ii) 0.034 T

Q5 c(ii) 817.9 nm

Q5 d $\omega_p=5.7\times 10^{15} \text{ rad/s}$; $\lambda_p=0.33 \mu\text{m}$

2009-2010

Q1 d $\delta k = 1.52 \times 10^5 \text{ m}^{-1}$

Q3 a (iii) $l=13 \mu\text{m}$

Q4 b (i) $E_d=0.47 \text{ meV}$

Q4 b (ii) $r_d=90.1 \text{ nm}$

Q5 c (i) $\omega_p=11.97\times 10^{13} \text{ rad/s}$

2010-2011

Q1 f $n=1.14\times 10^{28} \text{ m}^{-3}$; $E_F=1.85 \text{ eV}$; $k_F=6.98\times 10^9 \text{ m}^{-1}$

Q2 c $\rho=10^{-11} \Omega\text{m}$ and $\rho=10^{-9} \Omega\text{m}$; $\tau= 1.3\times 10^{-10} \text{ s}$ and $1.3\times 10^{-12} \text{ s}$

Q4 a(ii) $a_B=9.8 \text{ nm}$; $m= 0.065 m_0$; $E_d=6.1 \text{ meV}$

Q5 b(iii) $\omega_p=5.6\times 10^{15} \text{ rad/s}$; $\lambda_p=0.336 \mu\text{m}$