

Exam 2005

Part 1

(lecturer Dr Michael Kuchiev)

Literature:

- Textbook: *Solid State Physics, Hook & Hall*
- Lecture notes on the Web <http://www.phys.unsw.edu.au/~kmy>

- Symmetry and crystal structure (Ch 1,11 Hook & Hall)
 - Crystal lattice
 - Translational invariance, Bravais lattices
 - Wigner-Zeitzi cell
 - Planes in crystals, Miller indexes
 - Reciprocal lattice
 - Relation between vectors in the reciprocal lattice and planes in the original lattice (orientation, absolute value).
 - The Brillouin zone
 - X-ray scattering
 - Bragg's law, Laue condition
- Crystal dynamics, phonons (Ch 2)
 - Simplest description of acoustic waves
 - Chain of atoms
 - Acoustic waves and optical phonons
 - The phonon
 - Heat capacity of an oscillator
 - Heat capacity due to phonons (this one is not included in the mid-session exam)
- Electrons in metals, free electron gas (Ch 3)
 - Fermi level
 - Heat capacity
 - Effective mass
 - Conductivity
 - Thermal conductivity
 - Wiedemann-Franz law
- Band Structure (Ch 4)
 - Bloch's theorem
 - Nearly free electrons
 - Tight binding approach
 - Effective mass
 - Holes