

Tfy-3.461 Materiaalifysiikka II
Exam, 9.1.2004

1. Explain briefly which experimental techniques would you use to study:
 - a) vacancies in crystalline Si,
 - b) stacking faults in metals
 - c) color centres in alkali halides. (3p)
2. What information can you get from the defects by the methods you choose above? (3p)
3. Describe the Mott model for metal-insulator transitions. (3p)
4. What is the meaning of conductance quantization? Can you explain the origin of the quantization? (3p)
5. Explain the meaning of Landau levels. (3p)
6. How does the dispersion relation for transversal electromagnetic oscillations in insulators behave? What kind of regions can you recognize? (3p)
7. What kind of excitons there are in different types of insulators? (3p)
8. Explain the quantization of magnetic flux. What kind of structures it causes in superconductors? (3p)
9. Paramagnetism: In what kind of systems it is seen? What can you say about its temperature dependence? What is the meaning of crystal field quenching? (3p)
10. What are the effects determining the magnetic domain structures? (3p)