Sample test

1. In vacuum, when the line integral of the electric field around any closed loop is zero?
A) If there is no net current flow across the area closed by any loop.
B) If the line integral of the magnetic field around any closed loop is zero.
C) If the volume integral of the magnetic field is constant.
D) If the integral of the magnetic field for any surface is constant.
E) If the volume integral of the electric field is constant.
F) If the integral of the electric field for any surface is zero.

-1	3	

2. Which is true for the RKKY interaction and the energy of the interaction?
A) The energy has a minimum if the moments are orthogonal to each other.
B) The energy is proportional to the cosine of the angle between the moments.
C) The energy is proportional to the cosine of the angle between the moment and the external field.
D) It's formula can be easily derived from the Maxwell-equations.
E) It simply describes the magnetic dipole-dipole interaction of the moments.
F) It is strongest in electric insulators.

-1	4	

3. When is the domain wall wide?
A) If both the exchange interaction and the anisotropy are strong.
B) If both the exchange interaction and the anisotropy are weak.
C) If the exchange interaction is weak and the anisotropy is strong.
D) If the exchange interaction is strong and the anisotropy is weak.
E) The domain-wall width depends only on the Zeeman-energy.
F) The domain-wall width depends only on the shape of the sample.

-2	5	

Possible elaborative questions, usually for 12 points:

1. Difference between dia-, para-, and ferromagnetism
2. Exchange interaction and magnetostatic energy
3. Zeeman energy and anisotropy:
4. Domain walls
5. Hysteresis of macroscopic samples
6. Hysteresis of nanomagnets
7. Superparamangetism
8. Data storage
9. GMR
10. AFC and Magneto-optical recording