10. Kitchen Physics (12 points) — *Eero Uustalu, Jaan Kalda.*

Tools: aluminum foil laminated brown paper bag⋆; a kitchen sponge with abrasive green side (for removing the varnish from the aluminum surface of the aluminum laminated bag to achieve good electrical contact), two sheets of aluminum foil⋆, two sheets of cushioning foam⋆, a square-shaped piece of wooden laminated plate, a sheet of kitchen plastic wrap⋆, permanent marker, scissors, micrometer, ruler, multimeter with crocodile clips. You can ask for a replacement if items marked with a star become damaged. The resistivity of aluminum $\rho = 2.7 \times 10^{-8}\,\Omega \cdot \mathrm{m}$; permittivity of vacuum $\varepsilon_0 = 8.854 \times 10^{-12}\,\mathrm{F\,m^{-1}}$.

i) *(6 points)* Find the thickness of the aluminium foil coating of the brown paper bag.

ii) *(6 points)* Find the relative permittivity of the plastic wrap.