
You can answer in English or in Finnish

1. Are the following statements true?

You have three options to be selected (Y=yes / N=no / DK = don't know). Right answer means one point (+1p) and the wrong answer one minus point (-1p). If you choose the option DK (= don't know), you will get zero point (0p). Maximum is 6p and minimum 0p in all.

- a) Distributed generation along the medium voltage feeder raise the voltage level of the feeder.
- b) European Union's 20-20-20 targets mean that for example 20 % of energy consumption in EU comes from renewable resources in 2020.
- c) Distribution System Operator (DSO) is responsible for buying electricity from wholesale market (i.e. electricity exchange)
- d) A microgrid can be determined as a segment of Smart Grid with intended island operation capability.
- e) Solar power was just in the third place in new installed power generation capacity in the EU27 in 2012
- f) One essential feature of Smart Grids is that the power flows are controllable and multi-directional.

2. Define shortly the following terms or concepts (1.5p/each)

- a) DMS (Distribution management system)
- b) Virtual Power Plant (VPP)
- c) Day-ahead (spot) market
- d) Time-of-use pricing

3. a) List the main benefits which can be achieved by "Demand Response" (3p)

- b) Compare briefly the roles of electricity retailer and DSO (3p)

4. Explain briefly

- a) why low voltage (LV) network have a significant role in future Smart Grids (3p)
- b) different roles that electric vehicles could have in Smart Grids (3p)