

Own calculator is NOT allowed to use in the exam.

EE.EES.310 Introduction to Smart Grids and Renewable Energy P. Järventausta & S. Valkealahti  
Exam 19.10.2021

---

**You can answer in English or in Finnish**

1. a) What forms/types of energy are used to generate electricity? (3p)  
b) To which forms of energy belong different sources of renewable energy? (3p)
  
2. a) How is electricity generated by hydropower plants and what is the future role of hydropower in electricity generation? (3p)  
b) Can our electricity needs be met by using only renewable energy sources? Justify your answer. (3p)
  
3. Select two or three terms which relate to each question below and which have been dealt in the course material. You don't have to take all the terms relating to the question, just select two or three to be discussed in your answer. First define these terms briefly and then answer to the specific question by your own words. Each question may have different terms. The length of the answer with the definitions of the terms can be about 300 words in maximum.
  - a) Why electrical energy and its distribution have different pricing principles? (4 p)
  - b) How the distributed generation changes the operation of distribution networks? (4 p)
  - c) How the role of electrical energy end-users can be strengthened? (4 p)