ELEC-E8413 Power Systems

Exam 14.12.2020

Write your answers in this same file. Then convert your answer file to a pdf format and submit it in return box of MyCourses. Here we have seven questions. Please answer only to five questions. If you answer to more than five questions, only the first five answered questions will be considered. This is an open book exam, i.e. use of materials is permitted.

Name of the student:

Student number:

QUESTIONS

Q1: a) Let us consider a 20 kV three phase system (line voltage 20 kV). What is the maximum instantaneous value of the phase voltage? b) in a 400 V system, three resistances are connected in delta (i.e. between phases). The power consumption in these resistances is 10 kW. How big would the power consumption be if the same resistances are connected in star (i.e. between phase and neutral)?

Answer Q1a:

Answer Q1b:

Q2: Please explain in your own words the following concepts / factors: Load duration curve, load factor, load duration time, diversity factor, coincidence factor. Explain also how these factors are related to each other and in which limits their values may vary.

Q3: Explain regression analysis in electrical load forecasting

Q4: Explain the earth fault compensation in a power distribution system. How is the size of the compensation coil selected?

Q5: Explain different factors concerning the current rating of power system components. Explain the physical mechanisms behind the different factors.

Q6: You have to define the settings of distance relays in a 400 kV system. Explain which issues you have to take into account and why.

Q7: Below you see the behavior of power system frequency in an event where a large power generating unit is suddenly disconnected and there is unbalance of demand and generation. Explain the behavior of power system frequency, and which factors affect this behavior. Explain also how primary and secondary reserves react in this situation.

The effect of power (frequency) control:

The characteristics of the power controller (droop):