Tutorial-4 (EEM 101)

1. Consider a variable speed pumped storage unit of 250 MW capacity. The rated stator and rotor voltages of the generator/motor are 15.75 kV and 3.3kV, respectively. Find the following:
   Generating mode:
   (i) What shall be the rating of the unit transformer in case of an electric grid with extra-high voltage transmission lines connected to it?
   (ii) What shall be the rating of the excitation transformer?

   Pump mode:

   (iii) How much of the speed variation in the pump/motor is required if 200 MW of surplus power is available?
   (iv) What shall be the capacity of power converters?

2. Consider a fixed speed pumped storage unit of 250 MW capacity. The rated stator and rotor voltages of the generator/motor are 15.75 kV and 300 V, respectively. Find the following:
   Generating mode:
   (v) What shall be the rating of the unit transformer in case of an electric grid with extra-high voltage transmission lines connected to it?
   (vi) What shall be the rating of the excitation transformer?

   Pump mode:

   (vii) Can we operate the pump/motor if 200 MW of surplus power is available? Justify.
   (viii) What shall be the capacity of power converters?