LUT University

Exam 21.9.2026

BH50A2200 Bioenergy and Energy Use in the Forest Industry

Scientific calculators are allowed.
Programmable or graphical calculators or other materials are not permitted.

1) List the three largest low-pressure (LP) steam consumers in a typical modern pulp mill and the main high-pressure (HP) steam producers. In addition, describe three measures that could be used to increase steam production or reduce steam consumption in the units you identified. (12 p.)

2) Describe recent trends and changes in the forest industry during the last decade. How have these affected energy consumption and energy production in the Finnish forest industry? What kind of changes can be expected in the near future? (12 p.)

3) Define shortly the following terms in connection with forest industry and energy production. (12 p.)
   a) ADt
   b) O_2 stage
   c) Sulfidity
   d) Lime kiln
   e) NCG boiler
   f) Total alkali
   g) Lignin
   h) Condensing tail
   i) Black liquor dry solids
   j) NaOH
   k) Kraft pulp
   l) Recovery boiler

4) Compare the energy production and energy use of a modern NBSK pulp mill with those of an average Nordic pulp mill. (12 p.)

5) A 1 000 000 ADt/a NBSK pulp mill plans to add a 200 000 t/a CTMP line. Estimate how this addition affects the mill's total energy balance and the main process departments (wood handling, cooking & O_2 delignification, bleaching, drying, evaporation, recovery boiler, biomass boiler, causticizing, lime reburning, paper machine, and others). Consider the impacts on:
   a) electricity consumption
   b) energy production
   c) electricity production

   Describe the direction and approximate magnitude of the changes. (12 p.)