Questions for state doctoral exam – field of study: Chemical and Process Engineering Subtopic: System engineering

- 1. Definition and calculation of physical and chemical properties of pure substances and their mixtures in simulation programs.
- 2. Material and enthalpy balances of basic unit operations (mixer, split, pipe, pump, heat exchanger).
- 3. Degrees of freedom definition and their usage.
- 4. Column separation devices (rectification, absorption, extraction) and methods of their solution (short-cut and rigorous methods), separation of multicomponent mixtures.
- 5. Identification of recycle streams and minimization of their number (M and L algorithms).
- 6. Material and enthalpy balances of ideal types of reactors (batch, continuous ideally mixed, tubular with plug flow) and multiple steady states.
- 7. Synthesis of a network of heat exchangers pinch-point methods.
- 8. Dynamic simulations and their comparison with steady state simulations.