**Chemical Unit Operations II. exam, 29/03/2018**

**Name:**

**NEPTUN code:**

**Give the meaning of all notations, including dimensions. If you draw, don’t forget to explain as well.**

1. Define the following terms:: distillation, reaction rate coefficient, reaction enthalpy, optimal reflux ratio, equilibrium stage. (15 points)
2. For the given distillation based separation of a binary mixture (known: molar flow rate of the feed, composition of feed, required composition and molar flow rate of the distillate) you have to prepare short cut calculations for a possible distillation column. Phase equilibrium is known. Please explain how will you determine the height of the structured packing (in both sections of the column) and the diameter of the column by NTU, HTU and load factor methods. Please emphasize all decision making points. Derive all equations needed, give the meaning of all symbols, give all assumptions you use!(45 points)
3. Draw a plug flow reactor and explain how it operates. What are the advantages and drawbacks of using a plug flow reactor? Set the balance equations (cooled operation). How do you determine the outlet concentrations of the reactor in isothermal operation mode, if you have a first order reaction? Derive all necessary equations! (40 points)