



Final exam questions

Subject group name: **Process Engineering**

Neptun code: ZVEGEÉEBG61

Credit points: 7

Subject in this subject group:

- **Process and Equipment of Chemical Industry (BMEGEÉEBG61)**

Program: Mechanical Engineering, BSc (2NAAG0)

Specialization(s): Process Engineering

Responsible person:

- Dr. László Hégyel, hegely.laszlo@gpk.bme.hu, Department of Building Services and Process Engineering, Faculty of Mechanical Engineering

You can check the current subject forms at the Educational Portal of the Faculty of Mechanical Engineering.

<https://oktatas.gpk.bme.hu/>

Always check the for updates at edu.gpk.bme.hu before preparing for the exam, especially if the subject group contains at least one subject from your final semester!

Valid from 01 September 2024

Dr. László Hégyel

associate professor

I. Topics of Dr. Kinga Fehér Both

1. Heat transfer. Heat transfer surface.
2. Overall heat transfer coefficient.
3. Calculation of heat transfer coefficient.
4. T vs. L diagrams in heat exchangers (parallel, countercurrent flow, different number of passes)
5. Calculation of logarithmic mean temperature difference (use of correction factor)
6. Determination of heat transfer area of a tubular heat exchanger
7. How to improve overall heat transfer coefficient (which factor has to be improved)?
8. Mass and enthalpy balance equations in the case of one-effect evaporator.
9. Multi-effect evaporators.

II. Topics of Dr. László Hégyel

1. Agitation: Purposes of agitation of liquids. Flow patterns in agitated vessels (axial flow impeller; radial flow impeller; methods of prevention of swirling flow). Mechanical power consumption of agitation (power number; Re and Fr number of agitation) in case of Newtonian liquids.
2. Sedimentation: Sedimentation regimes, determination of settling rate in free settling, concept of hindered settling. Description and operation sedimentation tank (clarifier)
3. Filtration: Filtration mechanisms. Sand filters, bag filters. Darcy's law.
4. Absorption: Application of absorption. Layout of packed column (random and structured packing); Pressure drop in a packed column; Material balance, operating line; Equilibrium curve; Calculation of packing's height – gas side / liquid side - driving force; method of transfer unit (height of transfer unit, number of transfer unit)

III. Topics of Dr. Péter Láng

1. Psychrometry: Absolute, relative humidity; Humid enthalpy, Humidity chart – Mollier, Dew point temperature.
2. Drying: Wet bulb temperature; Moisture content of wet material (dry/wet basis); Drying rate; Batchwise adiabatic drying: drying curves (temperature, moisture content, drying rate versus time; drying rate versus moisture content of dried material); Periods of drying; Heat and mass flux at constant drying rate period.