



Final exam questions

Subject group name: **Energy**

Neptun code: ZVEGEENBGEB

Credit points: 5

Subject(s) in this subject group:

- **Energy Processes and Equipment (BMEGEENBGEB)**

Program: Mechanical Engineering, BSc (2NAAG0)

Specialization(s): Process engineering

Responsible person(s):

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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 27 February 2023

Dr. Edit CSÉFALVAY

associate professor

1. Describe the theoretical circuits (Carnot, Joule-Brayton, Clausius-Rankine, internal combustion engine, cooling..).
2. Explain the Standard Vapour Compression Refrigerating Cycle, how can you choose the temperatures? (block diagram, T-s and log p-h diagram).
3. Explain the sub-cooling on refrigerating system. What is the effect of the sub-cooling on the COP of the system? (block diagram, Log p-h diagram).
4. Explain the planning process of vapour compression refrigeration system for given (t_a , t_c) external condition?
5. Which types of solar thermal power plants do you know? Compare the two most important types of CSP plants!
6. Describe the difference between solar collectors, solar cells and solar thermal power plants and show the advantages of all three technologies! How do photovoltaic cells work
7. Give the definition of lower and higher heating value. What makes the difference in between them and how? Explain the Adiabatic flame temperature in a H-T diagram!
8. Describe principals of anaerob biogas fermentation. What are mass balance principals? What major and minor components biogas could have?
9. Describe basic procedures of biomass gasification. What major and minor components syngas could have? What by-products and pollutants can be gained by biomass gasification?
10. What is the working principle of fuel cells (PEMFC)? What are the advantages and disadvantages of fuel cells?
11. What H₂ production processes do you know? Describe one in detail!
12. What are the losses in a real internal combustion engine?
13. Describe the characteristic of the ICE engines (P_e , Torque, BSFC in the function of the speed)
14. What is Cogeneration, how it works (draw the system)?
15. What is Trigeneration, how it works (draw the system)?
16. What are the differences in between theoretical and real Joule-Brayton cycle? Draw the Block diagram, T-s diagram of the cycles, present the main equations.
17. Describe the equation of Compressor input and Turbine output power, How can we calculate the thermal efficiency of gas turbine?
18. What are the impulse stage and reaction stage? Draw the velocity triangles of this stages. Describe Power and specific work of the stages