



## Final exam questions

Subject group name: **Turbines**

Neptun code: ZVEGEENNXTU

Credit points: 5

Subject in this subject group:

- **Turbines** (BMEGEENNXTU)

Program: Mechanical Engineering Modeling MSc (2N-MW0-2019)

Specialization: Thermal engineering

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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](http://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 2021**

Dr. Krisztián SZTANKÓ  
associate professor

## Turbines

1. Specifications of impulse turbine stage: design, blade cascade, stage and isentropic efficiency, additional losses, Bánki efficiency analysis, under- and over-design
2. Specifications of impulse turbine stage: partial steam inflow, negative degree of reaction formation and its avoidance, calculation of speed of sound, velocity diffraction, Laval nozzle
3. Specifications of control stage: partial steam inlet, mixing in the wheel chamber, indirect measurement of the steam state, valve positions on h-s diagram, application of impulse ring
4. Specifications of double impulse (Curtis) stage: velocity diagram, efficiency curve, specific output power, stage design
5. Specifications of reaction turbines: stage design, blade cascade, gap and collision loss and their reduction, unshrouded and shrouded blades
6. Specifications of reaction turbines: axial force and its compensation, comparison with impulse stage
7. Specifications of long blades: blade twisting, uniform stress, recirculation
8. Specifications of long blades: erosion, water collision, water separation, outflow loss, vacuum limitation, low-RPM design, application of titanium alloys
9. Specifications of wet steam turbines: measurement of steam state (by choking calorimeter), Wilson zone, moisture separation, reasons of control by throttling, spontaneous condensation
10. Calculation of pressure distribution along the turbine by Stodola constant, conditions of validity, calculation method, evaluation of control stage
11. Structure of a Package gas turbine (with explanations)
12. Aero-derivate gas turbines
13. Parameters and optima of a real gas turbine cycle
14. Airfoils of axial compressors, velocity triangles, limiting factors
15. Application of airfoil theory to compressor blades
16. Characteristics of single-shafted gas turbines, characteristic curves of compressors
17. Characteristics of two-shafted gas turbines, characteristic curves of compressors
  - a) Structure and principles of operation of micro gas turbines