Final exam questions

Subject group name: **Fluid Machinery**

Neptun code: ZVEGEVGBX01

Credit points: 4

Subject(s) in this subject group:

- **Fluid Machinery** (BMEGEVGBX01)

Program: Mechanical Engineering, BSc (2NAAG0)

Specialization: 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. Csaba Hős

associate professor

Fluid Machinery (BMEGEVGBX01)

1. Define enthalpy, shaft work and specific work for a general hydraulic machine! Give the specific work for isentropic, isotherm, polytropic and constant density case! Explain the quantities and the difference between the cases!

2. Euler's turbine equation (no derivation needed). Derive the theoretical performance (H-Q) curve of a turbomachine. Explain the losses in the impeller and the difference between the theoretical and real performance curve!

3. Velocity triangles of radial and axial machines.

4. Losses and efficiencies in a pump.

5. Flow number, pressure number. Affinity. Specific speed. Typical performance curves of radial, mixed and axial machines.

6. Axial thrust on an impeller. Possibilities of reducing the axial load.

7. Pipeline curve, operating point. Effect of revolution number change.

8. Setting a desired operating point: control valve (series), bypass valve (parallel) and revolution number change.

9. Pumps and pipelines connected in parallel and series. Finding the operating point of simple systems.

10. Cavitation, NPSH.

11. Positive displacement pumps: □p-Q, M-□ relationships (derivation). Main differences from turbomachines. Typical pressure and flow rate ranges.

12. Performance curve measurement of turbomachines: draw a sketch of a test rig and explain the steps of measurement.

13. Piston compressors (p-V diagram, multistage compressors, optimal pressure ratio).