Fluid Machinery (BMEGEVGAG02)

State Exam Questions

Lecturer: Csaba Hős, PhD, cshos@hds.bme.hu

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: Δp-Q, M-ω 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.