

Specialisation in Infrastructural Engineering III.

final exam questions

(Department of Hydraulic and Water Resources Engineering)

Hydraulics 2 (BMEEOVVAI42)

1. 1D description of steady-state open channel flow with simple (ODE of a gradually varying surface profile, types M1 to S3) and compound cross sections (calculation of energy head and discharge with the vertical splitting method)
2. Gradually and rapidly varying surface wave phenomena (wave classification, celerity of small amplitude long waves, celerity of surge waves, breaking, reflection, refraction and diffraction)
3. Transport processes and sediment motion in rivers (advection, molecular diffusion, turbulent diffusion, dispersion, suspended load and bed load)

Water Resources Management (BMEEOVVAI43)

1. Describe and explain the water management balance equation, its elements, and indicators. Draw up and explain the stochastic water balance graph! What are the static and dynamic resources and the average water renewal time for surface and subsurface water resources.
2. What are the goals of nature-based solutions in water management, and how do we try to achieve them? What is the relationship between nature-based solutions and conventional engineering solutions? Explain the concept of ecosystem services!
3. What is the goal of the Water Framework Directive (WFD)? What is the methodology for evaluating surface and subsurface water bodies, respectively according to the WFD? What are the primary pollutants resulting from diffuse loads? How do they reach surface waters?

Water Damage Prevention and Water Use (BMEEOVVA-F1)

1. Drainage works. Groundwater regulation, groundwater drainage. Hillside water management. Runoff regulation. Environmental effects of water management.
2. Regulation of gullies, streams and rivers. Planning aspects, regulation measures. Innovative river restoration measures. Nature-based solutions.
3. River barrages. Reservoirs. Diversion canals.
4. Flood protection and flood fighting.
5. Hydropower utilisation. Navigation.
6. Agricultural water use: Irrigation works. Fish ponds, fish farms.

River Basin Management (BMEEOVVA-F2)

1. Catchment investigation: Its aim, content, tools, and data sources. Possibilities to support catchment investigation with GIS tools.
2. River basin management plans based on the Water Framework Directive. The aims of WFD. Structure and the territorial units of river basin management plans. The process of river basin management planning. Integrated water management.
3. The concept and development of hydroinformatics in water management. The application of hydroinformatics for water engineering. The general process of modelling a water system.