APPLIED AND ENGINEERING HYDROLOGY

Hydrogeology Engineer MSc mesterszak

2018/19 II. félév

TANTÁRGYI KOMMUNIKÁCIÓS DOSSZIÉ

Miskolci Egyetem
Műszaki Földtudományi Kar
Környezetgazdálkodási Intézet

Tartalomjegyzék

1. Tantárgyleírás, tárgyjegyző, óraszám, kreditérték

Course Title: Applied and engineering hydrology **Instructor:** Enikő Darabos, PhD	**Code:** MFKHT720022 **Responsible department/institute:** Institute of Environmental Management Type of course: Compulsory
Position in curriculum (which semester): 2	**Pre-requisites (if any):** -
No. of contact hours per week (lecture + seminar): 1+1	**Type of Assessment (examination/ practical mark / other):** practice mark
Credits: 2	**Course:** full time

Course Description:

To introduce the measurement methods and principles of hydraulic characteristics of surface and subsurface waters; to familiarize the students with its newest tools and the modern processing methods of the measurement data. Tools, methods and organizations of prevention of water damage. To prepare student how to solve basic hydraulic measurement problems.

The short curriculum of the subject:

Overview of hydrometeorology basics. Importance of precipitation in the hydrological cycle. Determination of precipitation data characteristics, precipitation forecast systems. Flowing and stagnant waters. The place of surface and subsurface flowing waters in the hydrological cycle. Measurement of water level, water depth and water velocity in flowing waters, calculation methods of water yield. Sediment measurements and calculating methods on flowing and stagnant waters. Effects of ice phenomena on water levels and on objects on shore. Place of evaporation in the hydrological cycle. Evaporation determination methods. Hydrology of storage. Surface drainage, river training, flood control, excess surface waters. Procession of hydrological data, hydrological calculations. Publication of processed data.

Compatencies to evolve:

Knowledge: T1, T2, T3, T5, T7

Ability: K1, K2, K3, K6, K9, K10, K11, K12, K13, K14, K15

Attitude: A1, A3, A4

Autonomy and responsibility: F1, F5, F6

Assessment and grading:

Students will be assessed with using the following elements.

Attendance:	15 %
Short quizzes	10 %
Midterm exam	40 %
Final exam	35 %
Total	100%

Grading scale:

% value	Grade
90 -100%	5 (excellent)
80 – 89%	4 (good)
70 - 79%	3 (satisfactory)
60 - 69%	2 (pass)
0 - 59%	1 (failed)

Compulsory or recommended literature resources:

- Almássy E. (1977, 1988): Hidrológia-hidrográfia, Tankönyvkiadó.
- Brooks, K. N. – Ffolliott, P. F. – Gregersen, H. M. – Thames, J. L. (1996): Hydrogeology and the management of watersheds. Iowa State University Press/AMES
- Chow, V., Maidment, D., Mays, L.:Applied hydrology, 1988
- Eslamian, S.: Handbook of engineering hydrology1: Fundamentals and applications, Taylor and Francis, 2014
- Ojha, C. S. P., Brendtsson, R., Bhunya P.: Engineering hydrology, Oxford University Press, 2008

2. TANTÁRGYTEMATIKA

Applied and engineering hydrology
Tantárgytematika (ÜTEMTERV)
Aktuális tanév tavaszi félév
Hidrogeológus mérnök MSc mesterszak 2. félév, törzsanyagos tárgy

Week	Date	Curriculum
1.	2019. 02.13	Introduction of course material, syllabus, requirements and deadlines
2.	2019.02.20	Seminar – Hydrological cycle Practice – *Elements of hydrological cycle*
3.	2019.02.27	Seminar – Precipitation Practice – *Main precipitation calculation*
4.	2019.03.06	Seminar – Evaporation Practice – *Evaporation measuring and calculation*
5.	2019.03.13	Seminar – Infiltration Practice – *Canal water transport I.*
6.	2019.03.20	Seminar – Runoff Practice – *Runoff calculation*
7.	2019.03.27	Seminar – Modelling Practice – *Canal water transport II.*
8.	2019.04.03	Seminar – Modelling Practice – *Sluices, weirs*
9.	2019.04.10	*Holiday*
10.	2019.04.17	*Holiday*
11.	2019.04.24	Seminar – Applied hydrological methodts and case studies Practice – *Complex calculations*
12.	2019.05.01	*Holiday*
13.	2019.05.08	Test
14.	2019.05.15	Retake of test

3) MINTA ZÁRTHELYI

Applied and engineering hydrology

Test

1. **What does the rainfall record, drawn by Hellman's rain recorder, show?**
   a. time function of rain yield ☐
   b. time function of rain depth ☐
   c. time function of rain intensity ☐
   d. time function of rain frequency ☐

2. **Why don't the clouds fall down from the sky?**
   a. Because clouds consist of water vapour ☐
   b. Because the gravity force acting upon the small droplets of the clouds gets balanced by the drag force already at very low descent speed ☐
   c. Because the specific gravity of the clouds is lower than the specific gravity of the air ☐

3. **Which of the following is not an evaporation process?**
   a. Sublimation ☐
   b. Transpiration ☐
   c. Evapotranspiration ☐
   d. Diffusion ☐

4. **Which of the following does not directly influence open water evaporation?**
   a. Water depth ☐
   b. Water temperature ☐
   c. Moisture content of the air ☐
   d. Wind velocity ☐

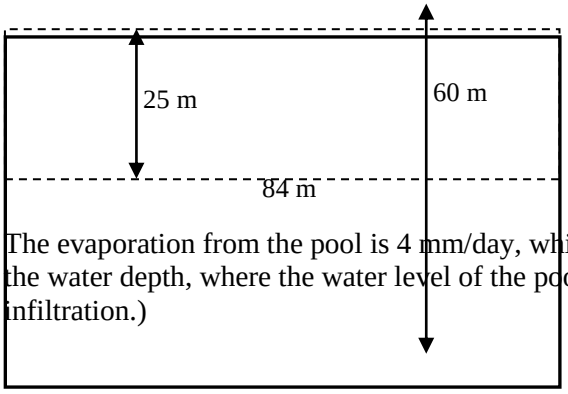
5. **Which of the following does not directly influence the rate of infiltration?**
   a. soil moisture content ☐
   b. size of the catchment ☐
   c. precipitation intensity ☐
   d. land cover ☐

6. **Which type of surface runoff occurs on a hilly area following an intense 30-minute rainfall?**
   a. saturation excess overland flow ☐
   b. precipitation excess overland flow ☐
   c. infiltration excess overland flow ☐

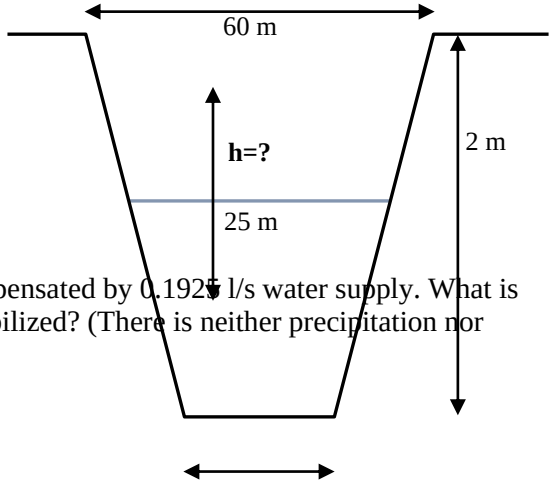
d. evaporation excess overland flow ☐

7. Given a pool with a trapezoidal cross-section:

Plan view:



Cross-section:



The evaporation from the pool is 4 mm/day, which is compensated by 0.1925 l/s water supply. What is the water depth, where the water level of the pool gets stabilized? (There is neither precipitation nor infiltration.)

h = …… m

8. Discharge is the

a. volume of water flowing through a unit area of a given section of the stream during a unit time ☐
b. volume of water flowing through a given section during a given time ☐
c. volume of wastewater discharged into a stream ☐
d. volume of water flowing through a given section during a unit time ☐

9. Which of the following statements is true?

a. The discharge of the river is lower in steady-state than in recession state given that the water levels are the same ☐
b. The discharge of the river is higher in recession state than in rising state given that the water levels are the same ☐
c. The discharge of the river is lower in steady-state than in rising state given that the water levels are the same ☐
d. The discharge of the river is lower in rising state than in recession state given that the water levels are the same ☐

10. Effective rainfall is

a. fraction of total rainfall that turns to surface runoff ☐
b. fraction of total rainfall that infiltrates and becomes available for crops ☐
c. fraction of total rainfall that infiltrates and contributes to the baseflow ☐
d. fraction of total rainfall that is intercepted by the canopy ☐

11. What is the purpose of baseflow separation?

a. Separation of spring flows from groundwater inflows during baseflow period ☐
b. Separation of baseflows from surface runoff during flood wave period ☐
c. Diverting baseflows from the stream for irrigation purposes ☐
d. Separation of the baseflow period from the flood wave period ☐

12. What is a conceptual hydrological model?

a. It is a hydrological concept that never works ☐
b. It is a result of an iterative model building with all the stakeholders involved ☐
c. It corresponds to the mental image and mathematical model of hydrological sub-processes and how they are linked together ☐
d. It is a feedback control system ☐
e. It is the concept of how best measure sediment flow in rivers ☐

13. Which of the following can be boundary conditions for a hydrological model?

a. Time series of precipitations ☐
b. Digital land use map of the catchment ☐
c. Time series of discharges at the outlet of the catchment ☐
d. Moisture content of the soil at the beginning of simulation ☐

14. Compared to lumped hydrological models, distributed hydrological models

a. do not need topographical data as input ☐
b. are less computationally intensive ☐
c. view the basin as one unit ☐
d. account for details in rainfall and basin characteristics ☐

15. Hydrological forecasting is

a. the estimation of the occurrence and magnitude of a certain hydrological variable for a certain time period ahead ☐
b. the guessing process of the prize of bottled mineral water ☐
c. the determination of the probability distribution of streamflow ☐
d. the separation of baseflow from surface runoff ☐
e. Projecting how much the prize of water will be ☐

4) MINTA ZÁRTHELYI (MEGOLDÁS)

Applied and Engineering Hydrology

Test

Megoldások

1. What does the rainfall record, drawn by Hellman's rain recorder, show?
   a. time function of rain yield ☐
   b. time function of rain depth X
   c. time function of rain intensity ☐
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2. Why don't the clouds fall down from the sky?
   a. Because clouds consist of water vapour ☐
   b. Because the gravity force acting upon the small droplets of the clouds gets balanced by the drag force already at very low descent speed X
   c. Because the specific gravity of the clouds is lower than the specific gravity of the air ☐

3. Which of the following is not an evaporation process?
   a. Sublimation ☐
   b. Transpiration ☐
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   d. Diffusion X

4. Which of the following does not directly influence open water evaporation?
   a. Water depth X
   b. Water temperature ☐
   c. Moisture content of the air ☐
   d. Wind velocity ☐

5. Which of the following does not directly influence the rate of infiltration?
   a. soil moisture content ☐
   b. size of the catchment X
   c. precipitation intensity ☐
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6. Which type of surface runoff occurs on a hilly area following an intense 30-minute rainfall?
   a. saturation excess overland flow ☐
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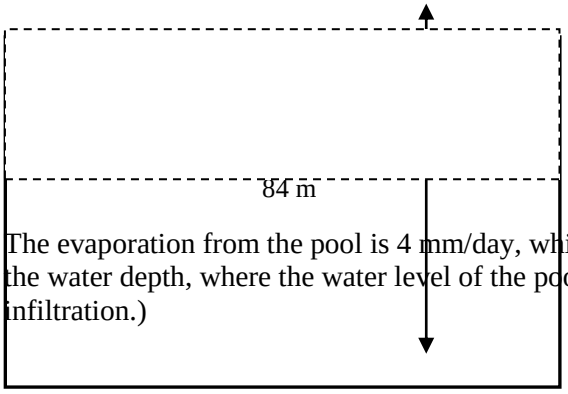

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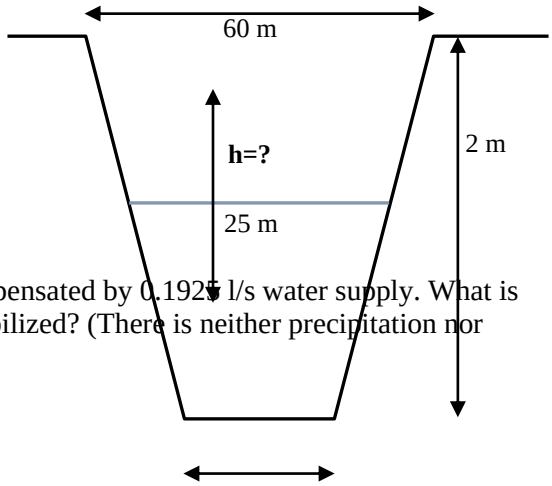

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   c. The discharge of the river is lower in steady-state than in rising state given that the water levels are the same X
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